

Anatomies of Kinship: Diversity in the Formal Structures of American Families

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Dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor
of Philosophy in the Department of
Sociology in the Graduate School
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ABSTRACT

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Abstract

American family relations are formally defined through marriage and descent but these formal distinctions are inadequate to capture the diversity of contemporary family life. Recent demographic trends have led to a diversification of family structures. Alternative, and less institutionalized ties like co-residence and informal partnerships bind an increasing number of families. Clearly defined cultural models do not yet exist for these new relationships. During these demographic changes the cultural dominance of the single breadwinner model has been challenged by women's mass entry into the labor market. New models of fatherhood have begun to emerge and conventional parenting roles may be carried out in diverse ways. A new method is needed to capture the relational processes of new family forms and the heterogeneity of conventional ones.

I argue families' formal structures can be classified by the things their members do, and the time they share with each other. Network methods sort family structures into discrete types that capture differences in lived experiences. The distinctions differentiating family structures from each another reveal meaningful information about how families are organized in the contemporary context. The four substantive papers in this dissertation each contribute a different demonstration of this fundamental argument.

First, the method is developed in a familiar context, using conventional distinctions embedded in kinship terms to move one step beyond traditional analyses of the family. Traditional categorical approaches enumerate traditionally defined relationships. We ask instead how patterns of consanguinity and marriage actually combine in American households, making no assumptions about the importance of any particular relation or individual attribute.

The three papers that follow are further from the traditional categorical approach. I don't assume that descent and marriage are necessary elements of family relationships. Instead, relationship types are defined by patterns of activities that children do with their potential kin. I apply the method to three waves of time use diaries from the Child Development Supplement of the Panel Study of Income Dynamics. Children's relationships with both traditional and new kin types are heterogeneous, yet structured. Next I develop and test a predictive model of parent-child relationships. The results show that allowing salient relationship features to emerge from time use data is fundamental to understanding how parent-child relationships differ by parents' attributes and household characteristics.

Finally, I examine how relationship types cohere into families. Children have the same type of family when their families are composed of a similar set of relationship types. The relations within most family types are qualitatively similar to each other – if one relationship is broad (or perfunctory) the others are likely to be as well.

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redefined patience again and again throughout this long process and I am forever grateful.

1. Introduction

Social scientists and the public alike are struggling to define family relationships. Families have traditionally been rooted in biological relationships that carry *social* roles – the rights and responsibilities associated with shared understandings of family. But the linkage between such socially defined roles and biological status is not given in settings where biology is only one of many possible components of family relationships¹. The last five decades have seen massive shifts in family structure that sociologists argue have loosened the connection between biology and social roles, leaving the latter ambiguous, opaque, and negotiable among both new (Cherlin, 1978) and traditional (Cherlin, 2004) family forms. In response to the gap between traditional labels and real family relationships researchers have called for studies that move away from asking what the family is, and ask instead what families *do* (Nelson, 2013; Allen et. al, 2011; Scanzoni and Marsiglio, 1991).

Formal kinship tools can be used to bridge the apparent gap between family structure and relational process. Traditional kinship methods understand families as systems of overlapping role sets. These concepts in turn can be extended to modern network methods. In this dissertation, I argue that family relations can be classified

¹ Not all biological fathers enact fatherhood and some individuals who aren't biological fathers enact fatherhood (Hook and Chalasani, 2008). The same distinction has been made between the fact of biological motherhood and the act of mothering (Arendell, 2000).

through the operating principles of “does for” and “does with” rather than the traditional principles of “is a parent of” and “is married to”. Then I demonstrate the efficacy of the approach using time diaries collected in the nationally representative Child Development Supplement to the Panel Study of Income Dynamics (PSID).

Traditional categorical approaches to family definitions predefine important relationships such as marriage or parentage and indicate whether a given household contains such a relationship and then assume that the presence of the relationship corresponds to relational processes. However, family relationships are not an immutable product of biological ties in practice. If a mother’s boyfriend and her child interact like friends, then the family’s relational processes resemble a single mother family from the child’s perspective. If, on the other hand, a social father (mother’s partner) acts like a father, then from the child’s perspective, the distinction is moot. By analyzing the pattern of interaction between the two actors, their relationship is observed directly, regardless of the traditional definition of the relationship. This definition can then be used to inform categorical distinctions of family relationships.

In this dissertation I develop inductive network models of family life. Chapter 2 lays the groundwork for the approach using conventional distinctions embedded in kinship terms – consanguinity, union status and gender to describe contemporary patterns of co-residence. Chapter 3 further develops the model to classify types of family relationships from the interactions captured in time diaries, introducing a new

application of network models to time use data, demonstrating that children's family relationships can be meaningfully classified by patterns of shared time. Chapter 4 uses the relationship types from the previous chapter and develops and tests a predictive model of parent-child relationships, to discover which traditional distinctions are most influential by employing fine-grained distinctions among traditionally defined parent types. The results demonstrate that allowing salient relationship features to emerge from time use data is fundamental to understanding how parent-child relationships differ by parents' attributes and household characteristics. Finally, chapter 5 shows how relationship types cohere into families following the methodology laid out in chapter 2.

1.1 Summary of Chapter 2

Chapter 2 develops a formal framework to capture the diversity of family forms without imposing pre-defined restrictions on the meanings of family. The work is co-authored with my advisor, James Moody. We build on old models from structural anthropology to build a formal network model of American kinship where the relations connecting individuals are derived from the distinctions made in Western kinship terminology – descent, marriage, generation and gender.

Rather than assuming that typical family structure distinctions – single mothers, single fathers, nuclear families – are meaningful, the framework allows us to ask if the absence of a spouse distinguishes the patterns of other relationships within households in practice. For example, the character of the conjugal tie is only difference between a

household composed of two married parents, and their two biological children and the same household headed by a cohabiting couple. Parents are tied to children through descent and children to each other through shared parentage. If one child had been from a previous union, the content of most of the household ties would be different. More generally the set of relational characteristics (consanguinity, marriage) that distinguish empirical structures from one another are revealed through social network methods.

This is achieved by identifying relationally equivalent role sets from the data. Social networks are constructed from sampled data using information collected about the respondent's relationships. Then the networks can be compared. Households are relationally equivalent if the same pattern of relations (marriage and descent) connect their members (White, Boorman and Breiger, 1976). In practice, few households have exactly the same pattern of relationships connecting their respective members.

Household networks with a similar relational pattern are placed into the same type, while those that have different relational patterns are placed into different types. Once these networks have been classified into different types, the researcher can ascertain the meaningful distinctions across types by working out what they don't have in common.

We use data from the General Social Survey (GSS): a nationally representative dataset that has been collected for nearly 30 years. The GSS has asked detailed questions about the nature of relationships as part of its core for the last ten years. They ask how each household member is related to both the respondent and his or her spouse or

partner (distinguishing between the two), which allows us to distinguish whether a minor child is the biological offspring of the respondent only, the respondent's spouse (or partner) only, or a shared child. We pool the data from the last ten years where these measures were available.

Ten household types emerge from the GSS household rosters. They range in character from collections of unrelated adults to extended families. The distinction between single men and women, and nuclear married families and cohabiting families provide some of the more informative distinctions. Single women are more likely to live with children than single men. While single women who live with their children are classified into a distinct cluster - separate from single women living alone, single men who live with their children are not. Single men living both with and without children tend to live with roommates and other relatives, much like single women. However, when single women live with their children they are less likely to live with other family members (except their own mothers).

Nuclear families (parents and children, isolated from other types of relatives and non-relatives) emerged as a distinct household type. Households containing cohabiting couples are more diverse than households headed by a married couple, whether or not there are children present. When there are children present, they are proportionately more likely to be stepchildren. This suggests that the ideal of a nuclear family is a

distinct family form while there is no social consensus on a household membership profile for cohabiters.

This paper develops the approach and applies it to a context where the relations (shared genetics and marriage) are known. The true promise of the approach is to allow it to define the relations themselves. The advantage is clear when categorical family roles may or may not overlap with lived experience, as traditional roles are re-negotiated and new ones emerge.

1.2 Summary of Chapter 3

This paper extends the model laid out in the previous paper to apply it to current problems defining family relationships. The previous paper defined household structure by patterns of relations distinguished by shared genetics and marriage. This paper replaces the operating principles “is descended from” and “is married to” with “does for” and “does with”.

Contemporary family forms are difficult to study because their boundaries frequently shift. Children link their parents’ households after divorce (or non-marital birth) and re-partnering creates many relationships that did not exist four decades ago. Structural changes have outpaced society’s cultural repertoire of available terminology which is often inadequate to describe these new family types. Widening the net of family terminology by expanding the number of categories that survey respondents can choose from to enumerate their families will reduce some measurement problems, but will not

solve the underlying problem. A longer list will not provide respondents or researchers an adequate vocabulary as there is no consensus on what terms should be used or what terms are missing.

Three questions in particular come to the forefront when redefining family relationships without relying on traditional labels: (1) What relationship types exist? (2) How well do relationship types conform to conventional kinship labels? (3) How do “new” relationships compare to conventional kin relationships?

This paper uses the analytical distinction between traditional labels for family relationships and the roles (or patterns of interaction) they represent to study family relationships independently from the attributes of their incumbents. I do this by analyzing patterns of shared activities between children and their contacts in within their homes by applying network techniques to data collected using time diaries. This approach allows me to ask which interactions actually distinguish family relationships on the ground, what relationships exist?

Conventional relationships may not fit easily into single, discrete relationship types. Multiple relationship types that include elements culturally consistent with a “mothering” role may emerge. Many of those “mothering” roles may be enacted by fathers, social fathers, siblings or grandparents. Moreover, biological mothers need not enact these roles. Generally, this approach allows us to perceive how well relationship types conform to kinship labels.

Non-traditional (or “new”) family relationships are easily contrasted and compared to conventional kin relationships in this framework. If a mother’s boyfriend and her child interact like friends, then the family’s relational processes resemble a single mother family from the child’s perspective. If, on the other hand, a social father (mother’s partner) acts like a father, then from the child’s perspective, the distinction is moot. By analyzing their patterns of interaction with children, we can ask how many relationships social fathers have with their partners’ children resemble married stepfathers, non-relatives, or whether they look like something new. How do “new” relationships compare to conventional kin relationships?

I use time use data from the Child Development Supplement (CDS) of the Panel Survey of Income Dynamics (PSID). The data provides a nationally representative sample of U.S. children when weighted, and it follows the sampled children for ten years, allowing comparisons within and across families and across the full range of childhood from birth to age 18. The data are ideal because they capture the phenomenon of interest (time spent with families) regardless of the residential status of the child, and time use diaries are less subject to social desirability bias than single item responses (Marini and Shelton, 1993). I use the data embedded within the time diaries (who does what with whom) to construct networks that connect each focal child to his or her contacts within their home through the multiple activities they share.

Eighteen relationship types emerged from the network analysis. They ranged from perfunctory – only including shared meals and T.V. watching to almost complete overlap in daily life. Non-conventional parents do have less structured relationships with their stepchildren than biological parents, and they are more likely to have perfunctory relationships but the single most striking conclusion from these results is: on the ground, neither “Motherhood” nor “Fatherhood” exists in the way they are typically conceptualized. Caregiving, affectionate roles exist, as do more leisure-focused family roles. However, the caregiving, affectionate roles are not occupied overwhelmingly by biological mothers (unless the child is young), and many mothers have a playful relationship with their children. Moreover, many biological parents do very few activities with their children at all, while many social parents are more involved. Focusing on the relationship itself rather than nominal distinctions allows a researcher to ask about important features of the relationship without making assumptions about who does what with whom.

1.3 Summary of Chapter 4

The biological, residential and legal underpinnings of children’s relationships with their parental figures are increasingly diverse. Rates of cohabitation, divorce and non-marital child bearing have increased dramatically in over the last five decades. In consequence, a third of children have a nonresidential parent (Stewart, 2010), and nearly a tenth (7.2%) have a either a married or cohabiting stepparent (Sweeny, 2010). Growing

evidence suggests that family structure shapes the content of parent-child interactions (Hofferth and Anderson, 2003; Mammen, 2011). Research hints at the possibility that the content of parent-child ties intersect with parental attributes to structure opportunities for children and their parental figures to interact and encourage some shared activities while discouraging others.

This study identifies the link between family structure and parent-child relationship by using patterns of interaction between children and their caregivers to derive parenting styles. I use this empirically grounded definition of parenting style, obtained in the previous paper to establish which of four parental attributes: parent-child co-residence, parental marital status, parental gender and the biological relationship between parent and child, are most important in structuring the parent-child relationship.

Parental gender, more than any other single status comes to the forefront in structuring parenting styles. Within gender, marital status is more important for structuring the probability that mothers will have an affectionate relationship with their child, whereas biological ties are more important for fathers. In both cases, the parenting distinctions are in shows of affection and positive emotion, not necessarily in who performs physical care. Conversely, marital status is more important for the probability that a father will have a physically caring relationship with their child. Non-resident married parents of both gender are less likely than their resident, married counterparts

to have an affectionate parenting style. Single non-resident mothers resemble married mothers, while single non-resident fathers are more likely to be friendly with their children than married, resident fathers. This finding is in keeping with previous work showing non-resident mothers have more frequent contact with their children than non-resident fathers.

1.4 Summary of Chapter 5

How do children's family relations cohere into families? In this paper I study families as systems of interlocking relationships (White, 1963). Systems have emergent, higher order properties rooted in the complex dependencies of their subsystems that cannot be reduced to a simple aggregation. Differentiation is the property being studied here. I discuss two different possible ways family systems may be organized. The first suggests that complimentary family roles will emerge, that family systems will be differentiated. The second suggests that families will have similar types of roles within them.

I apply the method developed in chapter two to the relation types induced in chapter three and find ten family types emerge from the 1997 data, while only six emerge in the 2002-2003 data. The structure of these sixteen family types more closely matches the similarity hypothesis. Only a single family type is characterized by specialized relations.

2. Anatomies of Kinship: Preliminary Network Models for Change and Diversity in the Formal Structure of American Families.

“Probably the only way to give an account of the practical coherence of practices and works is to construct generative models which reproduce in their own terms the logic from which that coherence is generated.” (Bourdieu, 1990:92)

“Mother is a verb, not a noun.”

-Proverb

In the face of rapid and fundamental changes, social scientists and the public alike are grappling with how to define “family” and “kinship” in a substantively meaningful way. Families have traditionally been rooted in biological relationships that seamlessly carry *social* roles – the rights and responsibilities associated with our shared understandings of family. But the linkage between such socially defined roles and biological status is not given in settings (such as ours) where biology is only part of the relationships comprising families. In fact, there is no necessary connection and roles may be completely divorced from biology (White, 1963). Since fundamental changes to family structure over the last 40 years has driven a proliferation of new family forms, we need tools that allow us to map kinship as a direct social practice that is not necessarily linked to biological understandings of kin. Here, we explore using an old tool- formal

algebraic relational models - in this new context. Our goal in this paper is to explore the promise of these approaches and, we hope, set the foundation for a new style of grounded empirical models of family forms in the future.

Traditional categorical approaches to family definitions predefine important relationships such as marriage or parentage and indicate whether a given household contains such a relationship while ignoring the larger the configuration of roles in the household (Widmer & La Farga, 2000). This archetypical reduction presupposes “the family” and pushes researchers to focus on “deviations” from it. In this vein, scholars of stepfamilies argue that nuclear families are held up as the standard, ignoring alternative family forms and important processual differences among them (Stewart, 2007). In response there have been calls for relational approaches that allow for a more organic picture of family roles to emerge (Scanzoni & Marsiglio, 1991). Our use of formal kinship tools fills this gap. By building on traditional kinship methods that understand families as systems of overlapping role sets we can extend these concepts to modern network methods.

In what follows, we first discuss the history of formal structured kinship models emerging from structural anthropology. We then illustrate how these tools can inform our understandings of current trends by discussing the implications of demographic changes for family composition in China and the US, showing that the availability of kin

(composition) implies root changes to the role system. While this example is informative for tool building and provides a clear deductive case for explication, it does not substantively move beyond our standard biology-based models. The true promise of the formal role-structure approach emerges in our second example, where we explore the possibilities of an inductive approach to derive roles-as-practiced from time-use data. The application of this approach allows “families” to emerge from the patterns of shared time, indicative of overlapping roles.

2.1 Theory: Status role & system

In 1936 Linton defined a status as “a collection of rights and duties” (Linton, 1936:113) and role as “the activation of a status” (Linton, 1936:114). Thus, a status is a position in an organized system characterized by social expectations, distinct from its occupants, and a role is the active relationship between statuses. An individual *holds* a status, and *enacts* a role Nadel (1957:11), an idea we are all familiar with in organizations: the title “assistant manager” is distinct from the individual who holds the position.

Our tacit knowledge of how a business organization works and how positions relate to one another inform the specifics of any particular organization. The concept “assistant manager” is only meaningful within the framework of this understanding. Our understanding of a formal organization rests on the simple relations of “reports to”

and “branch” – a clear rule for how authority flows in a system of offices. These two fundamental relations (“reports to” and “same jurisdiction”) define formal organization and are transposable across multiple organizations. The duty specifics of a particular office (typing, accounting, billing, etc.) are superficial fillings for the ravioli of the office: the dish is defined by the structure, not the content. Our fundamental argument is that “family” is exactly analogous: family is defined by a complex of role relations, fulfilled by the activities that comprise familial interaction and care.

Families and the kinship systems they are embedded within are also systems of positions systematically related to each other. There is no way to explain what a cousin is without reference to other kinship terms (i.e. aunt, uncle) which themselves refer to others (mother, father, sister, brother, child) rooted ultimately in the concepts “is a parent of” and “is paired with/married to.” Yet, intuitively we know this: brothers are brothers regardless of having one or ten, sisters are “like” brothers, while cousins are more similar to siblings than to uncles, but are somehow not the same. The systematic nature of these equivalencies is socially defined by the expectations built into the context for social obligations across roles.

The traditional foundation relations for kinship systems are gender and relative age (generation). Patrilineal descent systems join the child to the father’s group, matrilineal systems to the mother’s and bilateral systems acknowledges both paternal

and maternal contributions. Political membership and social rights are traditionally passed through different lines. In most societies, kinship *terminology* reflects meaningful social distinctions. In western kinship, a cousin is ego's parent's sibling's child but this designation is a product of the distinctions underlying our kinship system (gender of parent and child is irrelevant but generation is not) and "cousin" as such need not be acknowledged universally. Levi-Strauss (1947:72) discusses classificatory kinship systems which are characterized by the equivalence of same-sex siblings.

Western kinship systems do not strongly differentiate between male and female lines, nor does our terminology¹. We do, however, distinguish between full siblings and step-siblings, suggesting a distinction that is institutionalized and meaningful. Because terminology reflects social distinctions, we can use it uncover the underlying system logic.

The notation used in this work is straightforward (represents concrete social roles -i.e. "mother's brother's daughter" or "father's sister's daughter") and flexible enough to admit non-biological ties. This flexibility also allows researchers to accommodate local knowledge of relationships, such as societies that omit a generational

¹ While we do formally have "maternal grandmother" or "uncle on my father's side" the former is rarely used in everyday family and the latter, used more commonly, highlights the very lack of an everyday term.

distinction or do not differentiate father and father's father (White, 1963 pp.16, Bourdieu, 1990 pp.165, Read, 2007).

The quantity of relationship types and partitions recognized within a kinship system has a fundamental effect on how complex the kinship system can be. Simpler classificatory systems have relatively fewer roles than systems with several age classes or that distinguish unique roles several steps out. Likewise, the number of people enacting roles from any ego's perspective limits the possible role configurations. If n is the number of people in a household or family tree and k is the number of distinct roles, a household with three members can only have $3!k (=6k)$ possible role combinations while a household with four members has $4!k (=24k)$ possibilities

The beauty of the formal role systems approach is that it allows us to distinguish equivalent elements across settings and thus derive roles independent of standard labels. For example, systems that create a strong division between maternal and paternal contributions typically imply highly differentiated gender roles, yet there are cases when a person of one gender can be fully incorporated into the role associated with the other. The Nuer reckoned lineage through the patriline, transferring tribal membership from father to his children. However wealthy women could also have "wives" and high status widows were effectively men, overcoming biological constraints to continue the logic of inheritance – any children born to the wife would

belong to the lineage of the female husband (Evans-Pritchard, 1940). Robert Brain (1972) documented female fathers among the Bangwa mainly among high status women. These women could inherit wives. Any children born to these wives will inherit from the female husband just as they would from a male father. Such gender-breaking family roles give us a hint of how to make sense of the seemingly fractured world of the contemporary American family (and is implicit in our understandings of ideas like “Mr.Mom”): focus on the behavior pattern over the biology.²

While some systems assign different inheritances (political and social) from each line, others question the biological nature of parenthood. Malinowski (1932) finds among the Trobrianders that one does not become a father through sexual intercourse, but rather through providing the mother’s womb with an idea that will become the child. We can see a similar idea in the history of our own legal system with the distinction between biological fatherhood and legal fatherhood: unmarried fathers must typically apply for their legal rights and responsibilities to be recognized (Guzzo, 2009). Adoption presents another example – adopted children bear no relation to their family, yet they carry their name and are expected to act and be treated as “natural” children.

² Western kinship does not readily distinguish maternal from paternal biological or social inheritances yet maternal rights are automatic while paternal rights require legal intervention via marriage or non-marital custody arrangements.

Modern and unique situations such as surrogate motherhood and sperm donation have forced us³ to think hard about what precisely counts as “kin.”

Nonetheless, the dominant linguistic family frame for western kinship structures is biology. Thomson (2005) demonstrates how people using assisted reproductive technologies choose donors and surrogates with care to maximize genetic similarity to substantiate their claim to parenthood. The flexibility of the meaning of kinship becomes clear when parents explain the logic behind asking daughters to be their surrogate mothers, or when they ask that donors be from the same ethnic group, or when they ask their friends to provide an egg. In general, the parents place greatest importance on the biological matter they, themselves will be contributing to the child; separating the social connection between “birth” and “parent.”

The preceding examples show how deviations from typical role enactment at once challenge and uphold the kinship system. Like a transposition, these variations are “out of tune” but do not fundamentally alter the melody. For kinship to serve as a fundamental organizing feature within communities, members of that community need shared meaning, which implies a systematic logic of kin inclusion. Just as grammar

³ “us” being researchers: this is a much more vexing problem for researchers than practitioners. It is trivial for children to name the relations of their kin – a feature we should recognize as the hallmark of an underlying recognition of equivalencies that make social systems. That researchers see confusion where children see clarity is merely a recognition of different frames. The researcher is looking for a universal frame to cover all settings; while the child cares only for the consistency of his or her own local system. In a modern context, multiple local contexts might be quite distinct from each other, which is they central break from traditional structural anthropology.

guides everyday speech even when respondents are unable to specify the linguistic rules, kinship systems must have an underlying commonality to be sensible. As long as the underlying logics of kinship roles are well defined and stable, it is helpful to use a formal analysis of terminology. If, however, underlying logics of kinship have changed, an approach that views terminology as a complex behavioral grammar suggests that deviations from the terminologically prescribed behavior are grammatically incorrect. We agree with Stack and Burton who argue (1993) that there is no such thing as “the family,” rather families are localized systems that respond to local economic and cultural needs and with Bearman (1997) that a behavioral approach to define roles may be used to uncover these logics from patterns of interaction.

To help think through this logic, we make use of two important distinctions raised by Nadel (1957:12) that are relevant for the kin term system in the US and China. First he distinguishes structure from content and then goes on to argue, “One type of structuring is abstracted from interactions, the other from distributions” Nadel (1957:15). While kin term analysis focuses on how kin terms relate to each other, network analysis works backwards from interaction to *derive* kinship. These two distinctions mirror our analyses below. First we use the formal relationships between different kin *term* systems in China and the US. This makes clear the logic behind kinship systems and how seemingly quantitative changes have fundamentally qualitative effects. We then reverse

the process and describe how one could map American household structure based on what we currently know about the US kinship system with an empirical example. Finally we suggest a new method to derive behavioral roles from interactions by identifying patterns in time spent together.

2.1.1 Formal roles from kinship terms

We draw on a long tradition of formal analysis that uses a mathematical representation of a system to foster comparability. We owe a particular debt to White's (1963) An Anatomay of Kinship which outlined a method to reduce family types to their generative (primary) rules and examine the structure that results from the way the primary roles cumulate. The intuition here is had easily by generalizing traditional kinship extension terms, then reducing those to Boolean compositions in a series of family-structure equations. For example, we know that $Z=MD$; "sister equals mother's daughter" while "cousin" equals my parents-siblings-child. White's insight was that instead of compiling long sentences of such relations (MFZD – mother's father's sister's daughter), we can represent each relation as a matrix of equivalencies and induce such relations by multiplying across the sets of relations. In some cases, this multiplication yields an identity: - the spouse of my spouse is me, or the sibling of a sibling is a sibling. These final equivalencies form the boundaries of the system: where strings of compositions yield nothing (empty/full matrix) or only repetitions of relations we know.

In so doing, you can generate the entirety of a kinship system with a small number of primary relations.

Here, this allows us to identify which relationships are necessary to fully represent the modern American kinship system. Practically this is achieved by identifying relationally equivalent role sets from the data. Role sets are relationally equivalent if they are always found in households with the same role profiles (White, Boorman and Breiger, 1976). In answering the question, one can derive the underlying logic of how the system is ordered and possibly uncover social rules that even the participants are unaware of.

2.2 Applications

We will now apply some of these ideas in three cases. First, we examine how the Chinese one-child policy provides an example of the complex interplay between structural forces and kin types, we then apply a similar logic to the availability of kin in the US, and finally examine the effectiveness of using patterns of time use for identifying emergent kinship structures within households.

2.2.1 Structural limits on kin availability: Comparing the U.S. to China

The Chinese one-child policy offers a natural context to demonstrate the connection between the availability of kin and the types of family structures that can

emerge⁴. Family roles in Western kinship derive from two primary relations – “is married to” and “is a parent of”, both of which are further subdivided by gender.

Table 1: Examples of western kinship terms within one and two step neighborhoods

One-Step Neighborhood	Two-Step Neighborhood	Kinship Term
Father		Father
Mother		Mother
	Mother of mother	Maternal Grandmother
	Father of Mother	Maternal Grandfather
	Son of Father	Brother

If each term required to describe a relationship is called a step and we assume for simplicity each married couple has two children, the traditional Western kinship model implies a family system encompassing 26 people within two steps Table 1 illustrates these terminological divisions with common examples. Since the number of roles grows quickly with each new member, the number of people in a two-step neighborhood increases to 46 if each reproductive node has three children.

The Chinese kinship system expands the Western model by adding relative age and kinship order with to the foundations of “is married to” , “is parent of” and gender. This means that relations that are equivalent in the Western kinship system such as aunt

⁴ Here we are focusing on the *logic* of a one-child policy – how it changes the underlying set of formal kin ties. In practice, the policy has never been complete so the results on-the-ground are unlikely to be as clear.

and cousin, are differentiated in the Chinese system; expanding our 26 term family system to seventy-four unique kinship terms.

Limiting relations to a single child destroys two key compounding elements. First, we no longer have “older” or “younger” as a relevant partition, radically reducing a fundamental kin component. Second, the lack of siblings means that extension of any lateral kin terms (cousin, uncle, sibling) and their extensions built by compounding over generations disappears. The effects of the one-child policy on this system are profound; stripping from the community fundamental cultural elements. To the extent that kinship forms a social foundation – a scaffolding upon which to build community and social order – it is hard to understate the radical nature of such a reorganization.

Such changes, of course, are not exclusive to dramatic, externally imposed social policies. General demographic transitions, such as the current trend toward below-replacement fertility will have similar effects; but such transitions were historically generated through a more gradual endogenous process that allowed the social system to adjust. Moreover, the two processes may mutually reinforce each other by altering fertility norms even after formal constraints are removed (Merli and Morgan, 2011). While it is common to think about the economic effects of such transitions, the effects on cultural schema are also dramatic: over time entire swaths of the cultural kin-space are left null—simply unoccupied due to the lack of people.

2.2.2 Patterns in complex kin

Well-known trends in the components of families create the constraints that drive varieties of family structures. For example, cohabitation has markedly increased since 1980 (Bumpass and Lu, 2000), as has age at first marriage since 1970, so that *if* people marry they do so at later ages. There has also been a dramatic increase (that has since leveled off) in divorce, and finally non-marital childbearing has increased continuously since 1960 (Lesthaeghe & Neidert, 2006). These trends create a growing number of stepfamilies and non-residential parents, fewer births and greater residential instability. Finally, despite an increase in average age at first birth and births at advanced ages (Billari et al, 2007) increased longevity makes it more likely that older and younger generations will be alive at the same time (Swartz, 2009; Bengston, 2001).

Together these trends weaken traditional boundaries around the nuclear family defined as two married parents and their shared children. Children commonly link households after marital transitions and multiple generations are more likely to link households when children split off to form their own families. Each of these changes has been documented independently and there is some understanding of their effects on household structure and the content of relationships within the household (parenting style, sibling rivalry and so forth) and most of the focus has been on the prevalence and

diversity of stepfamilies. But these changes are systemically interdependent; shaping the system of relations we call “kin.”

In what follows, use Read’s (2007) reduction of the American system of kinship terminology into two partitions; type (common descent or marriage) and generation further subdividing these by gender. Then we record the presence or absence of each of these terms and cluster household configurations. This accounting generates several distinctly modern family types alongside a surprising array of family forms typically associated with pre-industrial society.

To bridge between formal (pre-defined, culturally understood relation terms) kin structures to inducing modern, perhaps un-recognized kin terms, we need to map families as networks directly. Kin terms are cultural representation of biological relations which can be mapped as networks. In a P-Graph analysis (White & Jorion, 1992) adults are linked to each other and their children through ties of blood or marriage and the relationships between children are implied by their relationship to the adults. Figure one provides an example of the network that results. The two types of relationships that constitute American kinship are represented as arrows and the equal sign. The thickness of the lines connecting the nodes indicate the strength of their biological relationship with the downward facing arrowhead indicating descent, the double headed arrows indicating sibships and the equal sign indicating marriage.

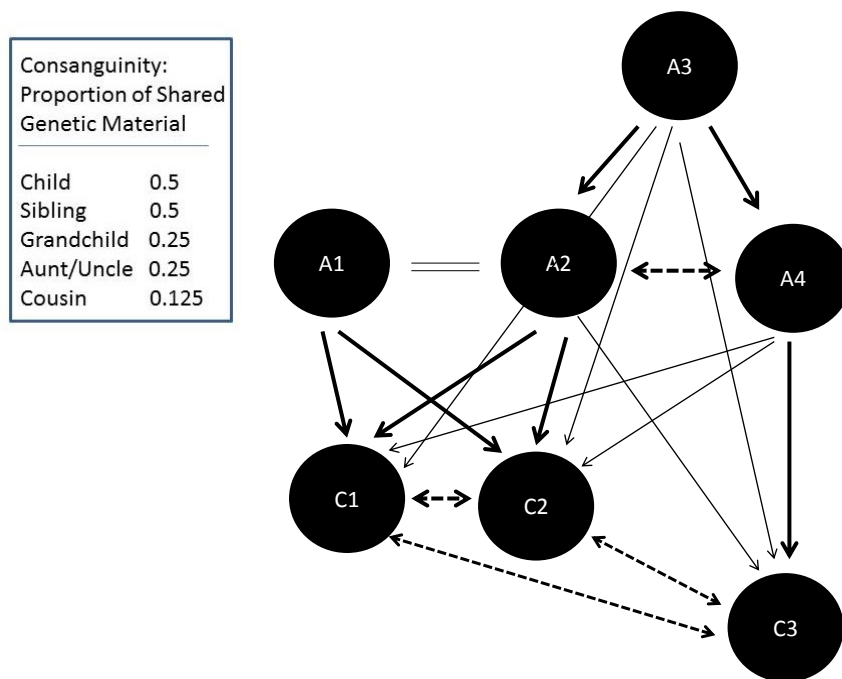


Figure 1: Genetic density in a three generation household

Figure 1 shows three generations with the grandparent at the top [A3], with two children [A2 and A4] and A2's spouse [A1]. The married couple have two children [C1 and C2] while the other adult child has one [C3] as well. The light double-headed arrows between the children denote collateral kinship – they are siblings and cousins. We use the weights of the ties to inform our measure of relatedness at a household level – what we call “genetic density”. It is a valued network density (Wasserman & Faust, 1994) measured as the average value of possible ties. Children take⁵ half their genetic

⁵ We conceptualize the genetic tie as asymmetric because children are a product of their parents' genetics.

makeup from each biological parent. As a result the most closely related people share about 50% of their genetics and only two parents can be this close to the children in the household.

$$e = ((N \text{ adults} * N \text{ adults}) - N \text{ adults}) * 0.5 + 2 * N \text{ Children} * 0.5 + (N \text{ adults} - 2) * N \text{ children} * 0.25$$

The matrix below is the weight matrix (w) that is a direct transformation of figure 1 and records the observed genetic material shared between each household member.

Table 2: Genetic weight matrix (W)

	A3	A1	A2	A4	C1	C2	C3
A1	0	NA	0	0	0.5	0.5	0
A2	0	0	NA	0	0.5	0.5	0.25
A4	0	0	0	NA	0.25	0.25	0.5
A3	NA	0	0.5	0.5	0.25	0.25	0.25

$$o = \sum W$$

Finally we divide the quantity of observed shared genetics from the possible shared genetics to obtain genetic density at the household level.

$$GD = \frac{o}{e}$$

In this case, there are four adults and three children, which generates 12 dyads among the four adults. If all three adults [A1, A2 and A4] were descended from A3, then the strength of the biological ties between the adults would all be 0.5 and the sum of the weights among the adults would be 6, (rather than the observed sum of 1). There are three children and four adults, so there are 12 dyads linking children to adults. Only two of these adults are parents to any given child, so the first two adults are assigned a weight of 0.5. The maximum weight of other related adults would be 0.25 for relations like grandparents and aunts/uncles so all weights between the remaining two adults and the three children are set to 0.25 and the sum of all the weights would be 1.5. Thus the possible weight of shared genetics in this household is 10.5. However, since not all adults are siblings nor all children of the same parents, the actual sum of genetic weights is 5 and the ratio of shared genetics to possible shared genetics in the example household is 0.47.

Biological relatedness pervades our understanding of kinship and thus the genetic density of households provides us with useful information about the field of possible family structures. In particular, identifying the genetic density allows us to distinguish equivalent roles with different biological foundations, such as comparing cohabiting households with children to married couples. This difference makes it

especially interesting to see what other kinds of roles are associated with cohabiters that are not associated with married households or vice-versa. Our idea is to paint a picture of the distribution of US families with respect to both roles and biology (within the limiting factor of household size), as these provide the foundation of any kinship system.

2.3 U.S. Context

How are families distributed across kin terms and biological relatedness in the US? The kinship term and genetic density measures defined above provide the tools we need to paint a structural portrait of the contemporary American kin system. On the one hand we're interested in putting together a picture of household configurations such that we know which kin terms tend to "go with" others (and perhaps as importantly which do not). On the other hand, we are interested in the "genetic density" of these configurations because it allows us to see how we understand the legal distinctions that go with family formations. Married households with children are indistinguishable biologically from cohabiting ones, yet the two differ socially (Bumpass and Lu, 2000). While these two may generally be isomorphic, they need not be, and differences are telling of shifts in the social system.

We start with family data from the General Social Survey (GSS): a nationally representative dataset that has been collected for nearly 30 years. The GSS has asked

detailed questions about the nature of relationships as part of its core for the last ten years. They ask how each household member is related to both the respondent and his or her spouse or partner (distinguishing between the two), which allows us to distinguish whether a minor child is the biological offspring of the respondent only, the respondent's spouse (or partner) only, or a shared child. Most surveys only ask about relations to the main respondent, which forces the researcher to infer relationships between an unrelated child and the householder's partner. Here we pool all 10 years for a total sample size of 16,971 respondents.

The number of possible role combinations in small households is bounded but large. There are 8 role combinations for a household of size 3 if the household head is married and lives with their spouse and one other person holding one of 8 non-spousal roles⁶. If the person is not married, there are 45 possible role combinations for a household of size 3. Not all possibilities are equally likely, and we can learn about what structures US households by identifying which *configurations* are most likely to occur, a problem easily solved with cluster analysis.

We begin with what we know about kinship in the US and maintain the distinction between types of relationships; legal (married/unmarried), lineal (is a

⁶ In-law relations are possible but reduce to relationship to the head when all role-dyads are enumerated. For example, if a householder lives with a spouse and parent-in-law, the role set contains {spouse, parent-child, parent-in-law-child-in-law} and if a householder lives with a spouse and parent the role set contains {spouse, parent-child, parent-in-law-child-in-law}

child/parent of) and collateral (is a sibling of), which result in 19 observed kinship classes, which can be further divided by gender, yielding 38 distinct kinship terms. The presence or absence of each of these 38 roles is recorded for each household. Limiting the model to the presence of roles, rather than a counts ensures we focus on role configurations (qualitative differences) rather than family size differences (volume).

After constructing the household rosters, we standardized the variables and calculated canonical variables which were then subjected to a K-means clustering model. The researcher specifies the number of clusters observations will be assigned to and then initial cluster seeds are chosen as a first guess at these clusters based on the variable means. Observations that are closest to the initial seeds based on Euclidean distance are added to that cluster until there are no observations remaining. A small local peak was observed in the Cubic Clustering Criterion at a 10 cluster solution and the improvement to R squared dropped off quickly as more clusters were added. The family types that were placed into the same cluster are shown below. We restricted our analysis to household types that made up at least 2.5% of the cluster to avoid enumerating a description of individual households, but we do give an account of their commonalities.

Table 3: U. S. household composition

Single Men	Single Women	Single Mothers	Cohabiting Couples with No Children	Cohabiting Couples with (Step)Children
73.5% Male alone	88% Female alone	28.5% female head, daughter	90% cohabiting couples living alone	16% cohabiting couple and shared daughter
3.3% Male with daughter only	3% female head, female roommate	30% female head, son	The remaining 10% assorted roommates and relatives, especially brothers	3% cohabiting couple and shared daughter and male other relative
4.8% Male with son only	remaining 9% assorted relatives, female head	24% female head, daughter and son		20% cohabiting couple and shared son
6.4% Male with roommate only		The remaining 18% are permutations of female heads, their children and grand-children		12% cohabiting couple, son and stepson
Remaining 12% is a combination of assorted relatives, children				13% cohabiting couple, shared son and daughter
				remaining 36% are other relatives, especially stepchildren

Table 3 cont'd U. S. household composition				
Married Couples with No Children	Married Couples with (Step)Children	Collateral Families with No Children	Collateral Families with Children	Stem Families
95% married couples 5% assorted family, esp. grand-children	25% married couple and daughter 29% married couple and son 33% married couple with daughter and son 13% assorted relatives including stepchildren	30% married couple, brother/brother-in-law 10% married couple, brother/brother-in-law sister/sister-in-law 10% married couple, daughter, brother/brother-in-law 15% married couple, son, brother/brother-in-law 10% married couple, son, daughter, brother	All 31 households are different permutations of married couples and their collateral kin/ own children and nephews	31% married couple and mother/mother-in-law 4% married couple and mother/mother-in-law, father/father-in-law 17% married couple, daughter and mother/mother-in-law 10% married couple, son and mother/mother-in-law 13% married couple, son and daughter and mother/mother-in-law The remaining 25% adds grandchildren, male parents/parents-in-law

The first five clusters contain relatively new family forms including living alone or with unrelated roommates, living with children but with no spouse and cohabiting with and without children. The second set of clusters includes more traditional family forms, including married couples with and without children and a small number of households that include extended kin.

The first cluster is composed mainly of single men and it makes up 17% of households in our sample. The vast majority of these men live alone but just under 10% of them live with either a son or daughter and a further 12% live with some other assortment of relatives, mostly their mothers and siblings. The second cluster is composed of single women. It mirrors the first cluster of single males in size, 17% of the sample is single women. But there are important gender differences. Single women are less likely to be living with roommates and other relatives. When they do live with other relatives, they are less likely to have their children among them – none of the women in this cluster are living with their own children.

The third cluster is made up of single women with children and grandchildren. This cluster is considerably large, containing over 10% of our sample. There are no clear gender differences among the children, between a quarter and a third of households in this cluster contain a mother/daughter pair, a mother/son pair or a mother/daughter/son triad. The remaining 18% of the sample are various household forms containing a daughter, her children and mother.

The fourth cluster makes up about 4% of the sample and contains generally isolated cohabiting couples. Ninety percent of the couples live alone and the remaining 10% live with other relatives, mainly brothers.

Cohabiting couples with children make up the fifth cluster. It makes up a considerably smaller portion of the sample (2.74%) than the married cluster and it is more heterogeneous. These households are proportionately much more likely to contain stepchildren.

Ninety-five percent of the sixth cluster is made up of an isolated married couple. The remaining 5% of households contain a married couple but also other relatives. The most common other relative is a grandchild. Together they make up almost a quarter of the sample. Households with a married couple and children are equally prominent. The seventh cluster contains married couples and their children – both stepchildren and shared children are included in this cluster. Slightly more households in this cluster contain only sons (29%) than daughters (24%) and more contain both (33%). The remaining 13% contain a mix of relatives including stepchildren. None of these unique configurations characterize more than 2.5% of the households in the cluster.

The eighth cluster is also composed of households headed by a married couple and including their siblings and this cluster also contains less than 1% of the sample. Rather than sisters/sisters-in-law, this cluster contains brothers/brothers-in-law and very few (2) of their children.

The households in the ninth cluster are broadly characterized by a married couple and other collateral kin. Most also contain a son and/or daughter and about half include a sister/sister-in-law and her male and female children.

Finally there a small proportion of families (about half a percentage) contain a married couple and one set of their parents. These are traditionally called stem families and are more common in preindustrial settings. The distribution of household across these ten clusters is shown below.

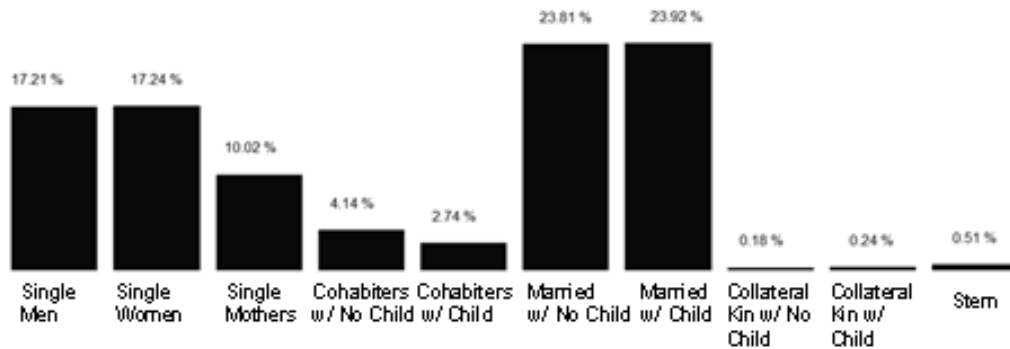


Figure 2: Distribution of households into ten clusters

This analysis may appear to contradict early studies that show far higher proportion of cohabiters, but it is important to note that this data is a cross section of the entire US and does not over represent younger people forming families.

The genetic density of each household was calculated by transforming the membership roster into a network of genetic relationships weighted by the proportion of shared genetics implied by the kinship term used to represent the relationship. As in the earlier example, relationships are directed (parents to children) and relations between children are implied. Finally the weight of realized relationships was divided by the possible weight of relationships. As plot 3 below indicates, genetic density ranges from 0% to 100% among US households with the many households sharing no genetics. These households may be couples with no children, or roommates.

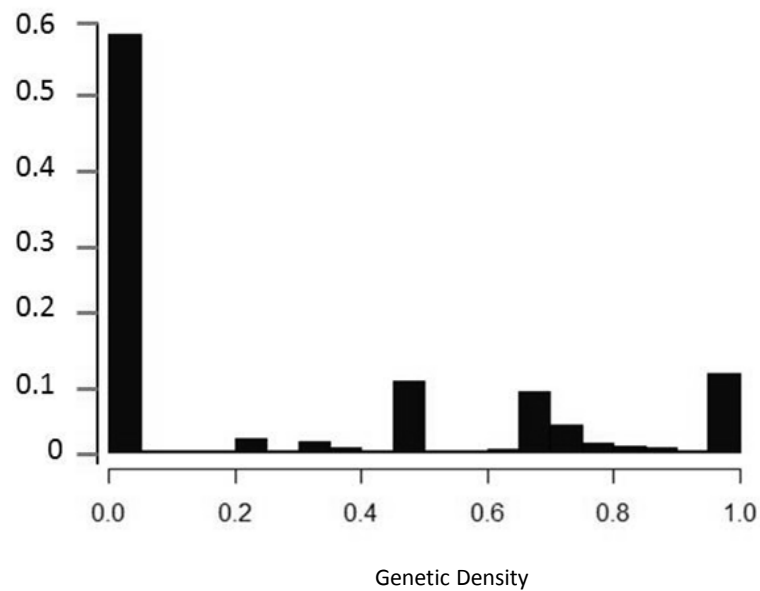


Figure 3: Distribution of genetic density across U. S. households

Figure 4 below provides the genetic density within each cluster. Households clustered together because they contained no children (the cohabiting cluster and the roommate cluster) have the lowest genetic density. On the other end, household containing no children, but containing siblings and their parents (the collateral cluster) have the highest genetic density. The range of genetic density is highest among the cohabiting with children group, this group contains both shared children and children from previous unions. It is also quite variable among the collateral kinship groups because at least some relationships imply a high level of relatedness because they share a common ancestor, while others are legally defined.

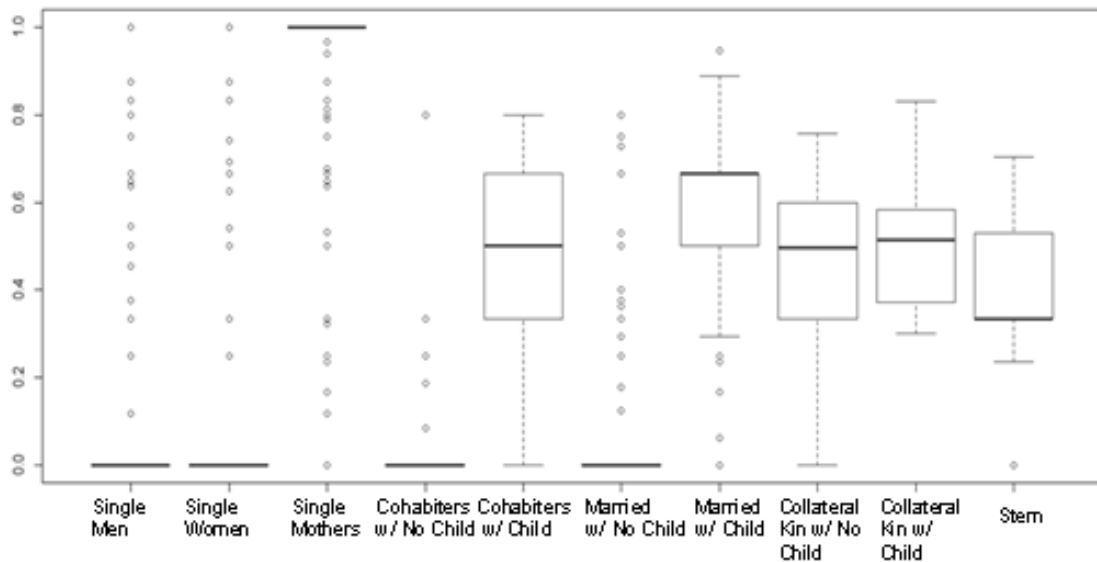


Figure 4: Genetic density by household configuration type

Only the presence of roles were used to identify household clusters – the presence of one parent-child dyad was treated the same as three parent-child dyads because we wanted to cluster role configurations. However genetic density was calculated based on all dyads in the households. As a result, the number of dyads, and thus the size of the household shapes the level of possible genetic density in each household.

To summarize our findings, differences based on gender and the legal status of adults are apparent. Single women are more likely to live with children than single men. While single women who live with their children are classified into a distinct cluster, single men who live with their children are not. They in fact, have household membership profiles that are more similar to the patterns found among single men. Single men living both with and without children tend to live with roommates and other relatives, much like single women. However, when single women live with their children they are less likely to live with other family members (except their own mothers). Households containing cohabiting couples are more diverse than households headed by a married couple, whether or not there are children present. This suggests that there is no profile for cohabiters – they are in the middle of the size distribution and the boundaries around their households are more permeable than married households.

2.4 Families as overlapping role sets

The ultimate promise of a formal network approach is to free us from relying on labels entirely, allowing us instead to use behavioral information to induce roles directly. In this last section we introduce what that process might look like. We want to use networks of shared activities to characterize role sets from an individual perspective. An individual's role set is the dual system of the set of actions they participate in throughout their day and the people who participate in these actions with them. This is a particularly appealing approach when social systems are unsettled, as individuals may be unable to clearly articulate the behavioral expectations (or implications) of a label.

Even when society is clear about which labels apply to which people, it is possible that privileging respondents' local understanding of the system to derive the rules guiding the macro structure can be misleading (Bearman, 1997). For kinship to serve as a fundamental organizing feature within communities, members of that community need shared meaning, which implies a systematic logic of kin inclusion. Just as grammar guides everyday speech even when respondents are unable to specify the linguistic rules, kinship systems must have an underlying commonality to be sensible.

In what follows, we provide a look at some basic structural features of the enacted role sets that constitute American families. Specifically, we measure the complexity and differentiation of family role sets. Role complexity is defined by the

number of different kinds of actions. For example a mother is likely to have a complex role set if she does a wide variety of things with her children and even more, different things with her friends. Role differentiation is defined by the number of different people the activity is shared with. A person who has many relations which are narrowly defined with a single focus (professional, socializing/relaxing) will have a differentiated role set.

To map the behavioral portrait of families, we make novel use of time use diaries. Time diaries record detailed data on everyday activities including who people are with and whether they were active participants or merely present (Paolisso & Hames, 2010). This allows us to construct a network of people through activities, reflecting the realized practice of family life as who-does-what-with-whom. We can then use bipartite networks of relations – not through names, but through practice – to categorize families' structure directly by shared activity.

The American Time Use Survey is a nationally representative time use study that has been carried out annually since 2003. It draws its sampling frame from the Current Population Survey (CPS). Respondents are randomly chosen from the household but must be over 15 years old. No substitute proxies were allowed. The sample was divided into four panels, each assigned to one of either weekend day and the other two divided among the week days to avoid “work-week” variation. Additional questions are asked

about “overnight” trips since those tend to be missed. This sampling frame is particularly advantageous for our purpose because it contains weekends and overnight trips and is therefore likely to catch visits between non-resident parents and their children. For most activities reported, respondents are asked “Who was in the room with you” or “Who accompanied you?” Each household member and nonhousehold child is assigned a separate “who” code. Generic categories also exist for nonhousehold family members and for others (e.g., neighbors, friends).

The time use data provides a rich record of respondents’ daily experiences. As an example, consider stylized response set derived heavily from one respondent’s diary. The respondent is an adult female who described spending a Sunday with two other people; her child and her cohabiting partner. She reports having a rather typical day. She woke up and got dressed then did some grocery shopping with her partner, then came home and made lunch. She ate lunch and cleaned up by herself and then went on to clean up the house and did the laundry with her partner. Then she spent time talking with her child. That evening she relaxed by smoking and eating dinner with her partner and watching TV with her partner and child. Finally she and her partner went to sleep. We use the seven aggregated categories provided by ATUS to simplify the following analysis: (1) Household activities, including cleaning and meal preparation, (2) Travel,

(3) Shopping, (4) Care for another household member, (5) Personal care, (6) Socializing and relaxing and (7) Eating.

The data can be read as an itinerary and this list of activities can tell that the set of things the respondent does with her partner is different from the set of things she does with her child. While she got ready for the day, ate and smoked with her partner, she helped her child. On the other hand, some activities were shared - she went to the grocery store and relaxed with both her partner and child, and both partner and child were recruited to assist with housework at some point in the day. The role of partner is manifestly different from the role of child, and moreover in the life of this respondent the partner role is more complex because together they did more different things than she did with her child. The family did many things together and so her role set is not particularly differentiated despite the wider range of things done with her partner. We focus on these two rather simple characteristics of the role sets embedded in their networks that summarize important features of their day-to-day lives.

We represent the respondents' alters and their shared behaviors as a bipartite network to facilitate further analysis. A bipartite network represents the duality of persons and groups (Breiger, 1974; Feld, 1982) by mapping implicit social ties. A network is bipartite if there are two sets of nodes (alters and behaviors) where all ties are only found between sets (Wasserman and Faust, 1994). The main advantage of adopting

this framework is that statistics developed for use on traditional one-mode networks can be modified and applied to two-mode networks. Figure 6 is the bipartite representation of the selected respondent's day. The respondent's alters are represented along the top and the activities she does with them are listed in the bottom. Alters are connected to activities but not directly to each other.

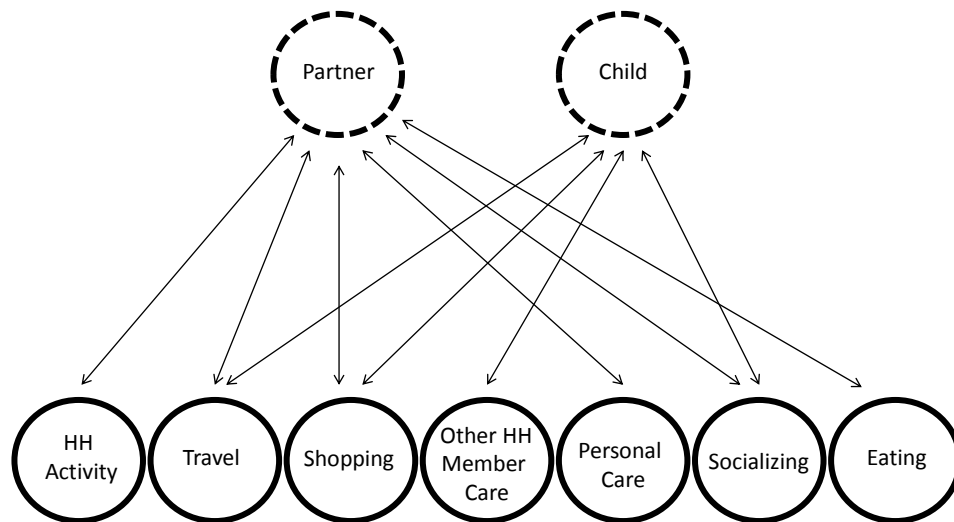


Figure 5: Bipartite representation of respondent's day

We use this representation of time use networks to calculate statistics for all the respondents in the next section. We operationalize the complexity of each respondent's role set by taking the average number of unique activities they report doing with each alter. This measures the average complexity of the respondent's role set. We use the Jaccard dissimilarity index (Oksanen, 2012) of the respondent's alters to measure role differentiation. The Jaccard index is a measure of dissimilarity between a pair of vectors. It ranges from 0 to 1 and is higher when the respondent's alters have different activity sets and lower when they do more of the same things with the respondent.

We begin by analyzing role set complexity by age in the first panel of Figure 6 below. On average, respondents report 3.5 distinct actions with each alter. While the differences are minor, middle-aged people have the most varied interactions, followed by the young and the elderly respectively. As shown in the second panel, women have slightly more complex role sets than men. Finally, the presence of children increases role complexity by half an action, this is a significant change because the unique actions are averaged over all alters⁷.

⁷ Gender and child differences are statistically significant at conventional levels and remain significant when all variables are added to the model. The age contrast between 65+ and middle-age are significant. In addition to the variables on the figure, we control for the number of social actions the respondent reported overall and the number of people the respondent reported interacting with overall.

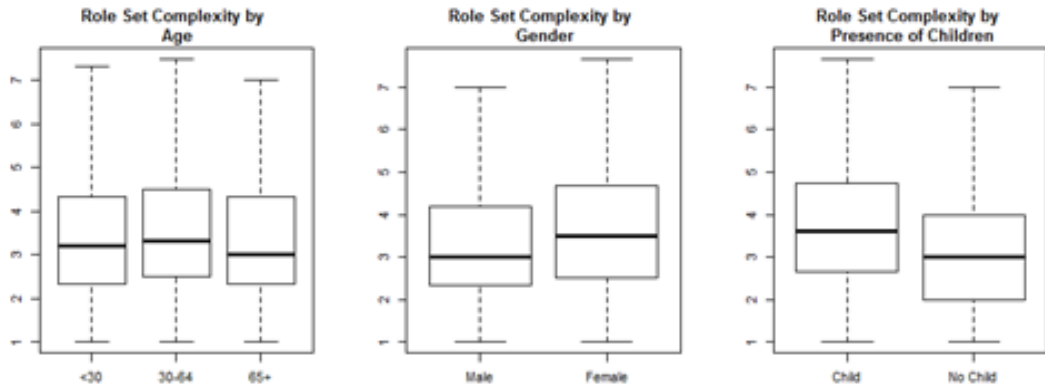


Figure 6: Role complexity by respondent characteristics

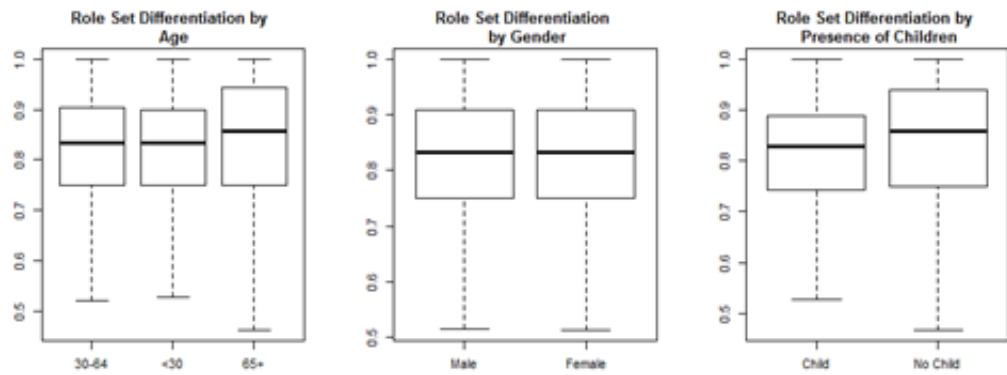


Figure 7: Role differentiation by respondent characteristics

Next we turn to role differentiation in Figure 7. The first panel indicates that role sets have more overlap among young and middle aged respondents. Respondents over

65 years old have more differentiated roles, suggesting they are more likely to specialize in who they do things with. The second panel shows that there is not much difference in role differentiation by gender. Finally children decrease differentiation⁸.

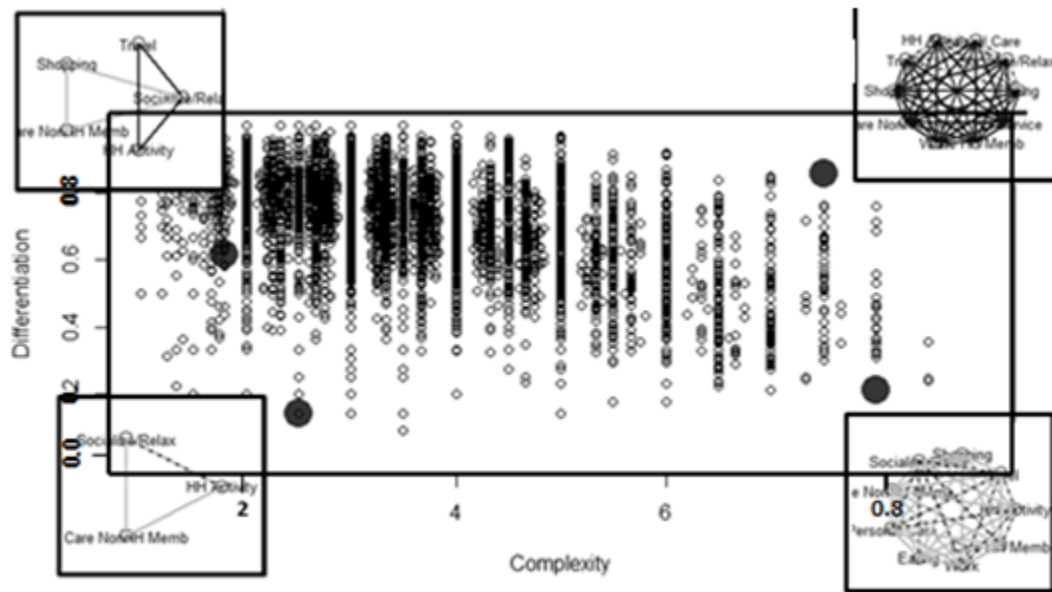


Figure 8: The relationship between role complexity and differentiation

Gender differences in both complexity and differentiation are small. However, the roles in women’s daily lives on average entail more activity than the roles in men’s daily lives. Nonetheless the roles women enact are as similar to one another as men’s are. Children’s needs structure their caregivers’ actions, requiring a complex set of

⁸ Age and children differences are statistically significant at conventional levels, however age drops from significance when the presence of children is added to the model.

caring actions. On the other hand the presence of children raises expectations of spending “quality” time together which would decrease the differentiation of roles in the household.

To get a sense of the range of role sets, we array them by complexity and differentiation in Figure 8 above. This space defines a field of possible experienced roles. A “main diagonal” flows along the general negative correlation, anchored at one end by highly complex but low differentiation networks (lower-right) and highly differentiated but low complexity networks in the upper-left.

Off this diagonal, low complexity is coupled with low differentiation and high complexity is coupled with high differentiation. We argued above that kin-type relationships are relatively highly structured. Relationships outside the bounds of kinship (“friends” or “coworkers”) may be less complex and differentiated if they do not include the complex demands of kinship. If, for example, most of the social things a person did were within one highly circumscribed social setting like work or if the relationships they had were less structured and focused around a single activity like casual friendships and acquaintances the relationships would entail more unidimensional activities. We expect then, that while not all non-kinship relationships will be simple or undifferentiated, people with role sets with low differentiation and complexity are less likely to be kin-based.

Respondents who named more non-kin alters in their daily interactions are more likely to have undifferentiated and non-complex role sets, while respondents who interact with children are more likely to have role sets that are both more complicated and more differentiated than others.

2.5 Conclusion

Current research uses kinship labels as a proxy for relationships, but the growing decoupling of kinship terminology from relationships, and the emergence of new kinds of relations that lack terms, suggest a revision of that practice is in order. Here we (re)introduced an old framework: by extending the logic of traditional kinship studies to contemporary social network techniques we suggest a formal, inductive approach to uncover patterns of family membership. This approach allows us to truly leave behind comparisons to the nuclear family. If the social networks that make up alternative family forms overlap in unique ways, we can see the multiplicity of logics that makes up families and then understand them on their own terms, situated in particular economic and cultural settings.

Early anthropological methods to uncover the kinship systems of foreign cultures using systems of kinship terminology have fallen out of favor because they are seen as static and structurally deterministic, often implying that alternative behaviors are dysfunctional or deviant. We argue that the fundamental logic of these methods is

valuable to understanding families as they are today, and if taken as representative of the constraints of localized social systems – rather than normative universals – offer a potentially powerful tool for mapping family diversity across the US. Without assuming a *single* logic, we suggest that family systems develop out of particular social, cultural and economic environments each operating according to their *own* logic.

Since traditional models of formal ties in families rest on the very elements undergoing change in our current age, we need a way to map roles that is independent of the family names we often rely on. Here, we turn to social practice: roles are characterized by repeated interactions, so we can induce such relations by looking at how people spend time with each other. This novel approach to family networks through restructuring time use data extends early anthropological methods *to families as they are experienced*. It provides an inductive approach that builds relationship categories from interaction, rather than assume a relationship's presence through the name. The theoretical payoff is the development of a general explanation of kinship variation as social practice that is not necessarily linked to shared genealogy, allowing the researcher to compare respondents' family networks across multiple relation types. Hence the modern family context is characterized by myriad solutions to local structural problems, generating a wide array of kinship forms. In contrast to mid 20th-century anthropology models, we live in a world characterized by multiple family forms, and thus a need for

multiple kinship anatomies. While the work here is a first-step, we think the approach presented here holds deep promise for understanding complex distributed families.

3. Anatomies of kinship: Children's family relationships from time diaries.

Social scientists and the public alike are struggling to define family relationships. Over the last half century there have been fundamental changes to family structure in the U.S. and a proliferation of diverse family forms (Scanzoni, 2001). Divorce trends have increased dramatically before levelling off (Raley and Bumpass, 2003), and non-marital childbearing has increased dramatically since 1960 (Lesthaeghe and Neidert, 2006). More recently, cohabitation has markedly increased (Bumpass and Lu, 2000).

Together these structural changes have caused an increase in previously uncommon relationships that carry uncertain behavioral prescriptions (Cherlin, 1978), and traditionally defined roles are carried out in diverse ways (Cherlin, 2004). Not all biological fathers enact fatherhood and some individuals who aren't biological fathers enact fatherhood (Hook and Chalasani, 2008)¹. As a result, current terminology is not always a faithful representation of family relationships: it may be inadequate to address new or previously uncommon relationships while obscuring internal heterogeneity within traditional relationships.

In response to the gap between traditional labels and real family relationships researchers have called for studies that move away from asking what the family is, and

¹ The same distinction has been made between the fact of biological motherhood and the act of mothering (Arendell, 2000).

ask instead what families *do* (Nelson, 2013; Allen, Blieszner and Roberto, 2011; Scanzoni and Marsiglio, 1991). Sociologists have examined how children spend time with parents, stepparents, social parents and siblings but they have not yet leveraged their findings about family processes to inform categorical distinctions and bring them back in line with how family relationships are experienced.

Three questions in particular come to the forefront: (1) What relationship types exist? (2) How well do relationship types conform to conventional kinship labels? (3) How do “new” relationships compare to conventional kin relationships?

This paper uses the analytical distinction between traditional labels for family relationships and the roles they represent to study family relationships independently from the attributes of their incumbents. I do this by analyzing patterns of shared activities between children and their contacts in within their homes. This approach allows me to ask which interactions actually distinguish family relationships on the ground, what relationships exist?

Conventional relationships may not fit easily into single, discrete relationship types. Multiple relationship types including elements culturally consistent with a “mothering” role may emerge. Many of those roles may be enacted by individuals traditionally labelled fathers, stepfathers, siblings or grandparents while biological

mothers need not enact these roles. More generally, I ask how well relationship types, derived from interaction patterns conform to traditional kinship labels?

Non-traditional (or “new”) family relationships are easily contrasted and compared to conventional kin relationships in this framework where relation types are derived from patterns of interaction. If a mother’s boyfriend and her child interact like friends, then the family’s relational processes resemble a single mother family from the child’s perspective. If, on the other hand, a social father (mother’s partner) acts like a father, then from the child’s perspective, the distinction is moot. By analyzing their patterns of interaction with children, we can ask how many relationships social fathers have with their partners’ children resemble married stepfathers, non-relatives, or something new. How do “new” relationships compare to conventional kin relationships?

This paper proposes to answer these questions using a method developed to locate roles from multiple networks, each containing a different type of interaction (Mandel, 1983), which I’ve modified for use with time diary data. First I place the problem – how can we define family relationships – into theoretical context. I provide a brief literature review summarizing what is known about conventionally defined family relationships (relationships defined by shared genetics and marriage). I turn to the current approach, in the methods section arguing that formal, network methods are

ideal to allow family relationships to emerge from patterns of interactions between children and their caregivers and peers. I elaborate Network terms and provide a detailed example of the approach. Finally, I introduce the data and apply the method to the problem at hand, describing relationships that emerge.

3.1 How conventionally defined kin “do” family

3.1.1 Incomplete institutionalization among re-partnered family relationships

Contemporary family relationships are difficult to define because they cut across and recombine traditional boundaries of the kinship system: shared genetics, co-residence and marriage. Children link their parents' households after divorce or a non-marital birth and re-partnering creates many relationships that did not exist in great numbers four decades ago. When new partnerships are formed within these households, step relationships that legally resemble traditional in-law relationships are created along with them. In his pioneering argument Cherlin (1978) argued that compared to first-marriage, nuclear families, stepfamilies, which at that time were mainly created through divorce and remarriage, are incomplete institutions.

Cherlin (1978) argued that several cultural, institutional and interpersonal challenges arise from the inclusion of a stepparent and stepsiblings. At the cultural level, many roles within stepfamilies remain nameless, reflecting a lack of cultural guidelines for action and making these roles difficult to think about. For example, there is no

culturally agreed on label for ex-husband's wife. Daily interactions between people in these roles have to be negotiated daily and on a case-to-case basis. Institutional guidelines in schools, hospitals and even the legal system outlining who has rights to take responsibility for a child apply to first-marriage families but exclude stepparents, who may in practice be actively involved in the child's life.

3.1.2 Incomplete institutionalization among conventional family relationships

Conventional family forms are not immune from the effect of structural change. Family researchers have argued that the marriage and childbearing have decoupled among unmarried women (Smock and Greenland, 2010), and married women (Hayford, Guzzo and Smock, 2014). These findings add weight to the claim that the meaning of marriage has changed over time (Gibson-Davis, Edin and McLanahan, 2005). Cherlin (2004) argues that the changing meaning of marriage has deinstitutionalized the traditional husband and wife roles along with the role of children in their parents' lives. The mass entry of women into the labor force has also challenged traditional mothering and fathering roles (Raley, Bianchi and Wang, 2012). These perspectives raise the possibility of opaque and ambiguous expectations arising from new structural contexts. The result is the potential for more fluid, less distinct types of relationships in practice.

3.1.3 Family relationships of “traditional” kin

Current approaches may be inadequate to provide a relationally complete picture of the family roles that exist because of the rift between traditional labels and real life relationships. Research employing time use data offers a potential means to bridge the rift, by focusing on what people do together but in practice the full potential has not yet been realized. The relationship itself is only partly studied because activities are forced into pre-constructed categories that reflect the researcher’s substantive interest rather than allowing behavioral distinctions to emerge. Additionally each activity is typically studied in isolation (Mammen, 2011), or summed to reflect total parent-child contact (for examples see Sandberg and Hofferth, 2001; England and Srivistava, 2013). Both techniques reduce the complexity of parent-child relationships to a single dimension.

Because current research does not allow the full complexity of relationships to emerge, it cannot fully tell us how well relationship types conform to conventional kinship labels. However mean differences across kin types in time spent doing childcare (Hook and Chalasani, 2008), investing in children’s development (Bianchi and Robinson, 1997), leisure, secondary childcare, and housework (Mammen, 2011) have all been studied using time diary data. In the following paragraphs I will briefly review what

current literature does tell us about cultural roles and family relationships, followed by an overview of its limitations in the context of what is known.

The cultural expectations of motherhood are well-defined (Arendell, 2000) and institutionally supported (Mohr, 1994). Mothers' needs and desires are assumed to align with their children's and they are ultimately responsible for their children's well-being (Russo, 1979). In contrast, fatherhood has traditionally been defined by being the main household breadwinner (Nock, 1998; Edin 2000) but the cultural and institutional underpinnings of traditional fatherhood have been challenged by women's mass labor force participation. In response, a two-breadwinner model has emerged and fathers are expected to take on more responsibilities at home (Hook 2010).

Perhaps, as a result of these changes more biological fathers have been found to "do" at least some aspects consistent with the cultural construct of motherhood. For example fathers are spending more time doing housework (Bianchi, Milkie, Sayer and Robinson, 2000; Bianchi, Sayer, Milkie and Robinson, 2012) and care work (Sayer, Bianchi and Robinson, 2004) and biological mothers are doing less (Bianchi et al, 2000) – although women still do more of the least coveted household chores – often multitasking housework and childcare (Offer and Schneider, 2011) and inflexible housework tasks (Hook, 2010).

Many aspects of the relationship remain obscured by measuring average differences in the time use category of interest and several questions remain. Do biological fathers who do household chores take on other aspects of the “motherhood” role, like childcare as well? Or do they have their own distinct relational patterns? Do mothers who spend less time doing housework “look like” mothers who do? Or do they more closely resemble fathers?

The sibling relationship is one of the most prevalent, long lasting and emotionally close relationships (Whiteman, McHale and Soli, 2011). The sibling role is often symbolically adopted to formalize a trusting, unbreakable bond. Empirically, siblings grow up in similar environments and share significant amounts of time together (Larson, Richards, Moneta, Holmbeck and Duckett, 1996). Cultural expectations of a “good” big (little) brother or big (little) sister may structure how they interact.

According to cultural expectations, older siblings should care for younger ones, and help them – but they should also not bear too much responsibility for their wellbeing (Wight, Price, Bianchi and Hunt, 2009). Nonetheless, in practice some older siblings (particularly sisters in lower income households) take on substantial childcare burden, sometimes exceeding 20 hours per week (Dodson and Dickert, 2004). Empirically, siblings who are close in age feel attached to, and care for one another (Whiteman, McHale and Soli, 2011), but they also act as competitors and reference

points to compare their achievements and shortcomings against (Feinberg, McHale, Crouter and Cumsille, 2003), and some conflict is common (Newman, 1994).

Grandparent-grandchild relationships have been found to be bifurcated, resembling either parental relations or more distant kin. Grandparents are normatively excluded from the nuclear family unit – sometimes even when they take on substantial caregiving responsibilities (Nelson 2006). However, grandparents are increasingly likely to be a child’s parental figure in place of their own child (McDonald and Armstrong, 2001; Jimenez, 2002).

The majority of sibling and grandparent-grandchild relationships aren’t characterized by caregiving. However a minority of caregivers exist within these kin types and traditional labels may overlook their contributions. We may also ask if these anomalous relationships differ in other important ways from their non-caregiving counterparts.

3.2 How new kin categories compare to conventional ones

Stepfather involvement can range from minimal to complete (Ganong and Coleman 2004). The stepfather-stepchild relationship may depend on a number of factors. A stepfather who is married to the child’s mother may have a more involved, parent-like relationship with the child compared to a cohabiting stepfather because marital ties are more stable than cohabiting ones (Bumpass and Lu, 2000), and they may

have more parenting authority than a cohabiting stepfather (King, 2009; Ganong and Coleman, 2004). Stepfather involvement also reflects the child's age; stepfathers are less involved in older children's lives than younger children (Stewart, 2007) and the child's age when the stepfather-mother relationship began (Ganong, Coleman and Jamison, 2011).

Stepmothers are less common than stepmothers and stepsiblings because children are more likely to reside with their mothers after a divorce, or non-marital birth. The motherhood mandate makes step-motherhood particularly problematic, especially if the children remain in contact with their biological mother (Ganong, Coleman and Jamison, 2011).

Involvement of the non-residential parent (usually the father) varies widely based on the educational level (Arditti and Bickley, 1996; McLanahan, 2004), race (Furstenburg, Peterson, Nord and Zill, 1983) and the quality of the relationship between the parents before the child was born (Waller and Swisher, 2006). While one third of children have very little contact with their nonresidential parent, as many see them every week (Stewart, 2010). Non-residential mothers are less common than non-residential fathers and they tend to have more contact with their children (King 2007).

These nonconventional kin types have less contact with their children (or partner's child) compared to conventional kin. However, some of these relationships are

close and “look like” conventional ones. As was the case with siblings and grandparents, if we only pay attention to categorical distinctions, the importance of these kin to the children they interact with may be overlooked. If the relationships differ from traditional kin, the method will allow us to pinpoint exactly how they differ, rather than assuming a priori that they do (stepfathers are different than fathers), and how they differ.

This review raises as many questions as it answers. On the surface these conventional family roles should emerge as behaviorally distinct. Previous literature demonstrates differences in interaction between different types of conventional kin.

However, comparing mean differences in a single measure like total time use or childcare time allows us to overlook important differences within kin types- it is entirely possible that these roles simply do not exist the way that we imagine them. Rather than a single, overriding “mother” role, there will be many roles that incorporate aspects of the cultural construct of motherhood. There may be multiple roles that incorporate aspects of the cultural expectations applied to fatherhood, siblinghood and grandparenthood. Moreover, any of these roles may be occupied by mothers, fathers, siblings or unconventional kin.

3.3 Developing a formal typology of family relationships

The theoretical typology below summarizes the problems raised by these two lines of research. The first line of research concerns the frequency and character of contact that children have with their caregivers. Previous research has documented trends in parental time use (Sandberg and Hofferth, 2001), documenting what caregivers actually do with their children and how it relates to maternal employment (Hook, 2010) and (mostly) paternal residence (Amato, Meyers and Emery, 2009; Cheadle, Amato and King, 2010; Hofferth and Anderson, 2003). These papers establish how much contact maternal (or paternal) figures have with their children, compared to biological mothers (or fathers) – usually married to the child’s other biological parent. I use the findings from this literature to interpret the relationships conventional and unconventional types of kin have with their children (and partners’ children).

Relationship types that encompass many different domains are more integral to the family. Relationship types that include only few domains, like leisure, or meal sharing are unintegrated. Another way to put this is that family relationships are integrated when their removal causes disruption to many domains of the child’s life.

The second theoretical perspective raises the possibility of opaque and ambiguous expectations arising from new structural contexts. The result is the potential for more fluid, less distinct relationship types in practice. Family relationship types that

are easily identified are structured. Those relationship types that are more amorphous and difficult to place are unstructured. Conventional and nonconventional kin types may have either structured or unstructured relationships. Changes in family structure that have seen new kin types emerge have also seen conventional relationships being enacted in increasingly diverse ways (Cherlin, 2004).

Table 4: Relationship type typology

Description of the four quadrants of relationship types		
Uniformity of interactions	Entrenchment in child's day-to-day life	
	Unintegrated	Integrated
Structured	Circumscribed: Clear expectations, narrow relational scope	Established: Clear expectations, broad relational scope
Unstructured	Peripheral: Relational expectations are narrow and unclear	In flux: Relational expectations are unclear and broad

The four quadrants represented in table 4 above are: (1) integrated and structured (2) integrated and unstructured (3) unintegrated and structured and (4) unintegrated and unstructured. I dichotomize the concepts of integration (integrated and unintegrated) and structure (structured and unstructured) to construct discrete spaces to classify relationship types.

Established (integrated and structured) relationship types are characterized by interactions that reach several aspects of the child's daily life. The boundaries of the

relationship are clear – all alters in the relationship type do (and don't do) the same things with the child.

In flux (integrated and unstructured) family types are made of relation types that reach into many aspects of the child's daily life, but the collection of relationships that make up the position are more heterogeneous – although they are still more similar to each other than to relationships in other relationship types. Critically, the alters who occupy this position are more difficult to place into a single relationship type.

Circumscribed (unintegrated and structured) family types are made up of relation types that are highly circumscribed but there is behavioral agreement about what the few interactions are. Basic relations that are fundamental to family time, like meal sharing (Offer, 2014), may be included here.

Peripheral (unintegrated and unstructured) relation types are narrow in scope and alters are rather dissimilar. Substantively, these positions are least like kin relations.

The previous literature introduced in the previous section would predict that mothers' relationships with their children are more integrated into every domain of the child's life. The expectations of motherhood are culturally well-defined and institutionally supported. Motherhood holds an almost sacred status in American culture, (Arendell, 2000) and mothers have been considered worthy of protection since at least the turn of the 20th century (Mohr, 1994). Even while women have entered the

labor force en mass, mothers are expected to selflessly put their children first, ahead of advancement in the workplace and their own desires, which are assumed to align with their children's needs (Ridgeway and Correll, 2004; Russo, 1979). Together these cultural expectations suggest that mothers' relationships will be more likely to be found in the **Established** quadrant of the theoretical typology.

Fatherhood has traditionally been defined by being the main household breadwinner, where fathers' relationships are **circumscribed**. The expectation has continued for married men (Nock, 1998; Edin 2000). Hook (2010) argues that the cultural and institutional underpinnings of fatherhood have been challenged by women's mass labor force participation. The movement towards convergence suggests in labor market participation and cultural expectations suggests the possibility of substantial overlap in the way that biological mothers and biological fathers interact with their children. Previous literature thus suggests that fathers may be more likely to have unstructured relationships with their children, as they are still working out what it means to be a father in the current social context. Since many continue to be less involved in some core areas of children's lives, they have **In-flux** relationships.

Sibling relationships are broad and variable, ranging from competitive peer relationships to primary caregiving, depending on relative ages and their parents' involvement. This suggests they will be found among the **Established** relationship

types. However, they may be less structured than parental relationships because of the possibility for non-normative, caregiving relationships, found instead among the **In-flux** quadrant.

Grandparents are more likely to have unintegrated relationships with their grandchildren, being involved in only a few domains. Their exclusion from the nuclear family unit places them into the **peripheral** quadrant. However, like siblings, many grandparents act as caregivers. When they do so, they are likely to occupy the integrated but unstructured **In-flux** quadrant.

Step relationships are the most likely to be unstructured, as they are least culturally and institutionally regulated. Stepmother-stepchild relationships, are difficult to predict because of their unique and ambiguous structural positions (being both female, and outside the traditional family boundary). However because of their ambiguity, they are unlikely to have **Established** relationships. Stepfathers have are a more common feature of family life, and have been for several decades. As such, their roles are more likely to be structured and narrow (**Circumscribed**) than other conventionally labeled family members.

To summarize the preceding discussion, a new approach to understand family relationships is needed because the past literature is limited by rigid definitions imposed

by the traditional the traditional constraints of shared genetics and marriage² which capture the reality of increasingly fewer families. In what follows I introduce a method allows us to define kinship from the ground up, allowing relationship types to emerge from reports of interaction. The approach allows us to enumerate which roles exist: Motherhood, fatherhood and other culturally prescribed relationships may (or may not) actually exist. It allows us to ask how well relationships apply to conventional kin terminology allowing that different types of people can occupy the same roles. Finally, relationships we don't currently distinguish will emerge (possibly among both conventional and new kin types).

I first provide a more detailed explanation of the method and then introduce the data, measures and sample. Finally, I apply the method to the problem at hand – showing what types of relationships exist and whether conventional distinctions are a good proxy for family positions.

3.4 Methods: A solution to the problem of defining family relationships

3.4.1 Structural perspectives on family and kinship

Social scientists used structural models to uncover kinship structure in so-called “primitive” societies successfully in the past. Structural approaches separate the

² Even when the relationships of unrelated, single (or cohabiting) adults and their partner's children are studied they are evaluated based on differences from some baseline rooted in blood and marriage.

structure of a phenomenon from its content and then study the structural patterns. One approach uses behavioral patterns such as cross-group marriage (Bearman, 1997), kin terms (Read 2007), witchcraft accusations (Evans-Pritchard, 1976) and joking (Radcliffe-Brown, 1952), to derive the normative rules that generated the patterned behaviors (See White, 1963). More recently, this approach has been brought to bear on collaboration networks (Moody, 2004) adolescents' sexual relations (Bearman, Moody and Stovel, 2004) and even families (Martin, 2009). Once the patterns of social relations are discovered the researcher can work her way back to biological or social labels. Rather than seeking to find a single, overriding logic undergirding family relations, I expect to find multiple logics working simultaneously and sometimes in contradiction with one another.

Current classification of conventional kin follows formal logic rooted in the concepts "is married to" and "is a parent of". The formal position "cousin" is only meaningful within the framework of this particular kinship system. There is no way to explain what a cousin is without reference to other formal kinship positions (i.e. aunt, uncle) which themselves refer to others (mother, father, sister, brother, child).

Family relationships can be classified and assigned to positions through the operating principles of "does for" and "does with" rather than the traditional principles of "is a parent of" and "is married to". Two different children may interact in the same

way with one (or more) of their respective contacts. For example, both may eat, watch TV, prepare dinner and do homework with the person we would traditionally call their “mother”. Using this approach, both “mothers” would share a position, but they would be assigned to the same position through shared patterns of interaction rather than formal (possibly outdated) kinship rules.

The implications of this definition of family are threefold: (1) Motherhood, fatherhood and other culturally prescribed relationships may (or may not) exist, and they need not exist in the ways we think. (2) Different types of people (traditionally defined) could occupy the same roles. (3) Relationships we don’t currently distinguish will emerge (possibly among both conventional and new kin types).

3.4.2 Network models of role equivalence

Many structural methods have been developed to measure an actor’s position in a system of roles using multi-relational network data (Boorman and White, 1976). The approach taken here to identify sets of similar relationships (positions) is identical to Winship and Mandel’s (1983) measurement of local role equivalence³. They develop the method to measure role-equivalence in a way that can be used to compare multiple actors’ roles across networks. Each individual (ego) is taken in turn and a binary vector

³ Formally, it is a subset of their approach when indirect relations are structurally null.

is generated recording the presence or absence of all the possible relations between ego and each other actor on the network (ego's alters). These vectors are called role relations.

Winship and Mandel developed their measure for full network data to measure all the ways a given ego's alters relate to one another, in addition to the direct ties between themselves and their alters. I modify their model to use the information available within ego-network data which can be used to assign alters to positions – rather than roles. We know how ego relates to their alters on multiple relations and how similar these sets of relations are to others. In this context, two individuals share a position when they share the same set of direct relations.

In practice, very few individuals have exactly the same pattern of ties, so assigning individuals to the same equivalence class requires first calculating the pairwise distance between observations and second, observations are placed into groups, or clusters, according to some criteria which will maximize the similarity of observations placed into the same group, and distance from those in other groups.

To illustrate the approach, let's take an example of a hypothetical, typical 8 year old boy we'll call Tim. Tim gets up in the morning and eats breakfast with Julie and Rachel, and then he does the dishes. He watches TV with Julie as they get ready for school and then they wait for the bus together. After spending most of the day at school, Tim comes home again on the bus. He and Julie go outside to play a game of catch and

then head in to do their homework. Once he's settled himself into the house, he asks Rachel for help and gets into an argument with Julie about the volume of the TV. Rachel admonishes them both to be patient with each other and the two reconcile, sharing a hug. After Tim finishes his homework, Al comes home and all four sit down in the living room to eat dinner and watch TV, after dinner, Jordan arrives and stays to watch TV with the group until it's time for Tim to go to bed.

Actions are recorded from Tim's perspective, he's the ego. Rachel, Julie, Jordan and Al are the actors with whom Tim shares his day, they are his alters. Taken as a pair, any two of these actors comprise a dyad, but we only have information from the perspective of Tim, so we focus on the dyads that involve him (Tim and Rachel, and Tim and Julie, Tim and Jordan, Tim and Al). Tim engages in a variety of interactions with Rachel, Julie, Jordan and Al, multiple relations are required to capture the character of the two dyads. Some of these relations overlap and some of them don't. Tim watches TV and eats meals with Rachel, Julie and Al, but he only argues with and hugs Julie and only Rachel helps him with his homework and disciplines his behavior. Finally, Tim only watches TV with Jordan.

The similarities and differences between five alters are quickly surmised, however, the process is untenable if the number of alters is large. Distance between alters must be calculated. The three components of Matching distance coefficients are:

(1) the number of relations the pair of alters have in common (2) the number of relations that are not in common and (3) the number of possible relations. The measure is the ratio of the number of shared present and absent relations to the total number of possible relations. The matching distance formula can be found, with other technical terms in appendix A.

In this example, we'll walk through calculating the distance between Julie and Rachel. They have two relations in common (TV and eating) and five others (homework help, playing outside, arguing, discipline and affection) distinguish them. The final component is the number of possible relations either of the pair could have shared with Tim but that both did not. Sixty-eight discrete relations were recorded in the time-diaries, and neither Julie nor Rachel did 64 of these with Tim. The matching distance between Julie and Rachel is $1 - \frac{2+61}{2+5+61} = 0.074$.

Now let's add a second ego, a fourteen year old girl who we'll call Sara. In contrast to Tim, Sara spends much of her day alone. She wakes to an empty house and heads to school. After school, she comes home and makes herself a snack and does her homework. Later that evening Jackie arrives and the two sit down to dinner and watch TV. The question of the first part of this paper (what family relationships exist?) can be answered by examining the differences between Sara's alter, Jackie, and Tim's alters.

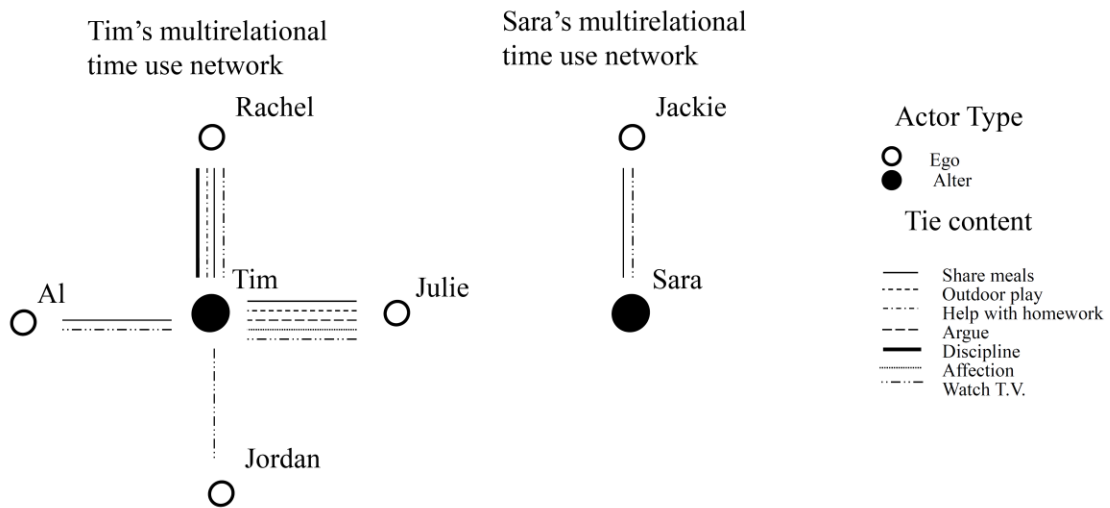


Figure 9: Hypothetical children's days represented as multi-relational ego-networks

Figure 9 above shows the two children's sets of relations. It shows that Al and Jackie have an identical set of relations with their respective focal children (Tim and Sara). Based on this alone, we can surmise that they share a position. Jordan also shares a very restricted set of relations with Tim. Jordan's relation set is closest to Al and Jackie, but if the meal relation is important in structuring relations, he will likely be in another position. Compared to the simple set of relations Al and Jordan have with Tim, Rachel and Julie both have a complex set of relations but they are qualitatively different from one another. Tim's relations with Rachel are hierarchal – she helps and disciplines him while those with Julie are more peer-oriented and they would also likely be assigned to different positions.

Table 5: Illustration of Matching distance

	Matching coefficient				
	R	J	A	J	J
Rachel	-	0.074	0.044	0.030	0.044
Julie	0.074	-	0.059	0.044	0.059
Al	0.044	0.059	-	0.015	0
Jordan	0.030	0.044	0.015	-	0.015
Jackie	0.044	0.059	0	0.015	-

The matching coefficient places Jordan and Al closer to one another than they are to Rachel and Julie, and suggests that Rachel and Julie are distant from one another. The Jaccard coefficient places Rachel and Al and the same distance as Jordan and Al because it doesn't take into account all the things the two *don't* do with Tim. I use the matching coefficient to assess the similarity of multi-relational dyads to assign importance to the null relations as well as the enacted ones because the relations that don't occur may be as important as those that do.

After distance between alters has been calculated, we assign alters to positions where those assigned to the same position have a more similar set of relations. We use a clustering method, developed for this purpose, and technical details and definitions are provided below in Appendix A.

Step 1: Generate ego-networks from time diary

Each child's set of interactions were transformed into a multi-relational ego-centered network. I constructed a multi-relational ego-network for each wave a child

contributed a time diary. Egos connected to their alters via the actions they report in their time diary. Details of the data format can be found in Appendix B.

Step 2: enumerate multirelational dyads

I modify Winship and Mandel's (1983) measurement of role equivalence. The method was developed specifically to have a measure of role-equivalence that can be used to compare roles across networks. For each pair of actors in the data, they generate a binary vector, which they call the role relation, recording the presence or absence of all the possible relations the two could have. The aggregate set of an actor's role relations is their role set and actors who have the most similar role sets are considered to be role-equivalent. In the following analyses, two individuals are role-equivalent when they share the same set of direct relations with their respective focal children.

I transformed each child's ego network into a matrix, with each alter's interactions recorded as a row. Each graph has up to 10 rows (alter types) and 64 activity types, with the presence or absence of each activity recorded as a 1 (present) or 0 (absent). An example of the data construction process is available in Appendix B. The resulting 6873 ego networks, were stacked to create three matrices, one for each wave. In 1997, 11423 alters were reported, 9112 in 2002 and 5332 in 2007.

Step 3: calculate matching distance between multirelational dyads

The distance between the rows (child-alter interactions) within each of the three matrices was calculated using the matching coefficient. A number of distance measures for binary data are available. The choice of which to use depends on how the researcher weighs the similarity of zero counts, the pattern of absences of interaction types may be as informative as the pattern of their presences. I use the matching coefficient to assess the similarity of multi-relational dyads to assign importance to the null relations as well as the enacted ones because the relations that don't occur may be as important as those that do.

Step 4: Assigning multirelational dyads to positions

Many methods have been developed to place similar observations into the same cluster. Hierarchical clustering methods partition the data into a decreasing number of clusters based on the greater proximity of the collapsed clusters to others. Ward's minimum-variance method of hierarchical clustering merges the two clusters that minimize the within-cluster sum of squares until all observations are contained within two clusters. The researcher can then study the partitions that emerge at different sized solutions and choose the best fit based on a weighted ratio of R^2 to expected R^2 based on the variance that would be explained if the data came from a uniform distribution (Sarle, 1983).

Each study period was subjected to an independent cluster analysis, allowing both the number and character of clusters to vary over time. After examining the R^2 for an absolute measure of explained variance, and the Cubic Clustering Criterion to evaluate relative fit. Alters who are placed into the same position have similar interaction profiles, however, there is internal heterogeneity within clusters. If a relation is twice as prevalent within a cluster than it is on average across all clusters, I designate it characteristic of that position. Technical details of model fit can be found in Appendix C and the branching trees from the three clustering procedures are provided in Appendix D.

Step 5: interpretation

The final step is to make sense of variation among the emerged positions. I first use multidimensional scaling (MDS) to visualize the similarity of traditional roles' position profiles. First, I calculate the proportion of each traditional label (mother, father, sibling, grandparent, stepparent, stepsibling, friend, non-resident mother, non-resident father) whose relationship with the focal child is characterized by each position, then calculate the Euclidean distance between the traditionally labeled roles. The resulting distances are displayed as a set of points, the distance between the points reflects the distance between the position profiles of each traditional label (Gower, 1966). The MDS results provide a broad picture of the relational similarity of kin types.

To study the content of emerged positions, three attributes are of particular interest. First, the content of the position – what alters within a given position actually do with the child gives us a qualitative sense of the inner workings of the particular relationships. In the description to follow, I've qualitatively noted when the alters in a position have been more than twice as likely to engage in a particular activity with the focal child, such as watching TV, compared to all alters taken as a whole. Eating together, watching TV and providing care are the three influential single relations which most structure cluster membership, thus special attention is paid to these activities.

Structured and unstructured kin

A position's structure is the extent to which there is high (or complete) behavioral agreement between alters within that position. In a perfectly structured position if one alter within the position has a particular relation, all the others do too. Unstructured positions are ones where knowing what one alter does with a child doesn't provide much information about what other alters in the position do. A poorer fit reflects internal heterogeneity and the difficulty of placing the individual into a position.

A position's structure is measured as the average pairwise Jaccard distance between the multirelational dyads within the position. It is an ideal measure of uniformity because it is a ratio of the number of shared activities two dyads share to the total number of activities each alter contained in both dyads.

Integrated and unintegrated kin

Second: Relationship types that encompass many different domains are more integral to the child's everyday life. This relational integration is the second dimension of the organizing scheme presented in table 1. Relationship types that include only few domains, like leisure, or meal sharing are unintegrated.

I have grouped together actions with similar content into six domains, with some overlap with the aggregate time use codes provided by the PSID CDS. The six domains are: Negative interactions, Games/TV, Caring interactions, Active Leisure, Passive Leisure and Chores⁴. Those six domains are used to measure breadth of relationship, where a position spanning all six domains is maximally broad and one where interactions only occur within one domain is most narrow. Specifically, I count the number of domains at least 75% of alters in the position share relation with the child in.

3.5 Data

In this paper, I use time use data from the Child Development Supplement (CDS) of the Panel Survey of Income Dynamics (PSID). The data provides a nationally

⁴ Negative interactions includes: Argue, negative emotion, discipline

Games/TV includes: TV, read to child, play cards, play computer, play games, play indoors, play outdoors, play pretend, do a puzzle, play with toys, dance, listen to radio, listen to records, play videogames.

Caring interactions include: affection, positive emotion, physical care, help with homework, teach child, child observes task, household management, child management, instruct child, travel

Active Leisure includes: Attend an event, go to museum, see a movie, recreation, entertainment, sport, other leisure

Passive Leisure includes: Eat/Drink, talk on the phone, socialize, talk, relax

Chores include: care for baby, play with baby, care for family member, auto maintenance, dishes, clean up after food, serve meals, housework, indoor maintenance, laundry, meal preparation, gardening, plant care.

representative sample of U.S. children when weighted, and it follows the sampled children for ten years, allowing comparisons within and across families and across the full range of childhood from birth to age 18. The data is ideal because it captures the phenomenon of interest (time spent with families) regardless of the residential status of the child.

Time use diaries are less subject to social desirability bias than single item responses (Marini and Shelton, 1993) or stylized questions (Andorka, 1987) and they are more reliable than single survey items that rely on respondent's ability to accurately calculate how much time on average was spent doing particular activities (Conrath, Higgins and McClean, 1983; Sonnenberg, Riediger, Wrzus and Wagner, 2012). One limitation of these time diaries is that they are also only collected on a two days per week which means that they are less likely to catch rare events. However, the method is more likely to pick up on regular patterns, which is ideal for the problem at hand (Paolisso and Hames, 2010).

The Child Development Supplement to the PSID was designed to assess processes of social capital accumulation in childhood. The sample is the subset of PSID households participating in 1997 with children aged 0-12 years old. Eighty-eight percent (2380) of eligible households provided information on 3563 children. In 2002-2003 the

supplement was administered again to 2907 children now aged 5-18 and finally in 2007 to those 1506 children who were still less than 18 years old.

The supplement includes time diaries which provide the main data source for this study were also collected from the primary care giver when the child was very young and by older children themselves in the final wave of collection. Up to two children from each studied household were asked to record their activities all day for one weekday and one day from the weekend. In 1997, time diaries were collected from 2904 children, 2569 in 2002-2003 and 1442 were collected in 1997. In total, 3325 children provided information about their interactions with 25929 alter types across the three waves.

The primary care giver, or the older child was asked to record all other people who were present, and to note whether they were participating with the focal child, or simply in the same area. The respondent was asked to choose from among ten types of alters including: Father, Mother, Stepfather, Stepmother, Sibling, Stepsibling, Grandparent, Friend, other relative, other non-relative. This data construction poses little challenge for relationship types which are typically unique (parents) but it also makes it impossible to tease out which of the (possibly) non-unique alter types (siblings) the respondent is interacting with at any given time. Interactions with siblings,

grandparents and friends must thus be interpreted as the aggregate interactions the respondent has with each of these types of people.

Finally, the location of the activity was also recorded, which allows the researcher to distinguish things done in the child's own home from others' including non-residential parents. Not all CDS children provided time diaries every year.

The PSID time use codes followed the American Time Use Survey's scheme. Daily activities were coded into one of ten categories: Household Activities, Child Care, Home Computer Related Activities, Entertainment/Social Activities, Sports and Leisure and Passive Leisure, within which specific activities were recorded. Activities occurring within the institutional settings of work, voluntary organizations, education, market-based exchanges, formal child care arrangements and instrumentally oriented travel⁵ were excluded in order to isolate behaviors oriented to social or domestic action. Non-social activities such as sleeping and self-grooming were also excluded.

The basic categories of interaction have been modified to reflect different domains of domestic interaction. I have grouped together actions with similar content into six domains, with some overlap with the aggregate time use codes provided by the PSID CDS. The six domains are: Negative interactions, Games/TV, Active Leisure,

⁵ As opposed to socially oriented travel, such as "going for a drive".

Passive Leisure, Chores⁶ and Caring interactions. Like Mammen (2011) who used the ATUS, we distinguish achievement related care from time spent administering primary care.

Seventy-two distinct social activities were reported at least once in one of the three studies and 64 of these were reported in all three. To limit the activities to those applicable across the age range of youth, and to facilitate comparisons across the three studies, the subset of 64 activities were retained⁷. An example of the raw data downloaded from the CDS from one child's time use diary is located in appendix B. Each step of data processing done to transform the raw data into an ego network is also included.

3.5.1 Sample characteristics

Descriptive statistics for the sample at the time of the three time diary collections are shown in Table 6 below. Two thousand, eight hundred and ninety-six children,

⁶ Negative interactions includes: Argue, negative emotion, discipline

Games/TV includes: TV, read to child, play cards, play computer, play games, play indoors, play outdoors, play pretend, do a puzzle, play with toys, dance, listen to radio, listen to records, play videogames.

Caring interactions include: affection, positive emotion, physical care, help with homework, teach child, child observes task, household management, child management, instruct child, travel

Active Leisure includes: Attend an event, go to museum, see a movie, recreation, entertainment, sport, other leisure

Passive Leisure includes: Eat/Drink, talk on the phone, socialize, talk, relax

Chores include: care for baby, play with baby, care for family member, auto maintenance, dishes, clean up after food, serve meals, housework, indoor maintenance, laundry, meal preparation, gardening, plant care.

⁷ The excluded activities were: pet care, being read to, getting the mail, receiving orders or instructions, being helped by someone, exercising (various specific forms of exercising are, however, retained), computer lessons, physical discipline, gymnastics, zoo trip, coaching and driving (child driving).

participating in the PSID were eligible to take part in the Child Development Survey, and had completed time diaries naming at least one alter (only eight children reported none).

The average age of these children was 6.65 years in 1997 and rises to 11.56 in 2002-2003 and 14.03 in 2007. The ages are not evenly five years higher at every survey because of significant attrition caused by both a failure to complete time diaries and because children become ineligible when they turn eighteen.

About half the sample is female in all three waves of data collection. Two thousand, one hundred and thirty-nine of these children continue on with completed time diaries in 2002 and 413 new children complete time diaries. Twelve hundred and thirty one of these 2552 children continue to provide completed time diaries into 2007 and 193 children who didn't submit completed time diaries in 2002-2003 submit them in 2007.

Table 6: Description of sample at three time points

	1997	2002-2003	2007
Number of children	2896	2552	1424
Average age (years)	6.65	11.56	14.03
Proportion Female	0.49	0.50	0.49
Mean number of alters	3.94	3.57	3.74
Total number of alters	11423	9112	5332

Data source: Child development supplement of the Panel Study of Income Dynamics 1997-2007. *Note:* Data are weighted using child-level weights.

The average child has between three and four alters. This number is lower than the number of people they interact with in any setting throughout the day because only interactions taking place within a home are under study.

3.6 Results: Describing enacted relationships

This section describes the positions that emerged from applying network methods to time use interactions. This is an opportunity to see what family roles actually exist, rather than assuming relations a priori based on predefined markers of blood and marriage.

Relationships

Eighteen positions emerged in total, sixteen in the first wave, and eight positions in both the second and third waves. I've placed the positions into five substantive categories based on their shared content (not structure or integration): Caring, affectionate, limited, broad, heterogeneous and friendly. The distribution of children's alters into each of these sixteen positions is provided in table 7 below.

Table 7: Percentage of all alters enacting each of the sixteen positions by survey year

Distribution of sixteen relationship types into six broad classes

1997																	
Caring	Affectionate		Limited		Broad		Heterogeneous		Friendly								
	N	%	N	%	N	%	N	%	N	%	N	%	N	%			
Panoptic caregiver	528	4.6	Affectionate playmate	519	4.5	Meal & T.V. companions	935	8.2	Everyday companion	583	5.1	Stand-in caregiver	1396	12.2	Indoor playmate	1326	11.6
Active caregiver	546	4.9	Expressive, affectionate playmate	274	2.4	Restricted caregivers	918	8.0	Trusted companion	376	3.3	T.V. companion	1747	15.3	Outdoor playmate	528	4.6
Balanced caregiver	498	4.4	Tumultuous playmate	28	0.2				Balanced everyday companion	538	4.7	Expressive caregiver	665	5.8			
Total N	11423																
2002-2007																	
Caring	Affectionate		Limited		Broad		Heterogeneous		Friendly								
	N	%	N	%	N	%	N	%	N	%	N	%	N	%			
			Tumultuous playmate	696	4.8	Meal and T.V. companion	2021	14.0	Everyday companion	1896	13.1	Expressive caregiver	1121	7.8			
					Meal companion	1523	8.5	Trusted companion	1689	11.7	Confidant	2053	14.2				
								Balanced everyday companion	3445	23.9							
Total N	14444																

Data source: Child development supplement of the Panel Study of Income Dynamics 1997-2007. *Note:* percentages of each position are not reported separately for 2002-2003 and 2007 because they are roughly equal.

Positions defined by Physical Care: panoptic caregivers, active caregivers and balanced caregivers

Caring relationships are characterized by uniform acts of physical care directed to the focal child only emerge in the 1997 data when the children are young. These relationships are the minority even within the 1997 data. About 14% of alters in 1997 enact one of the three relationship types, with just under 5% in each. They are

differentiated within themselves by the diversity of active play and whether or not they watch TV.

Panoptic caregivers have all-encompassing relationships with the focal child. The relationship is broad and structured, and the position falls in the first (upper-right) quadrant of the theoretical space. They play both indoors and outdoors with the child and they watch television together. They also do chores with the focal child and talk and socialize with them.

The relationships of **active caregivers** are less expansive in scope, fewer alters do chores with the focal child but they engage in a variety of passive leisure (play) activities (although fewer than the first) and watch no television with the focal child. Alters in the final position, **balanced caregivers** engage in TV centered passive leisure activities, along with indoor and outdoor play. **Balanced caregivers**, like the **panoptic caregiver** only emerge in the early (1997) data. All three caring positions are more structured than average, but the first is located in the established quadrant while the second and third are more narrowly defined and located in the second (upper-left), circumscribed quadrant.

Positions defined by high affect, multifaceted interaction: Affectionate playmates, expressive affectionate playmates and tumultuous playmates

Three positions are characterized by affection, chores, games and arguments and interactions characterized by negative emotion. **Affectionate playmates** do all three, and they are most likely to play games with the child. **Expressive, affectionate playmates** are more likely to engage in talking and socializing and they are less likely to do chores with the child than **affectionate playmates** and **tumultuous playmates**. Both **affectionate playmates** and **expressive, affectionate playmates** are in the fourth quadrant (lower-right, in-flux) of the theoretical space, and one is located in the first (upper-right, established) quadrant. Their relationships are characterized by active leisure and communication.

Tumultuous playmates have more negative interactions with the child than alters in the other two positions. They are more likely to feel negative emotions during their interactions with the child, they are also more likely to argue with and discipline the child compared to alters in other positions. This group is also the most likely to do chores, play sports and play indoors with the child. Finally, they are also the most likely to engage in informal religious practice. While these interactions are the most likely to contain conflict, it is also important to note, that they are also most characterized by affection. **Tumultuous playmates** are more structured than other broad positions, and they are located in the upper-right, established quadrant of the space.

Positions defined by limited interaction: meal companions, restricted caregivers and meal and T.V. companions

Alters in positions defined by limited interaction all share food with the child. Shared meals are the exclusive interaction between alters and children for **meal companions**. This position is present in all three waves of the data. **Restricted caregivers** are engaged in basic interactions with the child including sharing meals and watching TV. One fifth of alters in this group provide some sort of physical care in addition to sharing a meal. This position is exclusive to the 1997 data. **Meal and T.V. companions** emerge in the 2002 and 2007 waves of the data. As implied by the name, interactions between alters in this position and the focal children are limited to shared meals and watching T.V.

Positions defined by broad interactions: everyday companions, balanced everyday companions and trusted companions

Alters in the broad, non-care positions eat and drink with the focal child, do chores with, and engage in a variety of active and passive leisure activities, including sports. Unlike the other positions, these are differentiated from each other not so much in the kinds of activities they do with the focal child, rather they have different levels of intensity within the interaction domains. While all engage in some form of play and housework, **everyday companions** do more specific instances of play and housework

than the others. The interactions between alters in **everyday companions** and the focal child are of medium intensity and no TV but many of them play games, play indoors, play outside or play with toys with the focal child. **Trusted companions** do more chores and more active leisure activities, focusing on recreation and communication. The interaction profiles of **balanced everyday companions** are low intensity versions of the **trusted companions** because they do housework with the child but they also spend a lot of leisure time watching TV, playing games and engaging in other indoor and outdoor play with the focal child. **Balanced everyday companions** emerge again in the 2002 and 2007 waves of data. Finally, alters in all three relation types play sports with the child.

Heterogeneous positions: Stand-in caregivers, T.V. companions, expressive caregivers and confidants

These positions are the most heterogeneous set, characterized by intermediate proportions of alters who eat and drink with the focal child. This differentiates them from all the other positions where either the vast majority of alters eat and drink with the child, or none of them do. One quarter (26%) of **stand-in caregivers** provide care for the focal child, compared to just 4% **T.V. companions** and 58% **expressive caregivers**. The alters in cluster **stand-in caregivers** are among the least likely in the entire sample to play with, or talk and socialize with the focal child, and they do not watch TV with the focal child. All **T.V. companions** watch TV with the focal child, but do fewer chores, and

spend less leisure time with them than do alters in other clusters on average but otherwise resemble **stand-in-caregivers**. **Expressive caregivers** are characterized by high levels of care and high levels of indoor and outdoor play. Except for the meal patterns, **expressive caregivers** most closely resembles the affectionate positions, alters within this high care, communication and leisure cluster play sports, enjoy leisure activities and talk with the focal children.

Stand-in caregivers and **T.V. companions** emerge in 1997 and do not reappear in 2002 and 2007. **Expressive caregivers**, however, do reemerge along with the emergence of a fourth heterogeneous position; **confidants**. Interactions within **confidants** are spread evenly and thinly across activities. They have in common that their interaction set is defined by talking (in person and on the phone) and socializing with the child with very few other interactions. Unlike the friendly interactions found among alters in the first wave, these are focused on communication rather than active play. Few chores are done together but alters are about as likely to talk with and socialize with children as they are in general across the sample.

Positions defined by friendly interactions: indoor playmates and outdoor playmates

Alters in the friendly positions are distinct because they do not eat, or watch TV with the focal children. Rather they have “friendly” interactions such as sport,

socializing, play outside. **Indoor playmates** are more likely to play indoors with the focal child, while **Outdoor playmates** have more actively oriented interactions.

Figure 10 below places the positions into a space defined by relational breadth and structure. Relational breadth bisects the x-axis of the plot. Relations on the left side are narrow, focused into one or two domains while those on the right are broad. The y-axis of the plot represents the institutionalization of the family relationship. Behavioral uniformity within a position is easier to achieve when positions have one or few relations so I've calculated the average structure at low and high integration separately. I've standardized the structure and integration at each of the three observation periods in order to make the dimensions comparable across studies.

The six positions that emerge in all three waves (**tumultuous playmate, meal companion, everyday companion, trusted companion, balanced everyday companion** and **expressive caregiver**) are indicated in black, while the ten positions that appear only among the younger sample (**panoptic caregiver, active caregiver, balanced caregiver, affectionate playmate, expressive affectionate playmate, restricted caregiver, stand-in caregiver, T.V. companion, indoor and outdoor companions**) and the two emerging only in the older sample (**confidant** and **meal and T.V. companion**) are indicated in grey.

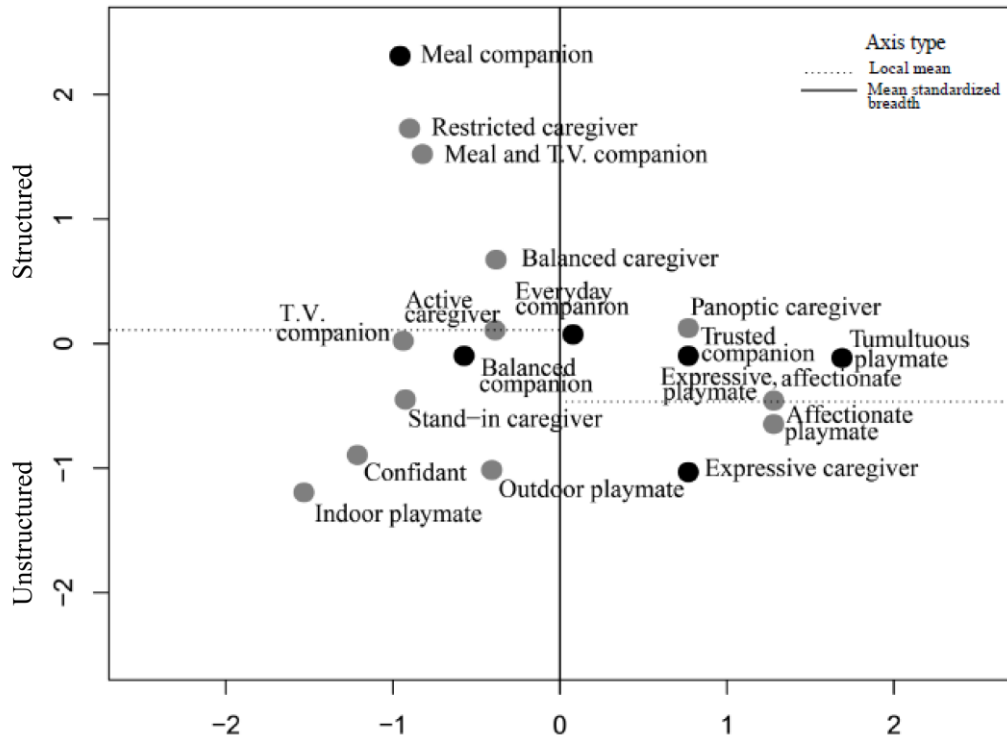


Figure 10: Positions' location in theoretical space

Positions defined by Physical Care: panoptic caregivers, active caregivers and balanced caregivers

All three caring positions are more structured than average. The **panoptic caregiver** position is also integrated and located in the first (upper-right, established) quadrant. **Active caregivers** and **balanced caregivers** are less integrated and located in the second (upper-left, circumscribed) quadrant.

Positions defined by high affect, multifaceted interaction: Affectionate playmates, expressive affectionate playmates and tumultuous playmates

High affect, multifaceted positions are integrated. The **tumultuous playmate** position is structured, the **affectionate playmate** position is unstructured and the **expressive affectionate playmate** position is right at the average level of structure for positions with high integration.

Positions defined by limited interaction: Meal companion, meal and T.V. companion, restricted caregiver

Alters in the limited set of positions have in common a very circumscribed set of interactions with the focal child, and all three – **meal companions, meal and T.V. companions** and **restricted caregivers** - are located in the second (upper-right) quadrant. While these three positions are very limited, they are also very well-defined in terms of proscriptions *against* many types of interactions. In effect, alters in these positions are unified in setting restrictions on interactions with the focal children.

Positions defined by broad, non-care centered interactions: Everyday companions, trusted companions, balanced everyday companions, T.V. companions, expressive caregiver

Everyday companions and **trusted companions** are located in the first (upper-right, established) quadrant. Their relations are broad and more structured than other integrated relations. **Balanced companions** are located in the unintegrated, less

structured, third (lower-left, peripheral) quadrant. **T.V. companions** and **expressive caregivers** are also unstructured and unintegrated quadrant but **T.V companions** are located on the edge of the third (lower-left) and second (upper-left) which reflects the greater uniformity (TV watching) of its members. The **expressive caregiver** position is located in the fourth (lower-right, peripheral) quadrant because, along with a greater relational breadth, its members have more heterogeneous profiles.

Positions defined by friendly interactions: Indoor playmates and outdoor playmates

Both **indoor playmates** and **outdoor playmates** are found in the third (low-structure, low-integration) quadrant. They share similar content (playing indoors) but the specific things they do with the focal children (reading, games, puzzles, etc.) are variable.

3.6.1 Summary description of positions

The majority of positions that consistently emerge in all three waves are found in the upper right quadrant, encompassing broad and relatively structured, established relationships. Two of the three positions (**everyday companion, trusted companion**) include less physical care and affection-based relations and more socializing, compared to the fourth broad, structured position **panoptic caregiver** that only emerges in the first wave. The fourth, however, **tumultuous playmates** provide continuity in that type of broad-based, high affection position across waves. Of five positions, the only narrow,

unstructured position (peripheral) that emerged across studies is the **balanced companion**. This suggests that there are a number of positions which are still being worked out within families. The continuity of the **meal companion** position, wherein alters only eat and drink with the child shows that sharing mealtime is an important dimension of family life when other relations are less certain.

3.7 How well do relationship types conform to conventional kinship labels?

Now we turn to an analysis of how the “traditional” family labels map on to these emerged positions. Table 8 below displays the percentage of alters belonging to each position by their traditional kinship label. Positions emerging in the first wave, are displayed in the first half, and the positions emerging in the second and third waves in the second. The most striking feature of this table is the heterogeneity within every kin type.

Table 8: Distribution of traditional kin types across positions

	1997										2002-2003 and 2007									
	Father	Mother	Stepfather	Stepmother	Nonresident father	Nonresident mother	Sibling	Stepsibling	Grandparent	Friend	Father	Mother	Stepfather	Stepmother	Nonresident father	Nonresident mother	Sibling	Stepsibling	Grand-parent	Friend
Panoptic caregiver	5.4	8.6	2.4	0.0	1.7	7.0	6.9	0.0	1.5	0.1										
Active caregiver	6.6	10.5	2.4	3.6	5.2	2.8	1.9	0.0	4.9	0.4										
Balanced caregiver	3.8	11.0	1.2	0.0	3.9	4.2	4.0	1.5	1.5	0.0										
Affectionate playmate	4.2	5.8	0.0	0.0	1.3	8.5	8.4	1.5	1.8	2.9										
Expressive, affectionate playmate	0.9	3.2	0.0	0.0	0.4	2.8	6.2	0.0	0.5	1.2										
Tumultuous playmate	0.0	0.1	0.0	0.0	0.4	0.0	1.0	0.0	0.0	0.2	2.1	2.8	0.0	2.1	0.7	0.9	10.7	5.4	0.9	6.2
Meal companion	12.2	7.2	29.8	25.0	25.0	11.3	3.5	13.9	17.0	2.1	17.8	15.6	13.8	2.1	14.0	18.8	12.5	8.1	8.2	1.1
Restricted caregiver	12.9	12.0	11.9	14.3	9.1	9.9	8.0	18.5	7.0	0.5										
Meal and T.V. companion											20.3	17.6	29.0	38.3	28.2	22.2	10.3	13.5	25.3	2.4
Everyday companion	6.8	4.6	7.1	7.1	3.5	2.8	3.4	6.2	5.4	6.0	18.0	17.8	19.3	25.5	12.8	16.2	8.5	18.9	17.8	7.2
Trusted companion	2.1	1.3	2.4	3.6	1.7	4.2	9.1	1.5	1.3	2.6	8.2	11.3	5.5	4.3	6.0	7.7	21.2	8.1	5.1	10.6
Balanced everyday companion	4.4	2.1	0.0	0.0	2.6	2.8	11.7	1.5	1.9	2.5	26.7	27.1	19.3	10.6	23.9	18.8	31.6	10.8	16.9	10.3
Stand-in caregiver	13.9	11.6	11.9	7.1	9.5	14.1	5.0	12.3	18.7	10.1										
T.V. companion	15.9	12.2	15.5	32.1	14.7	12.7	24.6	29.2	13.4	8.4										
Expressive caregiver	7.5	8.1	0.0	3.6	3.5	8.5	3.8	3.1	3.8	8.4	3.2	4.5	4.1	4.3	2.9	0.0	2.4	8.1	3.6	24.2
Confidant											3.7	3.3	9.0	6.4	11.6	6.0	2.7	10.8	22.2	32.0
Indoor playmate	2.5	1.2	14.3	3.6	13.8	8.5	1.9	9.2	17.8	34.6										
Outdoor playmate	0.9	0.6	1.2	0.0	3.9	0.0	0.8	1.5	3.3	20.3										
N	1702	2637	84	28	232	71	2204	65	982	1361	1872	3269	145	47	415	117	3004	37	891	2372

Notes

Figure 11 below is a visual summary of table 8, mapping the distance between the relational profiles of traditional kin. Kin terms that appear closer to each other tend

to occupy the same set of positions. Ultimately it shows us how close mothers are to fathers, and just how different they are from siblings and so on.

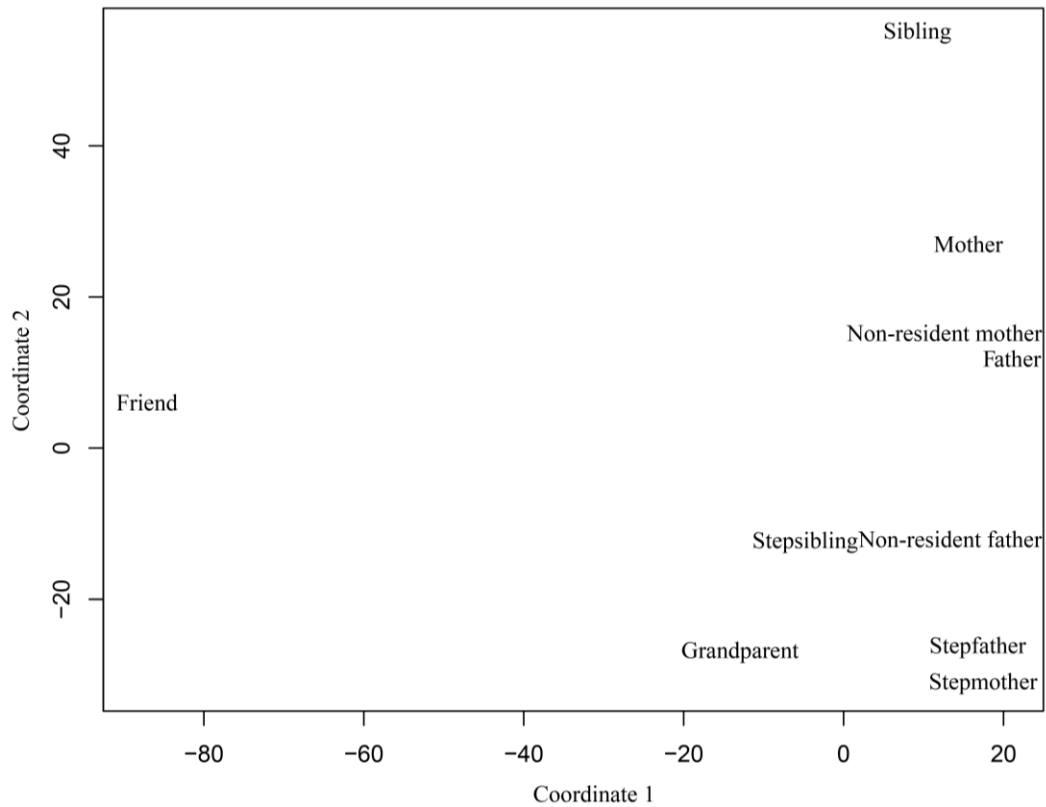


Figure 11 Metric multi-dimensional scaling model of the relational proximity of traditional kin types

Friends, stepparent and sibling categories are at opposite ends of the plot. These three groups tend to do different things entirely with the focal children. Some stepparents resemble biological parents, but most do not so they are placed far apart. Siblings too, have distinct relational profiles and they are located in their own corner. Compared to these other kin types biological parents have more similar relational

profiles and are located closer together. Figure 11 offers a broad picture of differences between conventional kin types. In the following section, the specific compositional differences will be explored.

Relationships with paternal figures

Just over half of relationships with residential fathers in the 1997 sample (55%) can be accounted for by four clusters. About half of these (a quarter of relationships with fathers) feature a very limited interaction profile, with children and their fathers doing little more than watching TV or eating meals (or some combination) together. The other quarter of relationships are also narrow in scope but are more interactive – the fathers in the twelfth position are engaged in some care, but mostly limited interactions, while those in the thirteenth are more engaged in indoor and outdoor play with their children.

The composition of fathers' positions in the 2002 and 2007 samples resemble those in the 1997 sample with the majority (83%) of residential fathers belonging to one of four positions. The defining feature of **Meal companions** and **meal and T.V. companions** is the very limited interactions and together, almost 40% of fathers belong to one of these. Those residential fathers who have a more complex set of relation with their children are likely to be **balanced everyday companions** (27%) where they engage in a variety of passive leisure activities, or **everyday companions** (18%), characterized by active and passive leisure activities and chores.

Fourteen percent of stepfathers and 14% of non-residential fathers are **indoor playmates** - the most narrow, lowest structure position characterized by indoor play and not eating meals together. A substantial minority of stepfathers (41%) and non-resident fathers (35%) occupy the most limited positions. Stepfathers and non-resident fathers are both less likely than resident fathers to be **balanced everyday companions**, and more likely to be **meal and T.V. companions**, making their profiles are almost identical.

Relationships with maternal figures

Mothers in the 1997 study period are more difficult to place into a few positions. They are more likely to be in one of the (first three) high-care/highly structured positions. They are also less likely to be in the most circumscribed relationship types, but almost a fifth of them are. Stepmothers are the most bifurcated – many have little contact with the child, and many (one third) are **T.V. companions** or **T.V. and meal companions**, while others (13%) are **indoor playmates** in the first wave, while a quarter are **everyday companions** in the later waves, and may have as much contact with children as mothers do.

Just over a quarter of mothers, like fathers, in the later samples are **T.V. centered companions** and a further 16% and 18% belong to the limited interaction positions **meal companions** and **meal and T.V. companions**. All of these percentages are significantly

lower than fathers⁸. In contrast, they are more likely than fathers (although the difference is small) to be **trusted companions**, where chores, communication and passive leisure compose the relation.

Sibling relationships

Siblings are the only traditional kinship category with a sizable portion of **trusted companions**, which are among the least internally heterogeneous broad position and based in communication. Looking across the table at the percentages of siblings going into positions in the later waves, the sibling positions are more likely to reappear than the parental ones as children get older. Sibling relationships are the most likely to be **affectionate playmates** and **expressive, affectionate playmates**, which are characterized by high warmth, affection and conflict as well as having a broad relational range, and being relatively well defined. The only other groups to make go into these positions are mothers (both non-residential and residential), and some siblings are caregivers. This suggests that at least some siblings “do” motherhood.

Stepsiblings, like stepmothers are very likely to be **T.V. companions**. If their relationship is not defined as **T.V. companions**, they are likely to be **restricted caregivers**, only eating, drinking and watching TV with the focal child.

⁸ The statistical significance of these statements has been evaluated in a series of multinomial logistic regressions measuring the propensity of mothers relative to fathers.

Grandparent relationships

Grandparents are the most variable and least institutionalized of the traditional kin types we've analyzed here. Like stepfathers, they are the most likely to be **stand-in caregiver** and **indoor playmates**. However, fewer grandparents (24%) than stepfathers are in strictly circumscribed positions.

Friendly relationships

Finally, friends are vastly most likely to be **indoor playmates** in the 1997 study period and the **confidants** in the later waves. This shared position with other non-traditional (or non-central) kin (non-resident fathers, stepfathers and grandparents) points to the importance of meal-sharing to the internal processes of family life. The **indoor playmate** position is also the least structured, so perhaps it isn't surprising to find non-kin in this position.

To summarize these findings, shared meal time comes out as a near-constant factor in family life. All-encompassing "mother" type roles are only present among the youngest children. Mothers tend to "look like" mothers regardless of their residential status while fathers' type of relationship depends more on their residential status. Stepparents look more like distant relatives (not a strongly hierarchal relationship) than friends (peer based). The relational overlap between different traditionally labeled kin types is vast.

3.8 Discussion

I argued that sociologists have examined how parents, stepparents, social parents and siblings share their time with children but they have not yet leveraged their findings about family processes to inform categorical distinctions. I raised several questions that these results can speak to. First – do social parents ever “look like” biological parents? Almost one third (29.8%) of stepfathers in 1997 enact positions that involve physically caring for the focal child, and one fifth of stepfathers (19.3%) in 2002 and 2007 enact the same position as the majority of more involved biological parents (**balanced everyday companion**). Likewise, one quarter (25%) of stepmothers in 1997 enact positions that involve **companions** caring for the focal child and 15% in 2002 and 2007 are **balanced everyday caregivers**. Further, nineteen percent of stepfathers and 25.5% of stepmothers are in the structured, broad position of **everyday companions**. These two groups of active stepparents are, however, the minority and in general, as shown in figure 11, stepparents have different relational profiles than biological parents – particularly biological mothers.

Second, I argued that the presence of a role doesn't mean the incumbent is fulfilling their nominal duties. A mother may be a mother but not a “good” parent. Moreover, there may be several different ways to *be* a mother, where “mother” is a proxy for all traditional role labels. One quarter of biological fathers, and one fifth of

biological mothers are **meal companions** or **restricted caregivers**, reported to only engage in the most basic relations with their children in the 1997 study. As expected, the numbers of **meal companions** and **meal and T.V. companions** are even higher among biological fathers and biological mothers in the later waves, 38% and 32% respectively.

Moreover, while there are mean differences in how much traditionally labeled alters do with the focal children, there exists huge heterogeneity in the positions enacted by long-established roles. Mothers and fathers may be caregivers, but they may also be **indoor playmates** eschewing shared chores and meals. On the other hand, a sizable minority of siblings (12.8%) are **panoptic, active or balanced** caregivers in the 1997 data. Siblings are less likely to take on parental roles as the focal child ages, but 2.4% are **expressive caregivers**.

Finally, Cherlin (1983) has suggested that important roles have emerged before the rights and responsibilities that accompany them. The unintegrated and undefined positions; **stand-in caregiver, confidant, T.V. centered companions, indoor playmate and outdoor playmate** best represent this position, and they are indeed most likely to be enacted by more traditionally peripheral alters. Non-resident mothers and grandparents are most likely to be **stand-in caregivers**, non-resident fathers, stepsiblings, grandparents and friends are most likely to be **confidants**, and the overwhelming majority of **indoor playmates** are stepfathers, non-resident fathers, grandparents and

friends, while **outdoor playmates** are likely to be friends. These results confirm the less institutionalized positions of non-resident parents and stepfathers.

3.9 Conclusion

The single most striking conclusion from these results is: on the ground, neither “Motherhood” nor “Fatherhood” exists in the way they are typically conceptualized. Caregiving, affectionate roles exist, as do more leisure-focused family roles. However, the caregiving, affectionate roles are not occupied overwhelmingly by biological mothers (unless the child is young), and many mothers have a playful relationship with their children. Moreover, many biological parents do very few activities with their children at all, while many social parents are more involved. Focusing on the relationship itself rather than nominal distinctions allows a researcher to ask about important features of the relationship without making assumptions about who does what with whom.

4. Parental relationships with children: Parental gender, biology, co-residence or marriage?

The biological, residential and legal underpinnings of children's relationships with their parental figures are increasingly diverse. Rates of cohabitation, divorce and non-marital child bearing have increased dramatically in over the last five decades. In consequence, a third of children have a nonresidential parent (Stewart, 2010), and nearly a tenth (7.2%) have a either a married or cohabiting stepparent (Sweeny, 2010). Growing evidence suggests that family structure shapes the content of parent-child interactions (Hofferth and Anderson, 2003; Mammen, 2011). This paper identifies the link between family structure and parent-child relationship by using patterns of interaction between children and their caregivers to derive parenting styles. I use this empirically grounded definition of parenting style to establish which parental attributes are most important in structuring the parent-child relationship.

Increasing diversity raises important questions about how four statuses: parental gender, a biological tie, parent-child co-residence and the parent's union type influence the content of parent-child relationships. Simultaneously, the increasing prevalence of previously uncommon combinations of statuses, like cohabiting-social-father, allows us to look at these four dimensions independently (Kalmijin, 2013). This paper extends previous literature in two ways. First, we utilize a novel measure of parenting style

which was derived from common features of relationships as they emerge from day-to-day interactions between children and their caregivers. Second we are able to make all the comparisons of parental statuses simultaneously – first as independent statuses and second in combinations that are commonly used to reference them.

Researchers use time diaries to study the time parents spend with their children. These measures have provided valuable insight into the quantity and quality of parental relationships. Time spent doing childcare (Hook and Chalasani, 2008), investing in children's development (Bianchi and Robinson, 1997), leisure, secondary childcare, and housework (Mammen, 2011) have all been studied using time diary data. However, the method is limited because activities are forced into pre-constructed categories that reflect the researcher's substantive interest. Additionally, and each activity is typically studied in isolation (Mammen, 2011), or summed to reflect total parent-child contact (Sandberg and Hofferth, 2001). Both techniques reduce the complexity of parent-child relationships to a single dimension.

Here I make novel use of time diary data, by allowing the salient characteristics of different types of parent-child relationships to emerge from disaggregated patterns of parent-child interaction (see chapter 2 for details). The result is an ensemble of multifaceted parenting styles, combining activities across different substantive domains which is then used to measure parenting style.

This paper adds to the literature in two ways. First our measure of parent-child relationship styles is derived from patterns of children's interactions within the home rather than pre-defined domains. Second, both the independent effect as well as the intersection of four parental statuses – parental gender, union type, co-residence and shared genetics – are examined.

These advances allow us to answer two questions: Does any single status most strongly differentiate parenting style? How does the intersection of parental gender, union type, co-residence and shared genetics structure parental relationships differently than the independent statuses alone. In what follows I place these four statuses into cultural context, introduce the parent types and provide a brief review of past literature studying the effect of these statuses on the content of parent-child interactions. Then I introduce the measure of parenting style and lay out specific hypotheses derived from the literature.

4.1 Previous literature: Patterns of parent-child relationships by family structure

There are many ways that parental statuses may shape the parent-child relationship. Co-residence and a parent's marital status structure the possibility of contact. Frequency of contact indirectly structures relationship content by bringing parents and children together for more routine, daily activities. The significance of

descent, parental gender and parent's marital status for structuring relational content is socially constructed and often legally reinforced.

Parent-child co-residence and parental marital status influences the content of parent-child relations. A non-residential parent has less opportunity to interact with their child in everyday, routine ways. Marriage (or cohabitation) increases the time a parent has available for children. Single parents who must also provide economically for their household have less opportunity for interpersonal interaction (Kendig and Bianchi, 2008).

Biological parents' rights and responsibilities to their children are legally reinforced while those of social parents are limited and contested (Stewart, 2007). The particular rights and responsibilities that married stepparents have to their partner's children are decided on a state-to-state basis. For example, stepparents may not have authority to make medical decisions, or be granted visitation rights once their union with the child's biological parent has dissolved whether or not they are the child's primary caregiver (Mahoney, 2006). Although their numbers are growing (Bumpass, Raley and Sweet, 1995), cohabiting stepparents are even less institutionally integrated. The lack of stepparents' legal status bars full institutional participation in their stepchild's life.

Gender norms equate femininity (rather than masculinity) with motherhood. Historically, the tender years doctrine legally reinforced gendered divisions in post-divorce childrearing by preferring to place children in the custody of their mothers. This preference has been contested in recent years and courts have begun to shift to a preference for shared custody (Jamison, Coleman, Ganong and Feistman, 2014).

The cultural connection between marriage and fathering behavior has been termed “the package deal” and it describes the idea that a man’s obligation to children depends on his relationship with their mother (Tach, Mincy and Edin, 2010). However, newer models of fatherhood challenge the tenuousness of the father-child relationship (Amato, Meyers and Emery, 2009).

These four statuses independently shape parent-child relations. They also intersect into 20 different unique statuses. Table 9 below illustrates the intersection of biological relatedness and marital status with co-residence and parent’s gender. Biological relatedness refers to the presence (or absence) of a biological tie between the parental figure and the child. Marital status is an individual characteristic of the parent only. It does not indicate whether or not the parental figure is married to the child’s biological parent. Biological parents may be single, cohabiting or married, step (or social) parents may only be cohabiting or married. Co-residence indicates whether or

not a child lives primarily with the parental figure. Finally, parental gender is ascertained by designation of “mother” or “father” title.

Table 9: Parent type by relationship to child and parental attributes

Parent-child co-residence and parental gender	Biological relation to the child and parental marital status				
	Biological Single	Biological Cohabiting	Biological Married	Social cohabiting	Social married
Resident Paternal	Single father	Cohabiting father	Married father	Cohabiting social father	Stepfather
Non-resident Paternal	Non-resident single father	Non-resident cohabiting father*	Non-resident married father	Non-resident cohabiting social father*	Non-resident stepfather
Resident maternal	Single mother	Cohabiting mother	Married mother	Cohabiting social mother	Stepmother
Non-resident maternal	Non-resident single mother	Non-resident cohabiting mother*	Non-resident married mother	Non-resident cohabiting social mother*	Non-resident stepmother

Notes: * Cohabiting status of non-residential parents was not consistently accessible

The table illustrates the complex configurations of the components of parent-child relationships. All possible combinations of parental statuses are presented. The following discussion will review the literature on these distinct statuses, and then each cell of the table. First parent types that transect households, and then parent types that imply a social relationship will be examined.

Married versus cohabiting and single biological parents.

Previous literature shows that marital status is more important for mothers' time spent with children than marital status for the time fathers spend with their biological children. The motherhood mandate holds that mothers are the best and only good caretakers for their children. Mothers are primarily and ultimately responsible for the children's well-being (Offer and Schneider, 2011). Married mothers continue to spend more time caring for their children than do married fathers, partly due to gatekeeping behaviors limiting fathers' interactions (Allen and Hawkins, 1999) although fathers spend more time with their children than in the past (Cabrera, Tamis-LeMonda, Bradley, Hofferth and Lamb, 2000). Rising rates of cohabitation meant that more children were being born outside marriage (Bumpass Raley and Sweet, 1995).

Married mothers have been found to be more engaged with their children than cohabiting (Carlson, Pilkauskas, McLanahan and Brooks-Gun, 2011) and single mothers (Kendig and Bianchi, 2008). Using the 1997 CDS, Hofferth and Anderson, 2003 found that marital status matters less for biological fathers than for social fathers. Cohabiting biological fathers closely resemble married biological fathers. Berger, Carlson, Bzostek and Osborne (2008) and Carlson et al 2011 found that cohabiting fathers are more engaged with their children than married fathers.

Interest in single parents has also called into question the gendered division of labor within the home. In general, the interactions mothers have with their children include more direct care than interactions with their fathers (Fuligni and Brooks-Gunn 2004). However, Hook and Chalasani (2008) found that single fathers spent only slightly less time with their children than single mothers and the share of time that residential, biological fathers spend with their children has been increasing over time (Bianchi 2000).

Non-residential parent-child relationships

A child's biological parents are spread across two households either if their parents lived apart at their birth, or if their parents had been cohabiting or married but subsequently dissolved their union. The majority of children living with one biological parent reside with their mothers. Kendig and Bianchi (2008) and Sandberg and Hofferth (2001) find that single mothers spend less time with their children than married mothers, but in both studies the effect was explained largely by differences in SES and employment status. Single fathers are more engaged with their children than married fathers (Marsiglio, 1991) but remain less engaged than single mothers when they are employed full-time and the child is young (Hook and Chalasani, 2008). There is wide variation in non-residential parent contact, but in general non-resident mothers have more contact with their children than non-resident fathers (Stewart 2010). Non-

residential fathers have become more likely to spend time with their children over the last three decades (Amato et al 2006).

As parents are spread across households, the time non-residential parents spend with their children ranges from never to daily. Relationships with social fathers are another important source of support for children. (Hofferth and Anderson, 2003; Bzostek, 2008) found their support to be as beneficial for children as biological fathers. Understanding all these relationship types is increasingly important to get a clear picture of children's social environments.

Parent-child co-residence has a variable relationship with the time parents spend with their children. The nature of the relationship depends on the parent's gender and marital status. Non-residential mothers have more contact with their children than non-residential fathers, but single non-residential fathers spend more time with their children than married, co-resident fathers.

While the motherhood mandate is the dominant ideology surrounding women's role in relation to their children, Fursetenber and Cherlin (1991) argue that fathers' involvement is contingent on their relationship to the mother in what they call the "package deal". Amato, Meyers and Emery (2009) find that the proportion of nonresident fathers who have weekly contact with their children had risen from under one fifth in 1976 to almost one third (31%) in 2002 which suggests that the role of the

romantic relationship between parents may have declined. Waller and Swisher (2008) report evidence that among low-income parents, the quality of the biological parents' relationship mediates fathers' contact and that in these families, mothers act as gatekeepers. The quality of co-parenting relationship still matters a great deal (Waller, 2012).

Stepparent households

The stepmother relationship is more problematic than the stepfather one, especially if the children remain in contact with their biological mother. The most difficult relationships among biological father-stepmother families were found among families where the children resided full time with the mother and part time with the father and stepmother (Ganong, Coleman and Jamison, 2011; Ambert, 1986). King (2007) found that although children reported feeling closer to their residential stepmother than their biological mothers, there was no relationship between child well-being and closeness to their stepmothers (King, 2007).

Children's relationships with their stepfathers are potentially supportive regardless of whether they are cohabiting with or married to the child's mother. More children report a close relationship with their resident stepfather than their nonresident biological father (35% and 16%) respectively. However, stepfathers have been found to spend less time with their spouse's children than married, biological fathers (Ono, Ono

and Sander, 2013). When children felt close to both their biological fathers and their stepfathers, they had increased well-being (King, 2006). Cohabiting, residential stepfathers spent slightly more time with their partner's children than married stepfathers (Hofferth and Anderson 2003). This pattern was more pronounced among low-income families, where mothers reported their partners spending more time with their children relative to married, biological fathers and engaging in equivalent parenting quality (Gibson-Davis, 2008). Using the same sample, Bzostek (2008) found that unmarried stepfathers' involvement was as beneficial to children as resident biological fathers.

4.2 The current approach: parenting style

4.2.1 Patterns of parent-child relationships derived from time-use data

Much of what we know about parent-child relationships is from studies of how much time is spent together, or a qualitative sense of the quality of the relationship. Other researchers have focused on the internal dynamics of what parents actually do with their children (Hofferth and Anderson, 2003; Mammen, 2011). This paper follows this approach with one important innovation - I allow the important dimensions of relationships to emerge from the micro-interaction patterns of a national sample.

In the previous chapter, Gauthier (2014) develops a novel approach combining network and clustering techniques to classify parent-child relationships captured in the

micro-interactions recorded in time use data. Eighteen distinct relationship patterns emerged (see chapter 2 for a detailed description). These relationship types have been aggregated into five parent-child interaction styles based on their common distinguishing characteristics as they emerged from the time-use data. I aggregated them into five classes to balance the need to have each of the sixteen parent types to be represented in each classes and maintaining the distinct quality of each relation. The five classes are not strictly ordered, although two feature frequent, intense interactions, two feature broad, less frequent and intense interactions and one is very circumscribed. A table providing a concise description of each relationship type, showing the similarities among those classified together can be found in Appendix E.

Relationship types characterized by caring interactions

The *caring* class is composed of four relationship types that include multifaceted interactions and physical care. In addition to providing physical care, all alters in this class play with the child and share meals with the child. **Panoptic caregivers** have all-encompassing relationships with the focal child. The relationship is broad and structured, and the position falls in the first (upper-right) quadrant of the theoretical space. **Active caregivers** have less expansive relationships. **Balanced caregivers** engage in TV centered passive leisure activities, along with indoor and outdoor play. Like **Active caregivers**, their relationships are less expansive than those of **panoptic**

caregivers. Expressive caregivers are characterized by high levels of care and high levels of indoor and outdoor play.

Relationship types characterized by affectionate interactions

The *affectionate* parenting class includes three relationship types with open displays of affection between the parent and child. Parents also do chores with, discipline, talk to and play with the child. **Affectionate playmates** show affection, play games and argue with the focal child. **Expressive, affectionate playmates** are more likely to engage in talking and socializing and they are less likely to do chores with the child than **affectionate playmates** and **tumultuous playmates**. Both **affectionate playmates** and **expressive, affectionate playmates** are in the fourth quadrant (lower-right) of the theoretical space, and one is located in the first (upper-right) quadrant. Their relationships are characterized by active leisure and communication. **Tumultuous playmates** have more negative interactions with the child than alters in the other two positions. While these interactions are the most likely to contain conflict, they are also most characterized by affection. **Tumultuous playmates** are more structured than other broad positions, and they are located in the upper-right quadrant of the space.

Relationship types characterized by limited interactions

Three parent-child relationship types that make up the *limited* class consist entirely of watching T.V. and sharing meals. Some parents in this class provide physical care when the child is young.

Relationship types characterized by entwined living

The *entwined* parenting class is made up of three comparatively variable, less intense relationship types. Parents and children who interact with this style go about their daily lives without constant togetherness but they share many domestic aspects of their days – they play with, talk with, do some chores and show some affection with each other in addition to time spent apart. Alters in the broad, non-care positions eat and drink with the focal child, do chores with, and engage in a variety of active and passive leisure activities, including sports. Unlike the other positions, these are differentiated from each other not so much in the kinds of activities they do with the focal child, rather they have different levels of intensity within the interaction domains. **Everyday companions** do more specific instances of play and housework than the others. **Trusted companions** do more chores and more active leisure activities, focusing on recreation and communication. The interaction profiles of **balanced everyday companions** are low intensity versions of the **trusted companions** and they emerge again in the 2002 and 2007 waves of data.

Relationship types characterized by friendly interactions

Parental figures in the *friendly* class interact with children more as peers than parents in the other three classes but they have more interaction than parents in the *limited* class. The five relationship types that make up the *friendly* class are characterized either by play or communication. **Indoor playmates** are more likely to play indoors with the focal child, while **Outdoor playmates** have more actively oriented interactions.

Alters in cluster **stand-in caregivers** are among the least likely in the entire sample to play with, or talk and socialize with the focal child, and they do not watch TV with the focal child. All **T.V. companions** watch TV with the focal child, but do fewer chores, and spend less leisure time with them than do alters in other clusters on average but otherwise resemble **stand-in-caregivers**. **Indoor playmates**, **Outdoor playmates**, **Stand-in caregivers** and **T.V. companions** emerge in 1997 and do not reappear in 2002 and 2007. Finally, interactions within **confidants** are spread evenly and thinly across activities. They have in common that their interaction set is defined by talking (in person and on the phone) and socializing with the child with very few other interactions.

4.2.2 Plan of analysis: Predicting parent-child relationships:

The analyses will proceed in two stages: first, the independent effect of parent's gender, parent-child co-residence, a biological tie between the parent and child, and the parent's marital status will be measured. We expect that gender will be the strongest independent factor differentiating parenting style. Second the joint effect of these four

statuses will be examined so that we can directly compare the parenting styles of sixteen parental figures with different bonds tying them to either the child or the child's biological parent. The structure of mothers' relationships with their children is likely to depend more on their union status, and less on their residence compared to fathers'. The structure of fathers' relationships will be structured more strongly by their biological relation to the child.

4.2.2.1 Predicting parent-child relationships: Expectations for the independent effect of statuses

We predict which of these five parenting styles based on the expectations for each type of parent defined by their own gender, whether they share co-residence and genetics with the child and their union status as laid out in previous literature.

Parental gender

Previous literature consistently demonstrates that mothers are more involved with their children than fathers. The only case where this gender effect is diminished is among single fathers. Mothers are expected to be overrepresented in caring and affectionate parenting styles. There will be less difference, or no difference between mothers and fathers in the entwined parenting style, and fathers will be overrepresented in the limited parenting style.

Married versus single and cohabiting

Much of the advantage associated with married, two biological parent homes has been attributed to the benefits of marriage. However, the effect of marriage has been shown to be attenuated by class differences in the propensity to marry. We expect to find that married parents are overrepresented in the *caring*, *affectionate* and *entwined* parenting classes but that once household resources are controlled, the difference between married and unmarried (cohabiting and single) parents will be reduced.

Biological versus social relationship to the child

Biological parents will be more likely to be represented in *caring* and *affectionate* parenting classes, and less likely to be in the *friendly* and *limited* ones. The effect will, however, be reduced among all parent types when children are young and require physical care.

Co-residence with the child

Since many non-resident parents have little or no contact with their children, they will likely be overrepresented in either *limited* or *friendly* parenting classes. There may be differences in the effect of co-residence by parental gender because non-residential mothers have more contact with their children than non-residential fathers (Hawkins, Amato and King, 2006).

4.2.2.2 Predicting parent-child relationships: Expectations for the intersection of gender, co-residence, shared biology and marital status

Studying the effects of parental gender, parent-child co-residence, a biological tie and parent's marital status in isolation provides an understanding of how these processes operate on parental relationships without taking into account how they intersect in reality. Parental gender and biology remain central to conventional understandings of how family members should interact. Biological fathers and biological mothers have been conventionally accorded different responsibilities for their children – their physical well-being versus their emotional well-being. Stepparents are accorded fewer rights and responsibilities than biological parents. Partners of biological parents are accorded even fewer. These parental statuses (male versus female, biological versus social) are expected to coincide with each other, and co-residence and marital status to produce different patterns of parental styles depending on their unique configuration.

*Stepmothers and stepfathers (Biology*Gender)*

Stepmothers transgress gender norms, their relationships will likely be the most bifurcated – compared to mothers they will be more likely to be in *limited* parent types, but also likely to be in *entwined* or *caring* relationships – depending on the age of the child. Gender norms are less demanding for fathers, and so more of them will have

limited relationships than mothers. As a result, stepfathers will be more similar to biological fathers than stepmothers are to biological mothers.

*Married, single or cohabiting parents (Marriage*Gender)*

Marriage appears to dampen men's relationships with their children and either does nothing for, or slightly enhances mother's relationships with their children.

*Non-residential mothers and non-residential fathers (Co-residence*Gender)*

Non-resident mothers have more contact with their children than non-resident fathers, however they will be less likely than resident mothers to enact *caring* and *affectionate* parenting styles. Nonetheless, non-resident fathers will look more like resident fathers because fathers are less likely to enact *caring* and *affectionate* parenting styles in the first place.

*Married stepparents and cohabiting stepparents (Biology*Gender*Marriage)*

Results about the effect of marriage on relationships between children and their stepparents are mixed. If we find that married stepparents are more likely to have *caring*, *affectionate* or *entwined* parenting styles than cohabiting stepparents, we expect this difference to be attenuated once the household income of the parental figure is held constant.

*Married non-residential parents and single non-residential parents (Gender*Marriage*Co-residence)*

Both non-resident single mothers and non-resident single fathers will be more likely to have *limited* relationship types. Married, non-resident mothers, however, have the parenting status that is most discrepant with social expectations. These parents will therefore be the least likely to have any of the other (non-limited) parenting styles.

4.3 Data

This paper uses data from the Child Development Supplement of the Panel Study of Income Dynamics. The PSID is a longitudinal, multi-generational survey of the US. Refresher samples of immigrants were added to bring the sample in line with the changing demographics of the population and the sample is representative of the US when child level weights are used (Sandberg and Hofferth, 2001; The Child Development Supplement, 2010).

The data are ideal for a number of reasons. Time diaries are less prone to social desirability than measures asking how many hours per week people do things with their children. The time diaries are from the child's perspective, rather than the parent's. This allows us to compare the time use of parents with all their potential parental figures.

The Child Development Supplement to the PSID was designed to assess processes of social capital accumulation in childhood. The sample is the subset of PSID households participating in 1997 with children aged 0-12 years old. Eighty-eight percent (2380) of eligible households provided information on 3563 children. In 2002-2003 the

supplement was administered again to 2907 children now aged 5-18 and finally in 2007 to those 1506 children who were still less than 18 years old.

The supplement includes a battery of measures assessing physical and mental health, social adjustment and educational motivation and achievement, acquired through interviews with both the focal children and their primary care givers until they were mature enough to provide self-reported information. In addition to these assessments, time diaries, which provide the main data source for this study, were also collected from the primary care giver when the child was very young and by older children themselves in the final wave of collection. Up to two children from each studied household were asked to record their activities all day for one weekday and one day from the weekend. In 1997, time diaries were collected from 2904 children, 2569 in 2002-2003 and 1442 were collected in 1997.

Hofferth (2010) found no significant differences between children who filled out the time diaries and those who did not. Duffy and Sastry (2012) compared the demographic characteristics of the 2007 sample of children in the PSID to the demographic characteristics of the American Time Use Survey, which is widely recognized to have excellent coverage. The original PSID sample overrepresented low-income, black respondents. Duffy and Sastry (2012) found that when unweighted, children in the lowest income quantile are overrepresented and when the data are

weighted they are slightly (but significantly) underrepresented. In total, 3325 children provided information about their interactions with 10634 parental observations across the three waves.

I pooled the 1997, 2002-2003 and 2007 samples of children for the following analyses. Observations are weighted using population weights adjusting for selection and attrition. Robust standard errors are used to cluster parents within children and a dummy term is used to capture differences in parenting styles across years.

4.4 Measures

Independent variables

Parental relationships are disaggregated into the marital status and gender of the parent as well as whether they reside with the respondent by using the household rosters provided in the main PSID. This detailed scheme differentiates single, married and cohabiting mothers from single, married and cohabiting fathers, whether or not these reside with the focal child and does the same for their spouses/cohabiting partners, resulting in 16 types of parents. These distinctions allow us to measure which of these statuses (consanguinity, co-residence, legal union) matter in structuring behavioral profiles with the focal children and how they map on to these patterns.

Parents filling out the time use diaries were instructed to code cohabiting stepparent as “Other nonrelatives.” If the parent filling out the time diary was also the

householder, and the household roster indicated they were currently cohabiting with a partner at the time the time diary was filled (or one year later in the 2002 sample), and this person was interacting with the child within their home, the person was assigned to the “cohabiting stepparent” category. This approach was similar to Hofferth and Anderson (2003), who also employed the 1997 CDS.

Control variables: Child characteristics

A child’s age strongly structures not just time spent with parents or other caregivers, but also the character of the relationship. While a young child requires physical and emotional care, an older child requires less physical assistance but ideally continues to have emotional support from their parental figures. The literature on gender has focused on time spent together, not on the quality of relationship. Fathers are known to spend more time with boys, and more time with girls when they have brothers (Cooksey and Fondell, 1996). These analyses will establish the kinds of relationships fathers have with their sons and daughters.

Control variables: Household characteristics

Parent’s time and financial resources are two critical household resources that can shape how parents interact with their children (Hofferth and Anderson, 2003). Hofferth (2006) found that the deleterious effect of living with a single father was completely attenuated by economic factors, and that of living with a mother’s partner

was also reduced. Kendig and Bianchi (2008) found that single mothers spend less time with their children on average, but more time with them once economic factors are accounted for. The number of siblings in the child's household has the potential to dilute parent attention (Folbre et al 2005; Bryant and Zick 1996).

Parent's household income was measured using the PSID caregiving map which links every child to both their biological parents' households, whether or not they currently co-reside. This was possible because the PSID follows its respondents through households as they split and grow and each household head is asked for their household income, in addition to their individual income. Child's age, gender and the number of siblings currently residing with them were also measured using parent's reports of household attributes.

Multinomial logistic regressions are used to predict parenting style. First each status is modeled as an independent effect. The relative contribution of each status is compared to a baseline model of child and household characteristics. Second, parenting style is regression on all parent types as they intersect biological, residential, gender and marital statuses.

4.5 Results

Univariate sample characteristics: Child characteristics

Descriptive statistics for the sample at the time of the three time diary collections are shown in Table 10 below. Two thousand, eight hundred and ninety-six children, participating in the PSID were eligible to take part in the Child Development Survey, and had completed time diaries naming at least one alter (only eight children reported none). The average child reports interactions with between one and two parents in 1997, one parent in 2002 and only half of the children report interactions with a parent in the 2007 sample. This number is lower than the number of people they interact with in any setting throughout the day because only interactions that are specifically focused on an interpersonal interaction taking place within a home are under study. Personal care, sleeping and reading alone would all be excluded even if a parent is present because those activities lack an inherently social component. Interactions in formal institutions like school and work were also excluded to focus in on domestic interactions. In total, 10634 parent-child relationships are observed from the interactions of 3204 children and their parental figures.

Table 10: Description of sample at three time points

Sample description	1997	2002	2007	Pooled sample
<i>Child characteristics</i>				
Number of children	2896	2552	1424	3204
Mean number of parents	1.71 (0.50)	1.18*** (0.89)	0.58*** (0.87)	1.30 (0.85)
Average age (years)	6.65 (3.79)	11.56*** (3.59)	14.03*** (2.15)	9.61 (4.54)
Proportion Female	0.49 (0.50)	0.50 (0.50)	0.49 (0.50)	0.49 (0.50)
<i>Household characteristics</i>				
Median household income	43290	64140***	67520***	
Number of siblings	1.44 (0.14)	1.51*** (0.10)	1.53 (0.08)	1.48 (0.01)
<i>Parental characteristics</i>				
Number of parents	4757	3835	2042	10634
Proportion married	0.78 (0.34)	0.79 (0.33)	0.78 (0.34)	0.78 (0.34)
Proportion female	0.55 (0.49)	0.55 (0.49)	0.55 (0.49)	0.55 (0.05)
Proportion biological	0.98 (0.05)	0.97† (0.06)	0.96 (0.08)	0.97 (0.00)
Proportion co-resident	0.94** (0.12)	0.92 (0.15)	0.91 (0.16)	0.92 (0.14)

Notes: Standard errors are adjusted for within child dependence, and data are weighted using focal child's weights.

An asterisk indicates a significant difference from the mean value of the prior observation year.

†p<.10. *p<.05. **p<.01. ***p<.001.

The average age of these children was 6.65 years in 1997 and rises to 11.56 in 2002 and 14.03 in 2007. The ages are not evenly five years higher at every survey because of significant attrition caused by both a failure to complete time diaries and because

children become ineligible when they turn eighteen¹. About half the sample is female in all three waves of data collection. Two thousand, one hundred and thirty-nine of these children continue on with completed time diaries in 2002 and 413 new children complete time diaries. Twelve hundred and thirty one of these 2552 children continue to provide completed time diaries into 2007 and 193 children who didn't submit completed time diaries in 2002 submit them in 2007.

Univariate sample characteristics: Household characteristics

Median annual household income of the sample in 1997 is \$43290, significantly lower than the later observations, possibly reflecting the attrition of lower income households (Daffy and Sastry, 2012). The number of siblings in residing with the children rises from 1.44 in 1997 to 1.53 in 2007.

Univariate sample characteristics: Parental characteristics

Four thousand, seven hundred and fifty-seven parents were observed in 1997, significantly more than the 3835 observations in 2002, and 2042 in 2007, reflecting the children's growth into adolescence. The proportion of these parents who are married remains roughly constant at about two thirds throughout the study. Biological ties are the vast majority compared to social ties, but they decline slightly over time from 98% of

¹ Child level weights are re-calculated for each year of the study to adjust for attrition (Hofferth, 2010).

parents to 96%. A higher proportion of children live in households that contain social parents, but they do not report interacting with them inside the home. More parents are female than male – just over 55% are maternal figures. Resident parents are more common than social parents but the proportion declines from 94% in 1997 to 91% in 2007.

Bivariate statistics: Parenting style by type of relationship

Table 11 below describes the distribution of parents in each parenting style. It provides the total number of each of the 16 parent types and their parenting style.

Bivariate statistics: Biological parents

Almost a quarter of partnered mothers and almost a third of single mothers and all fathers have a limited parenting style. Although almost twice as many biological married mothers have caring and affectionate parenting styles than residential biological fathers, and non-residential single mothers are more likely than non-residential single fathers to have an affectionate parenting style, the pattern is reversed among non-residential married parents. More non-residential married fathers have caring interactions with their children. They are also more likely to have friendly parenting styles, while married non-residential mothers are more likely to have limited parenting styles.

Bivariate statistics: Social parents

In general, social mothers (stepmothers and cohabiting stepmothers) are far less likely to engage in physically caring or affectionate parenting styles than their biological counterparts. However, over a third of stepmothers and almost all cohabiting stepmothers have entwined relationships with their partner's children. Social fathers resemble biological fathers more closely because they are also less likely to have physically caring, or affectionate parenting styles. Cohabiting stepfathers are less likely to have a limited parenting style than biological fathers – however they are more likely to have the other less engaged friendly parenting style. There are only a handful of non-resident stepparents in the sample as they had to interact with the children inside a home to be included. Those in the sample have either limited or entwined relationships with their partner's children, except for a few non-resident stepmothers who are friendly towards them.

Table 11: Percentage of parent-type in each relationship category

Parent type	Caring	Affectionate	Limited	Entwined	Friendship	N
Married						3916
mother	17.35	7.32	24.96	39.28	11.1	
Cohabiting						391
mother	28.37	5.32	24.82	31.21	10.28	
Single mother	15.75	2.37	34.72	33.21	13.95	1593
Married father	10.9	3.82	32.1	38.22	14.97	3287
Cohabiting						
father	14.84	2.58	30.97	24.52	27.1	189
Single father	5.26	1.32	51.32	28.95	13.16	89
Non-resident						
married						37
mother	0	0	33.33	54.76	11.9	
Non-resident						
single mother	9.6	8	34.4	36	12	153
Non-resident						
married father	3.88	0	33.98	39.81	22.33	116
Non-resident						
single father	6.7	1.79	38.17	29.69	23.66	517
Stepmother	9.09	3.03	27.27	27.27	33.33	35
Cohabiting						
stepmother	11.76	0	47.06	35.29	5.88	21
Non-resident						
stepmother	0	0	46.88	34.38	18.75	35
Stepfather	6.12	0	41.5	31.29	21.09	154
Cohabiting						
stepfather	8.57	0	32.86	32.86	25.71	92
Non-resident						
stepfather	0	0	70	20	10	9
Total N					10634	

Notes: Total counts are unweighted, percentages are weighted by child level weights.

Together these raw differences suggest that parental gender most strongly differentiates parenting style. In general non-resident parents are more likely to have

either limited or friendship parenting styles. Marital status, without other statuses taken into consideration has an inconsistent relationship with parenting style. Marital status is also the most likely status to have its effect attenuated once income differences are held constant. Co-residence differentiates relationships among partnered (either married or cohabiting) biological parents. Marital status may have a larger role in distinguishing mother-child relationships and that non-resident married mother-child relationships are among the most challenging. Socially constituted relationships between father figures and their partner's children are more similar to biological father-child relationships.

Multivariate results

Predicting parent-child relationships: Independent effect of statuses

In the following multivariate analyses, I conduct two series of multinomial logistic models. I begin with a baseline model of parenting style based on child characteristics (age and gender). I then add each status to this baseline, one at a time to assess the contribution of each status to parenting style. The four substantive models are non-nested, each containing three terms – the two baseline terms and a dummy term for the presence of each status (female parent, biological tie, married and co-resident).

Household income and the number of siblings a child has have been shown to have opposite effects on parent-child relationships. While higher household income enhances parent-child relationships, the presence of more siblings may decrease it,

leaving time for only limited interactions. The second series of models adds household characteristics to each regression.

Model fit

This section of results asks which independent parental status contributes most to structuring parent-child relationships. Table 12 below shows the fit statistics for each model.

Table 12: Fit statistics of models of parenting style by independent parental statuses

Fit statistics of models of parenting style by independent parental statuses

	Child attributes and selected parental status					Child and household attributes and selected parental status				
	Child attributes	Parental Gender	Descent	Marriage	Co-residence	Child and Household attributes	Parental Gender	Descent	Marriage	Co-residence
N	10634	10634	10634	10634	10634	10634	10634	10634	10634	10634
Log Likelihood	-211156	-213644	-213176	-212829	-212789	-212334	-209452	-211877	-211768	-211416
BIC	-96280	-101219	-97178	-97873	-97953	-97551	-103279	-98428	-98647	-99351
AIC	427328	422360	426401	425706	425626	424725	418968	423819	423600	422897
BIC difference from Baseline		4939	898	1593	1673		5728	877	1096	1800
AIC difference from baseline		4968	927	1622	1702		5757	906	1125	1828

The baseline model provides baseline BIC and AIC statistics against which the other models are compared – the models with the largest differences being the most likely to produce the data. Previous literature has indicated that the effect of marital status on parenting styles is partly explained by income differences in the propensity to

marry. I test this hypotheses directly in the models below, shown in table 13. Parental gender provides by far the best model fit, followed by co-residence, marriage and finally descent. Marital status and co-residence contribute almost identically to model fit. These results show the importance of opportunity for contact within the household for building relationships. A biological tie to the child is both less important, although it still matters.

The second model adds household characteristics – household income and siblings to the baseline. With these two background characteristics held constant, the importance of marriage falls relative to co-residence and becomes more comparable to the lesser importance of descent.

Direction and strength of statuses

The two models shown below in table 13 predict the log odds of a parent enacting a non-limited parental style (caring, affectionate, entwined and friendly) relative to a limited one. The first model shows the combined effects of child's age and gender, parental gender, co-residence, a biological tie and marital status. The second in the continued table adds income and siblings to the model.

Table 13: Full models of parenting style by independent parental statuses

Full models of parenting style by independent parental statuses				
Relative to Limited parenting style				
	Caring	Affectionate	Entwined	Friendly
Intercept	0.736	-2.395*	-1.155***	1.308***
Age	-0.316***	-0.318***	-0.068***	-0.033*
Female (child)	0.349***	0.430**	0.230**	0.304**
Logged household income				
Female (parent)	1.011***	1.175***	0.249***	0.005
Co-resident	0.416	-0.165	0.095	-0.421*
Married	0.253*	1.070***	0.418***	0.003
Descent	0.219	1.851*	0.355*	-0.526*
Year 2002	-1.109***	-0.906***	1.317***	-2.575***
Year 2007	-0.960***	1.056***	1.661***	-2.209***
BIC	-104265			
AIC	419227			
Log-likelihood	-209577			

Notes: Data weighted with focal child's weights.

10634 dyads are nested within 3204 children, standard errors are adjusted for within child dependence

p †<.10. *p<.05. **p<.01. ***p<.001.

Table 13 continued: full models of parenting style by independent parental statuses

Intercept	-2.842**	-7.363***	-1.992***	0.788
Age	-0.328***	-0.333***	-0.072***	-0.035*
Female (child)	0.358***	0.439**	0.239**	0.313**
Logged household income	0.350***	0.484***	0.095†	0.073
Female (parent)	1.056***	1.228***	0.259***	0.012
Co-resident	0.682**	0.106	0.141	-0.388*
Married	-0.038	0.676**	0.346***	-0.057
Descent	0.207	1.766*	0.356*	-0.529*
Year 2002	-1.179***	-1.022***	1.307***	-2.573***
Year 2007	-1.069***	0.882**	1.641***	-2.217***
BIC	-105636			
AIC	416524			
Log-likelihood	-208218			

Notes: Data weighted with focal child's weights.

10634 dyads are nested within 3204 children, standard errors are adjusted for within child dependence

p †<.10. *p<.05. **p<.01. ***p<.001.

Child characteristics

Parent-child relationships become increasingly likely to be characterized by a limited set of interactions (eating, drinking and watching T.V. together) as the child ages. Parent-daughter relationships are more likely to be any of the four non-limited styles than are parent-son relationships.

Household characteristics

The log odds of a parental figure enacting a caring, affectionate or entwined parent style increase with household income relative to a limited parenting style. There

is no effect on the relative probability of having an entwined or friendly parent. Number of siblings in contrast, has no effect on the relative odds of a caring or affectionate parent, but as the number of siblings a child has increases, the log odds of an entwined or friendly parent decrease. This suggests that engaged parents may have more children.

Parent characteristics: Parental gender

Maternal figures are more likely to have a caring, affectionate or entwined parenting style than paternal figures – but they are equally likely to be friendly with their children. This effect remains across model specifications, and is even slightly stronger among the affectionate parenting style once household characteristics are controlled.

Parent characteristics: Parent-child co-residence

Parental figures who co-reside with their children are less likely to be friendly with them than those who live apart. This suggests that a friendship type relationship is the most likely to develop between non-residential parents and their children. When household income and number of siblings are held constant, co-resident parents remain less likely to be friendly with their children, and they are more likely to have caring parenting styles.

Parent characteristics: Parental marital status

Married parents are more likely to have caring, affectionate and entwined parenting styles compared to cohabiting and single parents. This relationship broadly remains when income and siblings are controlled, but the marriage effect no longer significantly differentiates the log odds of having a caring parenting style and the magnitude of the effect on the log odds of having affectionate and entwined relationships is diminished.

Parent characteristics: Biological versus social relationship

Parental figures with a biological relationship to the child are more likely to have an affectionate or entwined parenting style, and they are less likely to have a friendly parenting style. They are not significantly more likely to enact a caring parenting style. The magnitude of the effect of a biological relationship is largely undiminished when background characteristics are held constant.

Summary

These results provide clear evidence that parental roles are strongly differentiated by gender, regardless of others parental statuses. They are in line with past studies that show that married parents are more engaged with their children, but also that this effect is largely a product of selection into marriage. Nonetheless, married parents were found to be more likely to enact an affectionate parenting style towards their children regardless of household income.

Predicting parent-child relationships: Expectations for the intersection of gender, co-residence, shared biology and marital status

The results so far treat each parental status as independent. In reality these statuses are unlikely to combine in straightforward ways, instead reflecting the complexity of gender norms and negotiating cross-household relationships. The results below contain a distinct term for all sixteen types of parental relationships that were found in the data. This analysis allows comparisons between all different combinations simultaneously. The limited relationship type is once again used as the reference category of parenting style. Married, biological fathers serve as the reference parenting type in the table below, another analysis will show the results with married biological mothers serving as the reference parenting type. These comparisons will allow for an easier comparison of results with previous literature. The first model includes child characteristics with the parenting types of interest and the second incorporates household background characteristics.

Table 14: Log odds of a having a limited parental relationship relative to biological, married fathers by parent type

Log odds of having a limited parental relationship relative to biological, married fathers, no household characteristics

Relative to Limited parenting style	Caring: Limited	Affectionate: Limited	Entwined Friendship: Limited	Friendship: Limited
Intercept	1.261***	-0.04	-0.522***	0.005
Age	-0.315***	-0.315***	-0.068***	-0.030*
Gender	0.343***	0.404**	0.227**	0.306**
Number of siblings				
Household income				
Married mother	1.059***	1.213***	0.250***	0.085
Cohabiting mother	0.973***	0.407	-0.168	0.029
Single mother	0.760***	-0.033	-0.085	0.029
Cohabiting father	-0.375	-1.428*	-0.458	0.398
Single father	-0.581	-1.059	-0.325	-0.512
Non-resident married mother	-0.522	-18.116***	-0.719	0.371
Non-resident single mother	0.168	0.942*	0.204	-0.18
Non-resident married father	0.005	-17.957***	-0.38	0.736
Non-resident single father	-0.339	-0.804	-0.517**	0.627**
Stepmother	0.492	0.254	-0.431	0.882
Cohabiting stepmother ^a	0.326	-0.332	-0.362	-17.885***
Non-resident stepmother ^b	-17.498**	-18.634***	-0.767	-0.123
Stepfather	-0.556	-18.398***	-0.560*	0.379
Cohabiting stepfather	1.991	-17.346***	0.173	2.979***
Non-resident stepfather ^c	-17.482***	-17.972***	0.551	-0.826
Year: 2002-2003	-1.118**	-0.891**	1.322***	-2.611***
Year: 2007	-0.955**	1.079**	1.670***	-2.248***
BIC	-104991			

Notes: Data are weighted with child level weights

10634 dyads are nested within 3204 children, standard errors are adjusted for within child dependence, and data are weighted using focal child's weights.

p †<.10. *p<.05. **p<.01. ***p<.001.

Table 14 continued: Full model of having a limited parental relationship relative to biological, married fathers.

Relative to limited parenting style	Caring	Affectionate	Entwined	Friendship
Intercept	-2.239**	-4.937***	-1.540**	-0.506
Age	-0.327***	-0.330***	-0.071***	-0.032*
Gender	0.358**	0.422**	0.236**	0.314**
Number of siblings	-0.072	0.015	-0.102**	-0.160**
Household income	0.339***	0.457***	0.110*	0.069
Married mother	1.071***	1.228***	0.249***	0.088
Cohabiting mother	1.189**	0.697	-0.105	0.089
Single mother	1.074**	0.393	0.009	0.08
Cohabiting father	-0.215	-1.214	-0.382	0.447
Single father	-0.576	-1.032	-0.296	-0.474
Non-resident married mother	-0.243	-17.684***	-0.632	0.423
Non-resident single mother	0.193	1.017*	0.231	-0.163
Non-resident married father	-0.024	-17.910***	-0.387	0.723
Non-resident single father	-0.397	-0.839	-0.517**	0.632**
Stepmother	0.544	0.373	-0.437	0.884
Cohabiting stepmother ^a	0.785	0.089	-0.269	-17.815***
Non-resident stepmother ^b	-17.252***	-18.319***	-0.713	-0.091
Stepfather	-0.507	-18.301***	-0.548*	0.39
Cohabiting stepfather	2.053	-17.251***	0.197	3.001***
Non-resident stepfather ^c	-17.373***	-17.773***	0.576	-0.835
Year: 2002-2003	-1.190***	-1.006***	1.307***	-2.607***
Year: 2007	-1.067***	0.904**	1.642**	-2.255***
BIC	-106263			

Notes: Data are weighted with child level weights
10634 dyads are nested within 3204 children, standard errors are adjusted for within child dependence, and data are weighted using focal child's weights.
p †<.10. *p<.05. **p<.01. ***p<.001.

Predicting parenting style relative to married, co-resident biological fathers: Caring parenting style

Co-resident, biological mothers – regardless of marital status are significantly more likely than co-resident fathers to enact a caring parental style. Non-resident

stepparents, of both genders, and stepmothers on the other hand are significantly less likely to enact this parenting style. Fathers' marital status does not significantly differentiate their relative log odds of having a caring parenting style relative to a limited one.

Predicting parenting style relative to married, co-resident biological fathers: Affectionate parenting style

The pattern of affectionate parenting style contrasts strongly with the caring style. Married mothers are more likely to enact an affectionate parenting style, but cohabiting and single mothers are not. Single, resident fathers are equally likely and cohabiting fathers less likely to enact affectionate relationships compared to married, co-resident, biological fathers. However, table 14, continued (below) shows that when household income is held constant, cohabiting fathers are no longer significantly different from married fathers. Both married and cohabiting stepfathers, who were undifferentiated from co-resident biological, married fathers in the caring style, are less likely to enact a relationship with affection as a defining characteristic. All non-residential stepparents are less likely to enact an affectionate parenting style.

Predicting parenting style relative to married, co-resident biological fathers: Entwined parenting style

Once again, married mothers are the only parent type more likely to enact an entwined parenting style. Married stepfathers and non-resident single fathers are less likely than married fathers to enact an entwined parenting style. This relationship remains after the household income of the parent is held constant.

Predicting parenting style relative to married, co-resident biological fathers: Friendly parenting style

Non-resident single fathers and cohabiting stepfathers are more likely than married fathers to be friendly with their (step)children. There are no differences in the probability of a friendly father-child relationship by fathers' marital status. Single and cohabiting fathers are not more likely to have friendly relationship with their children.

In the following analyses in table 15 below, co-resident, married, biological mothers are the reference group in place of fathers. Limited parenting style remains the reference group against which the other parenting styles are measured. Comparisons between married fathers and all types of mothers were discussed in the previous table and they will not be discussed here.

Table 15: Log odds of a limited relationship relative to married, biological mothers.

Log odds of having a limited parental relationship relative to biological, married mothers, no household characteristics

Relative to Limited parenting style	Caring: Limited	Affectionate: Limited	Entwined: Limited	Friendship: Limited
Intercept	2.320**	1.173***	-0.272	0.09
Age	-0.315**	-0.315**	-0.068**	-0.030*
Gender	0.343**	0.404**	0.227**	0.306**
Number of siblings				
Household income				
Cohabiting mother	-0.085	-0.806	-0.418	-0.056
Single mother	-0.299*	-1.246***	-0.335***	-0.057
Married father	-1.059**	-1.213***	-0.250***	-0.085
Cohabiting father	-1.434***	-2.641***	-0.708*	0.313
Single father	-1.640**	-2.272*	-0.575	-0.597
Non-resident married mother	-1.581	-19.329***	-0.969*	0.286
Non-resident single mother	-0.891*	-0.271	-0.046	-0.265
Non-resident married father	-1.053	-19.170***	-0.630*	0.651
Non-resident single father	-1.398**	-2.016***	-0.767***	0.542*
Stepmother	-0.567	-0.959	-0.681	0.797
Cohabiting stepmother ^a	-0.733	-1.545	-0.611	-17.971***
Non-resident stepmother ^b	-18.557***	-19.847***	-1.016	-0.208
Stepfather	-1.614**	-19.610***	-0.810***	0.294
Cohabiting stepfather	0.932	-18.559***	-0.077	2.894***
Non-resident stepfather ^c	-18.541***	-19.185***	0.302	-0.911
Year: 2002-2003	-1.118**	-0.891**	1.322**	-2.611**
Year: 2007	-0.955**	1.079**	1.670**	-2.248**
BIC	-104991			

Notes: Data are weighted with child level weights

10634 dyads are nested within 3204 children, standard errors are adjusted for within child dependence, and data are weighted using focal child's weights.

p †<.10. *p<.05. **p<.01. ***p<.001.

Table 15 continued: Full model of having a limited parental relationship relative to biological, married mothers.

Relative to limited style	Caring	Affectionate	Entwined	Friendship
Intercept	-1.168	-3.710***	-1.291*	-0.418
Age	-0.327***	-0.330***	-0.071***	-0.032*
Gender	0.358***	0.422**	0.236**	0.314**
Number of siblings	-0.072	0.015	-0.102**	-0.160**
Household income	0.339***	0.457***	0.110*	0.069
Cohabiting mother	0.118	-0.531	-0.354	0.002
Single mother	0.004	-0.835***	-0.241*	-0.007
Married father	-1.071***	-1.228***	-0.249***	-0.088
Cohabiting father	-1.286***	-2.442***	-0.631*	0.359
Single father	-1.647***	-2.260*	-0.545	-0.561
Non-resident married mother	-1.314	-18.911***	-0.881	0.336
Non-resident single mother	-0.878*	-0.211	-0.018	-0.251
Non-resident married father	-1.094	-19.138***	-0.636*	0.635
Non-resident single father	-1.467***	-2.066***	-0.766***	0.544*
Stepmother	-0.527	-0.855	-0.686	0.797
Cohabiting stepmother ^a	-0.285	-1.139	-0.518	-17.903***
Non-resident stepmother ^b	-18.322***	-19.547***	-0.963	-0.179
Stepfather	-1.578**	-19.528***	-0.797***	0.303
Cohabiting stepfather	0.983	-18.479***	-0.052	2.913***
Non-resident stepfather ^c	-18.443***	-19.001***	0.327	-0.923
Year: 2002-2003	-1.190**	-1.006**	1.307***	-2.607***
Year: 2007	-1.067***	0.904*	1.642***	-2.255***
BIC	-106263			

Notes: Data are weighted with child level weights
10634 dyads are nested within 3204 children, standard errors are adjusted for within child dependence, and data are weighted using focal child's weights.
p †<.10. *p<.05. **p<.01. ***p<.001.

Predicting parenting style relative to married, co-resident biological mothers: Caring parental style

All father types, except cohabiting stepfathers are less likely than married mothers to enact a caring parenting style. Perhaps more surprisingly is that single mothers are less likely to do so as well. However, this effect is small, and insignificant when household characteristics are controlled. Non-resident single mothers are also less likely to enact a caring role.

Predicting parenting style relative to married, co-resident biological mothers: Affectionate parenting style

All father types, this time including cohabiting are less likely than married mothers to enact an affectionate parenting style. Single mothers are also less likely to be affectionate, even after differences in background household characteristics are controlled. Neither married nor cohabiting stepmothers are significantly less likely to enact an affectionate parenting style.

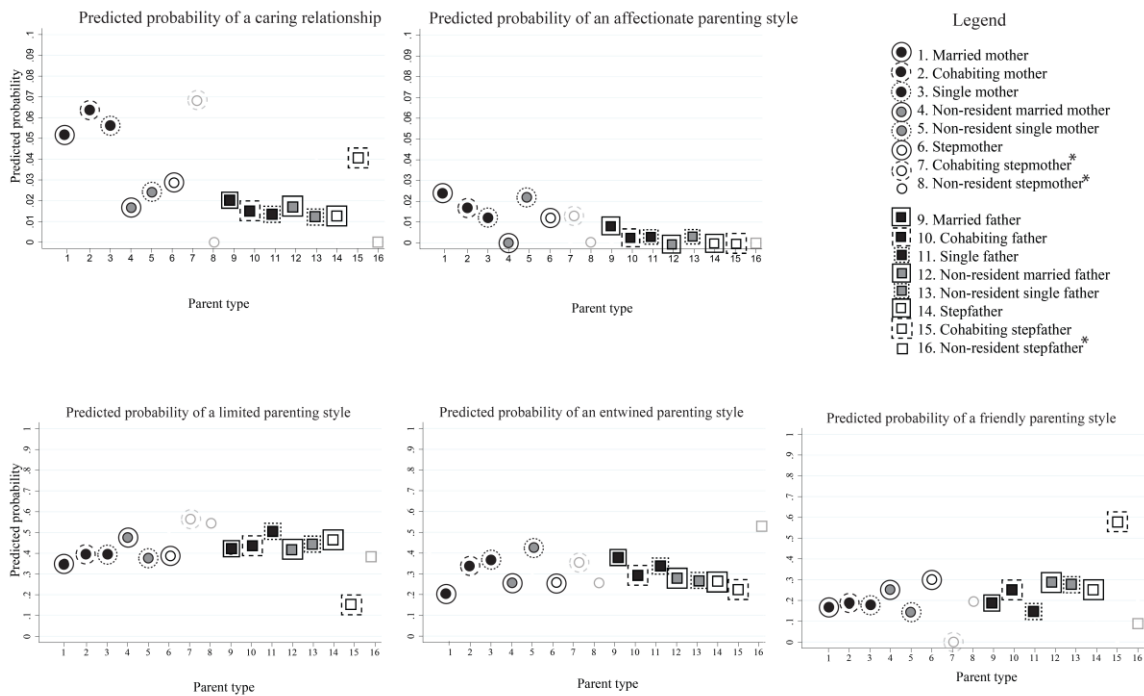
Predicting parenting style relative to married, co-resident biological mothers: Entwined parenting style

Single mothers, married and cohabiting father, non-resident married mother and father, non-resident single fathers, married and cohabiting stepfathers are less likely to be entwined parents.

Predicting parenting style relative to married, co-resident biological mothers: Friendly parenting style

Non-resident single fathers and cohabiting stepfathers are more, cohabiting stepmothers less likely to have friendly parenting styles.

The predicted probabilities of having each of the five parenting styles from the full multinomial logistic regression models are plotted in figure 11. below. Predicted probabilities are based on the parental figure with median household income, of a 12 year old boy who has one sibling. Shapes indicate parental gender. Maternal figures are depicted as circles, paternal figures as squares. Colors indicate the type of tie (biological or social) binding the parental figure to the child, and the biological parent's residential status. Black shapes indicate a co-resident biological relationship, grey a non-residential biological relationship and white a social relationship. The border of the shape indicates the parental figure's marital status. Married parental figures are indicated by a solid border, shapes representing cohabiting parental figures have a hashed border, and shapes representing single parents have a dotted border.



Notes: Predicted probabilities are based on the parental figure of a 12 year old boy with median income and one sibling
 An asterisk indicates a very small number (N<35) of observations
 Maternal figures are represented as circles, paternal figures as squares
 Black fill colors indicate a co-resident biological relationship, grey a non-residential biological relationship, and white a social relationship
 Married parents are outlined in solid, cohabiting in hashed and single in dotted lines.

Figure 12: Predicted probabilities of enacting each parenting style by sixteen parent types

Figure 12 shows that maternal figures are more clearly defined and differentiated. They are more clearly defined because there are larger differences among different types of mothers than among different types of fathers. They are more differentiated because the relative intensity of biological, married fathers' relationships is far less predictable than biological married mothers'. Married mothers are more reliably predicted to have caring, affectionate and entwined relationships.

The plot also shows that stepmothers are bifurcated in the contents of their relationships with their stepchildren. Like biological mothers, they are more likely than fathers to have caring and affectionate relationships with their stepchildren, but they are also more likely than mothers to be friendly with their stepchildren. This is possible because they are proportionately less likely to have entwined, everyday relationships with their stepchildren.

4.6 Discussion and conclusion

Stepmothers are less likely to enact entwined parenting styles than married mothers, they are not statistically less likely to be actively engaged with their stepchildren than married fathers are with their biological children. Stepparents of both genders are more likely than their biological counterparts to enact friendly relationship types with their partners' children.

The moderating effect of marital status on the parent-child relationship depends on the parent's gender. Marital status differentiates the probability that mothers, but not fathers have an affectionate parenting style. While cohabiting fathers are less likely to have an affectionate relationship with their children than married fathers, the difference is reduced when the fathers' household income is held constant. The difference between married and single mothers however, remains significant after controls. On the other hand, single mothers are more likely to be caregivers than single fathers.

Biology on the other hand, appears to play a larger role for fathers' parenting style compared to fathers in predicting affectionate and entwined relationships.

Stepmothers are not significantly less likely to take on any of the active parenting styles than married mothers, but stepfathers are less likely to be affectionate or entwined than biological fathers. It is important to note, however, that stepfathers are not significantly less likely to have a caring parenting style.

Co-residence matters more for the character of mothers' relationships with their children than it does for fathers'. Both are less likely to have an affectionate parenting style, but mothers are also less likely to have an entwined one as well, although they are not when differences in household income are controlled.

Parental gender, more than any other single status comes to the forefront in structuring parenting styles. Within gender, being single reduces the probability that a mothers will have an affectionate parenting style, and that a father will be a caregiver.

Non-resident married parents of both gender are less likely than their resident, married counterparts to have an affectionate parenting style. Single non-resident mothers resemble married mothers, while single non-resident fathers are more likely to be friendly with their children than married, resident fathers. This finding is in keeping with previous work showing non-resident mothers have more frequent contact with their children than non-resident fathers.

These results show that the relationship between commonly used measures of parental status (like co-residence, marital status, gender or biological tie) and parenting-style exists depends on which aspect of the parent-child relationship is being measured. Friendly relationships are more closely mapped on to stepparenthood than limited ones even though neither are characterized by a less integrated set of relations. Marital status is associated with different kinds of parent-child relationships when the parent is a mother versus a father. Together these results show that allowing salient relationship features to emerge from time use data is fundamental to understanding how parent-child relationships differ by parents' attributes and household characteristics.

5. Systems of overlapping relationships: A portrait of American families

Massive shifts in demographic processes including increased cohabitation, divorce and non-marital child bearing, have resulted in a rapid proliferation of diverse family structures. A normative shift away from functional idealizations of the nuclear family towards diverse understandings of multiple family forms has followed (Scanzoni, 2001), although not without considerable resistance (Adam, 2003; Powell, 2012). The connection between family structure and social roles has been weakened by structural changes, leaving the latter ambiguous, opaque, and negotiable among both traditional (Cherlin, 2004) and new (Cherlin, 1978) family forms.

In contrast to a growing fluidity in the conceptualization and experienced reality of family life, categorical approaches to measuring family structure continue to count the presence or absence of pre-defined roles, even though they may not accurately reflect family processes. How can we define families without imposing artificial homogeneity? Here, I offer a modern twist on a classic solution for the contemporary problem. I use network methods to show how family relationships cohere into family systems.

A family is a system of interlocking relationships (White, 1963). Systems have emergent, higher order properties rooted in the complex dependencies of their subsystems that cannot be reduced to a simple aggregation. Focusing on families as

systems allows us to classify families by their emergent properties. What kinds of relationships go together to cohere into families? While any combinations are possible, only a small number empirically emerge.

In what follows, I introduce families as systems, stressing the importance of an approach which allows configurations of relationship types to emerge from observed families. I first examine the diversity of family systems, drawing on theories of social organization to understand family's internal structure. Second, I test whether socioeconomic household characteristics differentiate the family systems.

5.1 Conceptualizing families as systems

Families are systems of interdependent subsystems. In sociology, the foundation for a systems theory approach to studying families was laid by Simmel (Levine, Ellwood and Gorman, 1976). His most salient contribution to the current problem was in developing a model of dynamics within subsystems (dyads and triads) as they relate to the dynamics of larger agglomerations (Simmel 1908). In their review of clinical family research, Cox and Paley (2003) define three principles of systems theory that apply to families. First, systems are greater than the sum of their parts. Systems have emergent properties that can't be reduced to simple aggregations of their subsystems. Secondly, family systems are composed of interdependent subsystems – the individuals involved taken in pairs (dyads) and triplets (triads), each with their own internal dynamic.

Finally, family systems self-organize in response to change and challenges from within, and from external forces.

Sociologists and family clinicians have studied many emergent properties of family systems. For example, boundary ambiguity measures whether agreement about who is “in” the family exists. This property is thus easily linked to growing rates of stepfamilies and cohabiting partners (Brown and Manning, 2009). Family solidarity among families with adult children is of particular policy concern for the aging population, because children are more likely to assist their aging parents if they experience family solidarity (Bengston, 1991; Swartz, 2009). The particular property studied in this paper is the extent of differentiation among family roles, from the perspective of children in the family system. This perspective limits the focus to dyadic family subsystems that include the child.

First I introduce theories of relational integration and their competing implications for the structure of families. Then I introduce relationship measures that compose families. These were derived from time use data in chapter three of this dissertation. I introduce the methods and then demonstrate how the relations cohere into families, relating the findings back to the theories of relational integration.

Theories of relational integration

There are many ways that family relationships could cohere into families. Early influential theories of family organization posited that parental roles are (and should be) diversified. Becker (1981) theorized that a strict division of parental duties into market and domestic labor is the most efficient way for a family to be organized because it allowed each parent to develop a specific talent to the best of their abilities. Parsons et al (1955) also suggested the kinds of relationship that each parent should have with their children should be specialized. Mothers should be emotional leaders, and fathers should be instrumental task leaders. Although the gendered implications of specialization models are outdated if mothers (or fathers) are assumed to be inherently suited to either role, both models draw attention to the family as a system of complementary roles. From this perspective, positions complement each other from the perspective of the child, so that a child goes to one alter for play, another for emotional sustenance and another for physical care.

On the other hand, consensus and similarity are considered to be central to building family solidarity (Bengson and Roberts, 1991). Families interact as units, its members cannot easily separate their actions with one member from those with another. This constraint may make positions more similar to one another within a family than they would be if the dyads were independent actors, devoid of family context. Using the

current approach, we can ask: if a child has a relation characterized by communication, is likely to have other relations defined by high levels of communication as well?

England and Srivastava (2013) found that mothers' education increases both the amount of time that they spend performing childcare, and the amount of time their spouses spend in childcare as well. Fathers' own education was also found to have an independent effect on their childcare time in their study, but it was not as large. spouses are more similar to each other than they are to the public at large (Smith, McPherson and Smith-Lovin, 2014) and much research has demonstrated the correlation of spouses' education (Blossfield, 2009; McPherson, Smith-Lovin and Cook, 2001; Kalmijin, 1991). Together these two processes might magnify the effect of education on the time that parents spend in childcare.

Siblings too, are likely to treat each other in ways that are more similar to the way that their parents act since the family is the primary agent of socialization, and siblings learn how to interact with others based on the interactions that take place within their family contexts (Brody, 2004).

The empirical correspondence of spouses' parenting styles has been mixed. Among a sample of 56 parents, Winsler, Madigan and Aquilino (2005) found modest correspondence between mothers' and fathers' self-reports of permissive ($r=.55$) and authoritative ($r=.33$) parenting styles but none for authoritarian ($r=-0.07$) parenting style.

While mothers, fathers, siblings and stepparents occupy different positions, are similar *types* of mothers, fathers, siblings and stepparent found in the same family?

Theories of relational structure: Adaptation and Conflict

A system is always changing and developing, both new and traditional family structures can re-negotiate their interactions. At any given time, the members of a family may have conflicting interests and there's no reason to think that consensus and harmony exist in the family system all the time. Because the family system is a negotiated system in flux, it's possible that on any given day it is observed, its members will be in the process of redefining their place in the system.

5.1.2 Relationship types derived from time-use data

Much of what we know about children's family relationships is from studies of how much time is spent together, or a qualitative sense of the quality of the relationship. Other researchers have focused on the internal dynamics of what parents, siblings and other relatives (and nonrelatives) actually do with children (Folbre, Yoon, Finnoff and Fuligni, 2005). This paper follows this approach with one important innovation - I allow the important dimensions of relationships to emerge from the micro-interaction patterns of a national sample. In the previous chapter, Gauthier (2014) develops a novel approach combining network and clustering techniques to classify parent-child relationships captured in the micro-interactions recorded in time use data. Eighteen distinct

relationship types emerge. Fourteen are prevalent enough to contribute to distinct patterns of family organization – they are the basic building blocks of children’s family systems. The relationship types are classified by two characteristics that describe the breadth and homogeneity of the relationships they contain; which I refer to as integration and structure respectively. I briefly describe these fourteen relationship types, and the space they occupy in the cross-classification of integration and structure below (see chapter 2 for full details and appendix F for a concise description of the positions that make up family types).

Previous research defines two central problems concerning the classification of family relationships. The first stresses the different ways that family members are involved in each other’s’ lives. Family relationship types that encompass many different domains are more integral to the child’s everyday life. Family relationship types that include only few domains, like leisure, or meal sharing are unintegrated.

The second theoretical perspective raises the possibility of opaque and ambiguous expectations arising from new structural contexts. The result is the potential for more fluid, less distinct relationship types in practice. Systems theory also suggests that even well-established family types can experience periods of disruption when they may work out new patterns. Relationship types that are easily identified relationship are

structured. Those relationship types that are more amorphous and difficult to place are unstructured.

Table 16: Theoretical classifications of aggregate relationship types

Aggregate relationship type theoretical scheme		
Uniformity of interactions	Entrenchment in child's day-to-day life	
	Unintegrated	Integrated
Structured	Circumscribed: Clear expectations, narrow relational scope	Established: Clear expectations, broad relational scope
Unstructured	Peripheral: Relational expectations are narrow and unclear	In flux: Relational expectations are unclear and broad

These two variables can be cross-classified to construct a space containing all possible family types. The four quadrants of this space are: (1) integrated and structured (2) integrated and unstructured (3) unintegrated and structured and (4) unintegrated and unstructured. I dichotomize the concepts of integration (integrated and unintegrated) and structure (structured and unstructured) to construct discrete spaces to classify relationship types.

Established relationship types: Everyday companion, panoptic caregiver and trusted companion

Three relationship types are **established** (integrated and structured). They are characterized by interactions that reach several aspects of the child's daily life. The

boundaries of the relationship are clear – all alters in the relationship type do (and don't do) the same things with the child. One of the three relationship types *panoptic caregiver* is a caregiving relation. Panoptic caregivers have all-encompassing relationships with the focal child. They play both indoors and outdoors with the child and they watch television together. They also do chores with the focal child and talk and socialize with them.

The other two relationship types are aggregates of broad, non-care relationships. Alters in the broad, non-care positions eat and drink with the focal child, do chores with, and engage in a variety of active and passive leisure activities, including sports. While all engage in some form of play and housework, everyday companions do more specific instances of play and housework than the others. Trusted companions do more chores and more active leisure activities than everyday companions, focusing on recreation and communication.

In-flux relationship types: Affectionate playmate, expressive caregiver

Two relationship types are **in flux** (integrated and unstructured). They are made of relation types that reach into many aspects of the child's daily life, but the collection of relationships that make up the position are more heterogeneous – although they are still more similar to each other than to relationships in other relationship types. Critically, they are more difficult to place into a single relationship type.

The first relationship type *affectionate playmate* is a peer-like relationship characterized by displays of affection, doing chores, playing games and arguing with the focal child. The second *expressive caregiver* is a caregiving relation. Expressive caregivers are characterized by high levels of care and high levels of indoor and outdoor play. Alters within this high care, communication and leisure cluster play sports, enjoy leisure activities and talk with the focal children. They are distinct from other caregiving relationship types because they do not consistently share meals with the child.

Peripheral relationship types: Balanced companion, T.V. companion, confidant, stand-in caregiver

Four relationship types are characterized by **peripheral** (unintegrated and unstructured) relationship types. These are narrow in scope and alters are rather dissimilar. Substantively, these positions are least like kin relations. Three are companionship relationships with no elements of caregiving, while the last relationship type contains elements of both companionship and caregiving.

Balanced companions do housework with the child but they also spend a lot of leisure time watching TV, playing games and engaging in other indoor and outdoor play with the focal child. All *T.V. companions* watch TV with the focal child, but do fewer chores, and spend less leisure time with them than do alters in other clusters on average. Interactions between children and *confidants* are spread evenly and thinly across

activities. They have in common that their interaction set is defined by talking (in person and on the phone) and socializing with the child with very few other interactions. Few chores are done together but alters are about as likely to talk with and socialize with children as they are in general across the sample. One quarter (26%) of *stand-in caregivers* provide care for the focal child. Stand-in caregivers are among the least likely in the entire sample to play with, or talk and socialize with the focal child, and they do not watch TV with the focal child.

Circumscribed relationship types: Balanced caregiver, meal and T.V. companion, restricted caregiver and meal companion

Four relationship types are **circumscribed** (unintegrated and structured). They are made up of relation types that are highly circumscribed but there is behavioral agreement about what the few interactions are. Basic relations that are fundamental to family time, like meal sharing, may be included here. One relationship type (*balanced caregiver*) is less unintegrated and structured than the other three. *Balanced caregivers* engage in TV centered passive leisure activities, along with indoor and outdoor play. Restricted caregivers are engaged in basic interactions with the child including sharing meals and watching TV. One fifth of alters in this group provide some sort of physical care in addition to sharing a meal. Interactions between *Meal and T.V. companions*, and

the focal children are limited to shared meals and watching T.V. Finally, shared meals are the exclusive interaction between alters and children for *meal companions*.

These relationship types are the basic building blocks of children's families. They cohere into systems of relationships that center on the focal child. What do children's family systems look like? Are some particular relationship types more likely to go together than others? How are family systems distributed by child's characteristics, household characteristics and family structure?

5.3 Methods

Network models of role equivalence

I use Winship and Mandel's (1983) measurement of local role equivalence¹, modified for ego-network data to measure family structure from the perspective of children. Winship and Mandel develop the method to measure role-equivalence in a way that can be used to compare multiple actors' roles across networks. Each individual (ego) is taken in turn and a binary vector is generated recording the presence or absence of all the possible relations between ego and each other actor on the network (ego's alters). These vectors are called role relations. The aggregate set of an actor's role relations is their role set and actors who have the most similar role sets are role-equivalent.

¹ Formally, it is a subset of their approach when indirect relations are structurally null.

Paper 2 in this dissertation calculated each child's role relations. This paper continues the analysis and calculates role sets from those role relations. The same procedure is carried out, but the presence or absence of all the possible positions that a child could have in their role set is recorded, rather than the relations that make up the positions (which have already been aggregated into positions).

In practice, very few individuals have exactly the same pattern of role relations, so assigning individuals to the same equivalence class requires first calculating the pairwise distance between the set of each child's role relations (their role set) and second, each child's role set is placed into a group, or cluster, according to some criteria which will maximize the similarity of role sets placed into the same group, and distance from those in other groups.

To illustrate these concepts, let's take an example of a hypothetical, typical 8 year old boy we'll call Jack. Jack gets up in the morning and eats breakfast with Ann and Kim, and then he does the dishes. After spending most of the day at school, Jack comes home again on the bus with Ann. Once they're settled into the house, Ann phones a friend and promises to start her homework while Jack and Kim go outside and practice passing a soccer ball back and forth for a while. Then they go inside and Jack helps Kim make dinner while Ann does her homework. After Ann finishes her homework, she heads out to meet her friends at the mall. Jason arrives at the house to visit Kim and Jack

and the three sit down in the living room to eat dinner and watch TV until it's time for Jack to go to bed.

Based on the descriptions of relationship types introduced previously in this paper, which were derived from interaction data in chapter 3 of this dissertation, Jason is a **meal & T.V. companion**, Ann is a **T.V. companion** and Kim is a **balanced everyday companion**, engaged in a variety of domestic activities, and especially leisure activities (outdoor play and T.V.) with Jack. Jack's family system is composed of these three relationship types.

Now let's add a second ego, a fourteen year old girl who we'll call Amy. In contrast to Jack, Amy spends much of her day alone. She wakes to an empty house and heads to school. After school, she comes home and makes herself a snack and does her homework. Later that evening Deb arrives and the two sit down to dinner and watch TV.

Amy only interacts with one alter, Laura who is a **meal & T.V. companion**, based on the relationship type descriptions. Her relation-set is identical to one of Jack's alters, Jason.

Below in Figure 13, we begin by enumerating each ego's family system. While the two children's roles have one relationship type in common, they have a very

different family experience. The positions that make up a child's local role are recorded in a vector as either present or absent.

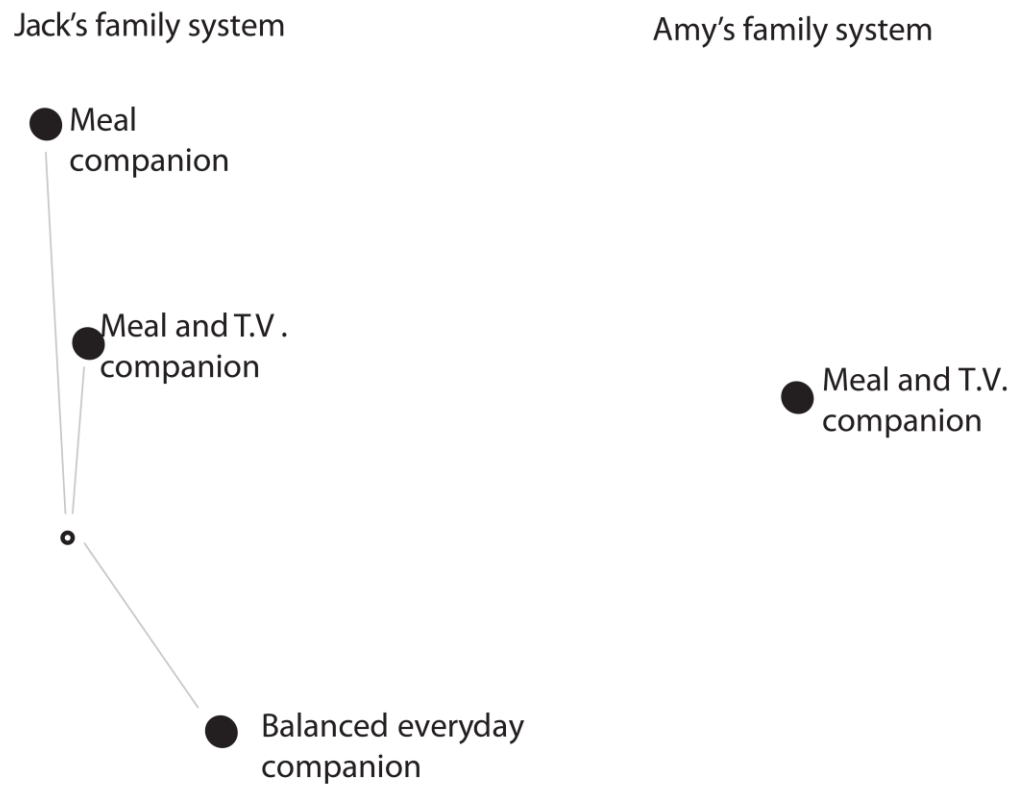


Figure 13: Family systems of two hypothetical children

Jack and Amy have different types of childhoods, in different family systems. Alters come in and out of Jack's everyday life over the course of the day, and he does housework with his caregiver, but they also spend a lot of leisure time together; watching TV, playing outside and eating meals. Amy's family, on the other hand is a limited system of interactions. In this example, each of the relations that Jack has with

his alters are subsets of one another. They are not complimentary nor are all his alters interchangeable with one another – but all of his alters can be replaced by one (Kim). These distinctions are easily made by eye with one two family systems, but the process is untenable if the number of family systems is large. Distance between systems must be calculated, and then we assign systems to family types where those assigned to the same family type have a more similar system. We use a clustering method, developed for this purpose, and technical details are provided below.

Step 1: Generate family type from individual children's family systems

Each child's set of relationship types were transformed into a network of relationship types. Relationship types deduced in chapter 3 and described earlier in this chapter are connected to each other through children. The resulting network is a picture of that particular family system.

Step 2: Remove duplicates and enumerate family systems

We modify Winship and Mandel's (1983) measurement of role equivalence. They develop the method in order to have a measure of role-equivalence that can be used to compare roles across networks. For each pair of actors in the data, they generate a binary vector, which they call the role relation, recording the presence or absence of all the possible relations the two could have. The aggregate set of an actor's role relations is their role set. The ego-network equivalent of these role sets were calculated in Chapter 3,

they are the relationship types described earlier in this chapter. Actors who have the most similar role sets are considered to be role-equivalent. Where Winship and Mandel include all the paths connecting each pair, we can only enumerate the direct ones. Two individuals are role-equivalent when they have the same family system.

Each child's family system was transformed into a vector, with the presence or absence of each of the eighteen relationship types recorded in one of eighteen columns. The resulting 6873 vectors, were stacked to create two matrices, one for the 1997 sample and one for the 2002-2003 and 2007 sample. In 1997, 11423 alters were reported, 9112 in 2002 and 5332 in 2007.

Step 3: calculate Jaccard distance between family systems

The distance between the rows (child-alter interactions) within each of the three matrices was calculated using the Jaccard distance to assess the similarity of multi-relational dyads, assigning importance to only shared relationship types.

Step 4: Assigning family systems to family types

Many methods have been developed to place similar observations into the same cluster. Hierarchical clustering methods partition the data into a decreasing number of clusters based on the greater proximity of the collapsed clusters to others. Ward's minimum-variance method of hierarchical clustering merges the two clusters that minimize the within-cluster sum of squares until all observations are contained within

two clusters. The researcher can then study the partitions that emerge at different sized solutions and choose the best fit based on a weighted ratio of R^2 to expected R^2 based on the variance that would be explained if the data came from a uniform distribution (Sarle, 1983). Appendix G contains the fit statistics and appendix H contains the branching structure for the two cluster analyses.

The first study period was subjected to an independent cluster analysis because the relationship types that emerged from the 1997 sample were distinct from the relationship types that emerged in the other two. After examining the R^2 for an absolute measure of explained variance, and the Cubic Clustering Criterion to evaluate relative fit. Children who are placed into the same family type have similar family systems, however, there is internal heterogeneity within clusters. If a relation type is twice as prevalent within a cluster than it is on average across all clusters, I designate it characteristic of that family type.

Step 5: interpretation

The family types that emerge are classified according to the location of the relationship types that cohere to create them. Family types are represented by networks of relationship types, which maintains the distinct pattern of relationship types that cohere into family types.

Independent variable measures

Family type differentiation

Differentiation is measured by the extent to which the component relationships of a family type are located in different regions of the theoretical space. A family type is differentiated if its relationship types are located in different quadrants, and undifferentiated if all its relationship types are located in the same quadrant – for example, if all relationships are **Established**, or **In-flux**.

Child characteristics

A child's age strongly structures not just time spent with parents or other caregivers, but also the character of the relationship. While a young child requires physical and emotional care, an older child requires less physical assistance but ideally continues to have emotional support from their parental figures. Fathers are known to spend more time with boys, and more time with girls when they have brothers (Cooksey and Fondell, 1996). Child's age, gender and the number of siblings currently residing with them were also measured using parent's reports of household attributes.

Household characteristics

Parent's time and financial resources are two critical household resources that can shape how parents interact with their children (Hofferth and Anderson, 2003). In general, parents in households with fewer economic resources spend less time with their children (Hofferth, 2006; Kendig and Bianchi, 2008). Sibling and grandparent

relationships are also effected by household income. Older siblings particularly sisters (Dodson and Dickert, 2004), and grandparents (particularly grandmothers) (Jimenez, 2002) in lower income households have been shown to take on substantial childcare burden, sometimes exceeding 20 hours per week. The number of siblings in the child's household has the potential to dilute parent attention (Folbre et al 2005; Bryant and Zick 1996). Parent's household income was measured using the PSID caregiving map which links every child to both their biological parents' households (see chapter 4 for details).

While research has shown how each of these factors relates to particular relationships, and how they relate to boundary ambiguity and family solidarity less is known about how they shape the particular configurations of relationship in the family system. These analyses will establish how these individual and household level characteristics shape the family system from the perspective of the child.

5.4 Data

In this paper, we use time use data from the Child Development Supplement (CDS) of the Panel Survey of Income Dynamics (PSID) (see chapter 3 for details). The data provides a nationally representative sample of U.S. children when weighted, and it follows the sampled children for ten years, allowing comparisons within and across families and across the full range of childhood from birth to age 18. The data is ideal because it captures the phenomenon of interest (time spent with families) regardless of

the residential status of the child, and time use diaries are less subject to social desirability bias than single item responses (Marini and Shelton, 1993).

5.5 Results

Univariate sample characteristics: Sample characteristics

Descriptive statistics for the sample at the time of the three time diary collections are shown in Table 17 below. Two thousand, eight hundred and ninety-six children, participating in the PSID were eligible to take part in the Child Development Survey, and had completed time diaries naming at least one alter (only eight children reported none). The average child has between three and four alters. This number is lower than the number of people they interact with in any setting throughout the day because only interactions taking place within a home are under study.

The average age of these children was 6.65 years in 1997 and rises to 11.56 in 2002 and 14.03 in 2007. The ages are not evenly five years higher at every survey because of significant attrition caused by both a failure to complete time diaries and because children become ineligible when they turn eighteen². About half the sample is female in all three waves of data collection. Two thousand, one hundred and thirty-nine of these children continue on with completed time diaries in 2002 and 413 new children complete

² Child level weights are re-calculated for each year of the study to adjust for attrition (Hofferth, 2010).

time diaries. Twelve hundred and thirty one of these 2552 children continue to provide completed time diaries into 2007 and 193 children who didn't submit completed time diaries in 2002 submit them in 2007.

Table 17: Description of sample at three time points

Sample description	1997	2002	2007
Number of children	2896	2552	1424
Average age (years)	6.65***	11.56***	14.03***
Proportion Female	0.49	0.50	0.49
Median household income	43290	64140***	67520***
Number of siblings	1.44 (0.14)	1.51*** (0.10)	1.53 (0.08)
Mean number of alters	3.94	3.57	3.74

Data source: Child development supplement of the Panel Study of Income Dynamics 1997-2007. *Note:* Data are weighted using child-level weights. An asterisk indicates a significant difference from the mean value of the prior observation

Household characteristics

Median annual household income of the sample in 1997 is \$43290, significantly lower than the later observations, possibly reflecting the attrition of lower income households (Daffy and Sastry, 2012). The number of siblings in residing with the children rises from 1.44 in 1997 to 1.53 in 2007.

Family types

The 10 roles found in 1997 fall into five substantive categories, narrow (**on-the-go**), undefined (**the clan**), broad (**T.V. family**), isolated (**dinner-and-a-show**) and mono-relational (**independent**). **On-the-go, clan, T.V. and dinner-and-a-show** families re-emerge in the later waves, while no children are found to be in an **independent** role. Last, a sixth, bifurcated (**traditional**) role emerged among the 2002 & 2007. Figures 14 and 15 below provide a visual guide to the relationship types that cohere into family types. Figure 14 corresponds to family types in 1997 and figure 15 corresponds to family types in 2002-2003 and 2007 family types. In both plots, established relationship types are indicated in red, circumscribed in blue, peripheral in yellow and in-flux in green. The colors demonstrate the structural similarity of the family types within each of the five categories.

1997 Family types



Figure 14: Relational composition of family types among the 1997 sample.

Narrow (“On-the-go”) family types defined by combinations of circumscribed and peripheral relationship types

The relationship types that cohere into **on-the-go** families are located in circumscribed and peripheral (narrow) quadrants. Four different **on-the-go** family types emerge, three in 1997, one in 2002 and 2007. The configurations of relationship types that constitute **on-the-go** families are located on the first row of figures 14 and 15.

Substantively, all **on-the-go** family types include meal-sharing, shared leisure (T.V. watching) and a small amount of s wide variety of other assorted household duties and recreation. The three that emerge in 1997 are differentiated amongst themselves by the proportion of **restricted caregivers** and **meal companions** from the circumscribed quadrant, and the **stand-in caregivers** and **T.V. companions** from the peripheral quadrant. Together about 30.2%³ of children in the 1997 (N=875) have narrowly defined family types. They are displayed along the first row in figures 14 and 15, above and below.

³ Percentages are weighted with child-level probability weights.

2002-2003 & 2007 Family types

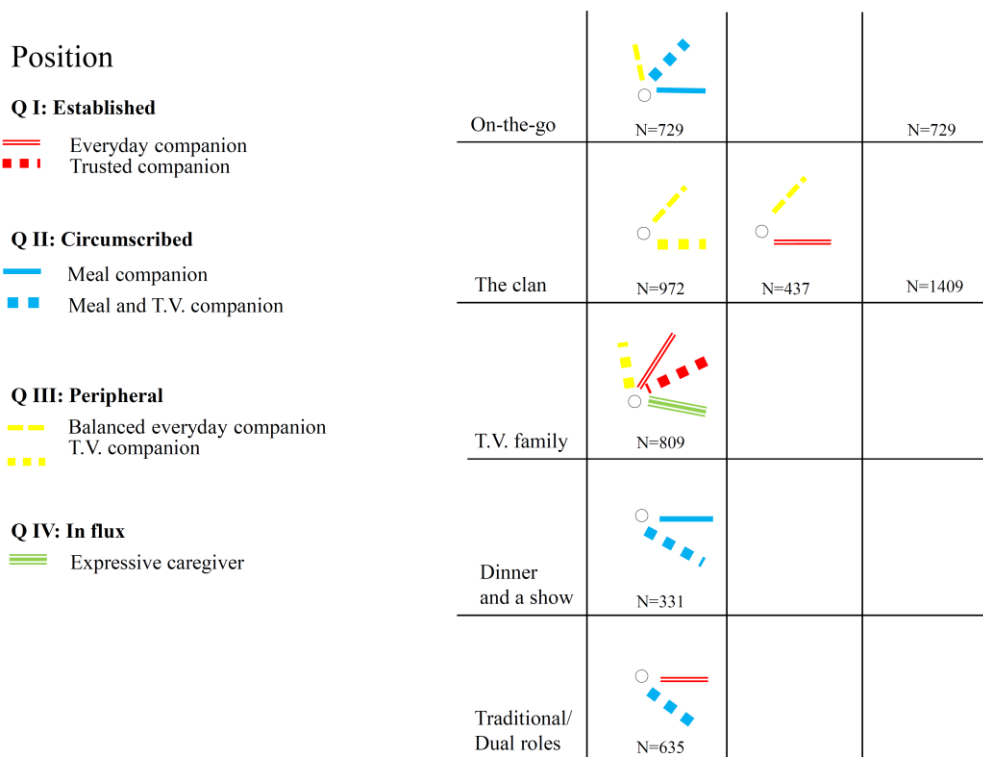


Figure 15: Relational composition of family types among the 2002-2003 and 2007 samples

A single on-the-go family type is observed in the 2002-2003 and 2007 samples. Balanced everyday companions are paired with the limited relations – meal companion and meal and T.V. companions. The overall proportion of children who have these narrow family types in the later waves is similar to the 1997 sample in 2002-2003 (23%) but it is just over half (16%) in 2007. Together, 729 children have on-the-go relationships in the two later waves.

Unstructured (“The clan”) family types defined by combinations of peripheral relationship types

Three distinct **clan** family types emerge from the 1997 data, and two in both 2002 and 2007. They are located on the second row of figures 14 and 15. **Clan** family types are the most common type of family structure. The relationship types that they’re constituted from are disproportionately unstructured and comparatively narrow at the intersection of positions falling into the bottom-right (in-flux), quadrant of the theoretical space. These family types have no strongly hierarchal positions, although they include **stand-in-caregiver** in 1997 and **confidants** in 2002 and 2007. They have a mix of peer relations including **indoor playmates** in 1997 and **T.V. companions** in all years. Twenty-eight percent (N=797) of the children in 1997, 37% of children in 2002 and 31% of children in 2007 (N=1409) have unstructured family types.

Heterogeneous family types “T.V. Family” defined by combinations of established and in-flux relationship types

Family types formed from relationship types that were predominately found in the right side of the theoretical space were classified as **T.V. families**. The specific configurations of relationship types that make up **T.V. families** in both samples are found in the third row of figures 14 and 15. They most closely resemble idealized (T.V.) family dynamics. Eleven percent of children in 1997 (N=321), 18% in 2002 and 24% in 2007 (N=809 combined) had **T.V. families**. These children have variable but intense

relationship types (**panoptic caregiver, affectionate playmate, everyday companion, trusted companion** and **expressive caregiver**). One distinct **T.V. family** type was present in all three waves.

*Isolated family types (“**Dinner-and-a-show**”) are defined by combinations of peripheral relationship types*

In 1997, one family type **Dinner-and-a-show** made up of relationship types characterized by a very restricted set of interactions (meal sharing and T.V. watching) emerged. The relationship configurations are located in the fourth row of figures 14 and 15. About 7% of the children in 1997 (N=197) had these family types defined by minimal involvement. The proportion of children in these **dinner-and-a-show** families is relatively constant across time. Another one such family type appears in both 2002 and 2007 (N=331 combined), where relationship types are split between **meal companions** and **meal and T.V. companions**. Nine percent of children in 2002 and 8% in 2007 have isolated family types.

*Mono-relational family types (“**Independent**”) are defined by the concentration of social activity into one peripheral relation type*

Two family types characterized by a strong concentration of a single relationship type, either ambiguously or peer-oriented (**T.V. companion** and **indoor playmate**) emerge in 1997 (N=706). They are located in row five of figure 16. Both family types are

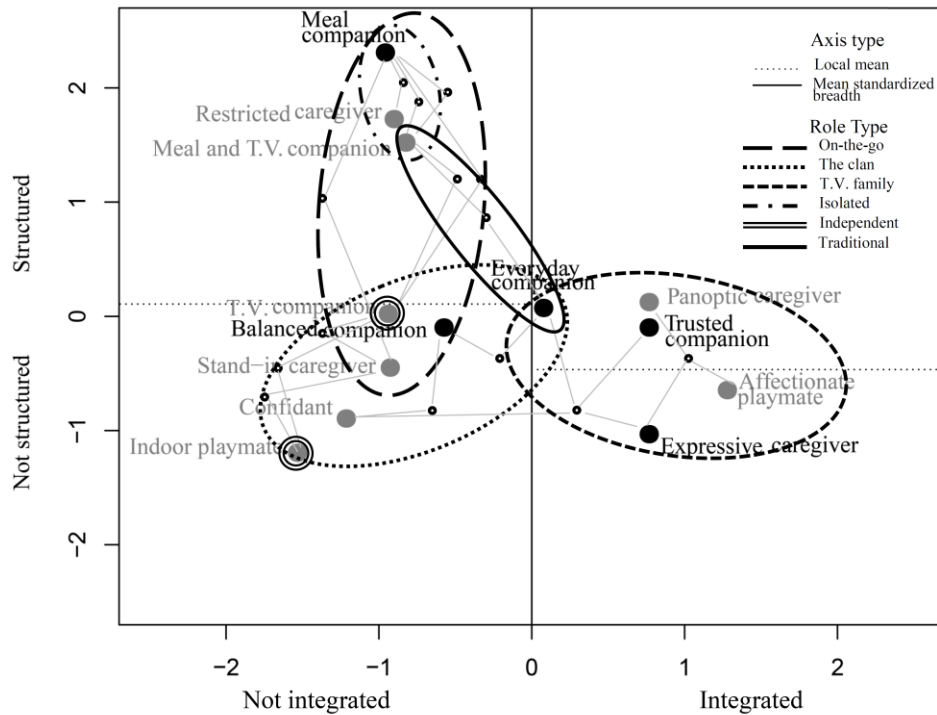
composed of relationship types found in the low-structure, narrow quadrant (peripheral) and they account for 24% of children's roles.

Family type ("Traditional") characterized by one established and one circumscribed relationship type

A single role, split between the established quadrant and the circumscribed appears in the later years. This family type is the clearest case of specialization. Its defining positions are split between the more perfunctory **meal and T.V. companion** and the supervisory position of **everyday companion**. The combination of one low-involvement relationship type and one high-involvement position is reminiscent of the traditional breadwinner household. Thirteen percent of the children in 2002 and one fifth of the children in 2007 (N=635 combined) have families with this structure. The configuration of relationship types is located in the final, sixth row of figures 14 and 15.

The figure below displays the sixteen family types as networks originating from a set of role-equivalent children overlaid on top of the twelve positions that contribute substantially to family types (none of the excluded positions were shared by more than 10% of the alters in any family type). A family type is the distinct configuration of relationship types that distinguish a group of role-equivalent children. In order to display that configuration, the relationship types shared by role-equivalent children are

connected to each other. Specifically, a connection is drawn if a particular relationship type is twice more common within a role than it is among all family types.



Notes: The locations of positions present in all three waves are indicated in black. Those present in '97 or '02 and '07 are indicated in grey.

Figure 16: Family types mapped on to theoretical space

Three distinct regions of the theoretical space are populated by children’s family types with some overlap at particularly common relationship types. Unsurprisingly, the most common relationship types near the average markers of structure and breadth, however it is notable that the other relations making up a family type tend to “hang together” in this space. Children with a **T.V. family** type are at the intersection of almost

all the broad relationship types, while those with a **clan** configuration draw relationship types almost entirely from the narrow, unstructured quadrant. **Dinner-and-a-show** families are a subset of **on-the-go** families, while **traditional** families transect the boundaries of many family types. Between 6 and 9 percent of children in any given year have no contact within the home beyond meals and T.V. in every year.

Two relationship types, both peripheral (unintegrated and unstructured) in 1997 are contained in most children's roles and two positions in 2002 and 2007, one in-flux (unstructured and integrated), one structured and narrow (circumscribed) are found in most children's roles. This contrast strongly suggests that the roles of younger children are less structured compared to those of older children.

Over three quarters of children's family types includes at least one **T.V. companion** relationship type (42.34%), **stand-in caregiver** relationship type (25.71%) or both (9.94%) in 1997. The only family types that have neither relationship type are the **T.V. family** type which is instead composed of the most intense relationship types, and the **dinner-and-a-show** family type which is composed of the least intense relationship types.

In 2002 and 2007, most family types include either a **balanced everyday companion** (37.44%) or a **meal and T.V. companion** (21.89%), or both (22.6%). These two basic relationship types are less similar to one another than **T.V. companions** are to

stand-in caregivers. While **T.V. companions** also engage in a range of other activities with the focal child, **meal and T.V. companions** are restricted to their titular activities. The only family type that includes neither is, like in 1997, the **T.V. family** type.

Multivariate statistics

Family style by socio-demographic characteristics

In the following multivariate analyses, I conduct two multinomial logistic models, one the 1997 sample and one for the 2002-2003 sample and the 2007 sample combined. I adjust for the dependence of observations within children in the second set of analyses. The data are weighted using child-level weights in both analyses. The results will show how socio-demographic characteristics are related to the configuration of relationship types that cohere into family types around individual children.

Table 18 below shows the change in log odds predicting a child's family type in 1997, compared to the Dinner-and-a-movie family type which serves as the base category. The dinner-and-a-movie family type is composed of a set of dyadic relation types that include only the limited relations eating together and watching T.V. It thus serves as a meaningful reference because all other categories incorporate more integrative relation types. The remaining nine family types are ordered by their position in the theoretical space. The particular configurations of relationship types that cohere into each family type are unique.

Table 18: Effect of socio-demographic characteristics on child's family type in the 1997 sample.

Model of child's family type in the 1997 sample.

	On-the-go		The clan		T.V. Family		Mono-relational		
Relative to Dinner-and-a-movie	Restricted caregiver, T.V. companion	Meal companion, T.V. companion	Meal companion, Stand-in-caregiver	Stand-in-caregiver, T.V. Companion	Stand-in-caregiver, indoor playmate	T.V. companion, indoor playmate	Everyday companion, affectionate playmate, expressive caregiver	Stand-in-caregiver	T.V. companion
Child's age	0.097**	0.082*	-0.126***	-0.006	0.121***	-0.031	-0.200***	-0.008	-0.085**
Female	-0.445†	-0.281	-0.009	-0.026	0.295	-0.061	-0.037	0.065	0.036
Number of siblings	-0.005	-0.033	-0.121	-0.056	-0.142	-0.029	-0.489***	-0.048	-0.197*
Logged household income	0.407	0.535**	0.480**	-0.15	-0.054	-0.222†	-0.347**	-0.346*	-0.028
Intercept	-4.994	-6.353**	-3.338	2.135	1.791	3.073*	6.183***	4.249**	1.864

Notes: data are weighted with child level weights
 †p < .10. *p < .05. **p < .01. ***p < .001.

Child characteristics

As children age, they become less likely to have all Clan, T.V. family and Mono-relational family types, relative to a dinner-and-a-movie family type. The only exceptions are that they are more likely to have two on-the-go family types. Both include an assorted variety of relations in addition to T.V. watching and meal sharing, although they remain centered on T.V. watching and meals, and they are located in a position which spans the two unintegrated quadrants – peripheral and circumscribed relationship types. In general, as children age, their family configurations become more

likely to be restricted to the (non-physical care) core activities of family life – shared leisure (T.V.) and meals. Child's gender doesn't have a consistent or significant relationship with family type.

Household characteristics

The number of siblings a child has decreases the log odds that they will have a very diversified, or a very simple family type. Children with more siblings are less likely to have T.V. family – which is both structured and integrated, and they are less likely to have a mono-relational family type which is strongly dominated by the T.V. companion relation types. The measure is relative to the highly structured but unintegrated dinner-and-a-movie type, which implies children with more siblings are more likely to have this family type.

Child's household income generally increases the log odds that a child has an on-the-go family type, characterized by largely unintegrated relation types (circumscribed and peripheral). Perhaps counterintuitively, household decreases the log odds that a child will have most the most integrated family type (the T.V. family), which is composed of established and in-flux relation types among the (young) children in the 1997 sample.

Table 19 below shows the change in log odds for a child's family type among the sample at 2002-2003 and 2007, when the children are five and ten years older

respectively. As previously, the limited family type serves as the reference family category.

Table 19: Effect of socio-demographic characteristics on child's family type in the 2002-2003 & 2007 samples.

Model of child's family type in the 2002-2003 & 2007 samples.

	On-the-go	The clan	Everyday companion, balanced everyday companion	T.V. Family Confidant, Everyday companion, Trusted companion, Expressive caregiver	Traditional Everyday companion, Meal and T.V. companion
Relative to Dinner-and-a-movie	Confidant, companion, Meal companion	Balanced everyday companion, Confidant	Everyday companion, balanced everyday companion	Trusted companion, Expressive caregiver	Everyday companion, Meal and T.V. companion
Child's age	-0.034	-0.061*	-0.05†	-0.083**	-0.002
Female	0.114	0.348*	0.298	0.154	0.149
Number of siblings	0.014	0.012	0.003	0.073	0.013
Logged household income	0.063	0.242*	0.357**	-0.089	0.250*
2007	-0.197	-0.017	-0.264	0.575**	0.431*
Intercept	0.579	-1.123	-3.035*	2.425*	-2.431

Notes: data are weighted with child level weights and standard errors are adjusted for repeated child observations.

p †<.10. *p<.05. **p<.01. ***p<.001.

Child characteristics

As the post-preschool children in the later samples age, they become more likely to have a limited family type than all others, all coefficients for child's age are negative, and three of five are statistically significant. However, the difference between the traditional family type, and the limited family type is very small and insignificant. Girls in the older sample are more likely to experience communication-based family types.

Household characteristics

The number of siblings a child has appears to have no significant effect on how they experience family processes. Household income, however, among this sample increases the log odds of a child having both The Clan family types, and the Traditional family types. Clan relationship types include unstructured and unintegrated relationship types – located in the peripheral quadrant of the classificatory space and everyday companion relationships which are structured and integrated. Traditional family types also include everyday companions, along with the limited meal and T.V. companion relationship type. If the evidence is taken together, household income shifts children's family types into more integrated regions of the relationship space among the 2002-2003 and 2007 samples.

5.6 Summary and conclusions

The goal of this paper has been to study the structure of families from the perspective of the child. Many studies of individual family relationships exist, this is one

of the first non-clinical study to both allow relationships to emerge out of the interactions between family members and then study how the relations aggregate into family systems. This paper offers a first look at the full diversity of family systems as they are experienced by the children within them.

Child's age has an unequivocal role in shaping the pattern of family relations the child experiences. As children age, they become more independent and their relationships with their family members tend to shift towards the **peripheral** and **circumscribed** (unintegrated) side of family relationship types. Households with higher income among the 1997 sample were more likely to have on-the-go family types, located in the **peripheral** and **circumscribed** quadrants, while children in households with higher income in the two later samples were more likely to have **clan** family types, located in the **established** and **in-flux** quadrants.

To understand this result, I conducted a separate analysis, available in Appendix I. I've excluded it from the main analysis in order to focus on how relationship types aggregate into family types. In the supplemental results, I use aggregated categories (on-the-go, clan, T.V. family, traditional and split) to allow comparisons across the samples. I verify that the aggregated categories have the same relationships with family type as the disaggregated categories used in the main analysis. Then I restrict the sample to the common ages (5-12) and add an interaction term measuring whether the effect of income

is different by survey year when children's ages are restricted to a common range. The interaction between survey year and household income is insignificant. This suggests that among young children, there is a trade-off between household income and intense, structured family relationships. Future analysis will test the possibility that one caregiver – who would otherwise provide the structured, integrated relation – is in the labor force.

This method has identified a coherent taxonomy of children's roles within families. A family cannot be studied independently because the positions intersecting at the focal child are not independent. For example, if a child's interactions with one of their alters is highly structured and narrow, then all the interactions they experience are more likely to be narrow in scope. Most family types are concentrated into dense regions of the relational space. Nonetheless, about a third of children in 1997 and 15% of children in 2002 and 2007 have diversified families.

These results support the idea that families are interactive units, whose parts respond to the others. Family routine ensure that members cannot easily separate their actions with one member from those with another. This constraint may make positions more similar to one another within a family than they would be if the dyads were independent actors, devoid of family context.

6. Conclusion

The structure of American families has undergone fundamental transformation and many of the changes have challenged fundamental aspects of traditional understandings of family and kinship. The first goal of this dissertation is to offer a new method is needed that allows structuring elements of contemporary family life to emerge from observed interactions. The second goal is to apply that method to children's time use data to understand how family relations are structured from children's point of view and ultimately how the family system is structured from the perspective of the child. In the following conclusion I will discuss how this dissertation fulfilled these goals. I will also discuss methodological limitations and future work.

6.1 Measuring families as networks

I began chapter two arguing that there is no social consensus on what constitutes a family, and families integrate traditional and negotiated elements into their relationships.

I then extended network methods were designed to capture social roles to measure contemporary family forms. Families with similar structures are sorted into the same family type, differentiating them from more distant structures. This paper took a familiar context, measuring family structure as patterns of consanguinity and descent

with a household. The differences between family structures sorted into different types reveal the rules that differentiate the system on the ground.

The larger goal of the paper is to show that researchers need not rely on pre-defined combinations of relations (descent and marriage), and in fact – asking how they combine instead is a logical first step.

6.2 Children's family relations grounded in interaction

The second goal of this dissertation is to understand family relations as they experience them. I offer three different applications of the method to children's time use using the Child Development Supplement (CDS) to the PSID. The advantages of the CDS data are that they contain full time use diaries, rather than single item response variables. This is good for two reasons. First, the time use categories are more fine-grained than the single item responses – if necessary the actual time diaries with full explanations could be obtained and recoded. Second, interactions between the child and all their contacts are potentially captured, rather than only the interactions of interest (usually parents). That is an important distinction because I wanted to allow relational categories to emerge from patterns of interaction *regardless* of predefined categories. The CDS time diaries also have the advantage of being from the perspective of the child, rather than the parent. Other nationally representative time use surveys capture

children's lives only through their parents, much as parent's lives are only captured through children in the CDS.

Chapter 3 introduces a new application of network models to time use data, demonstrating that children's family relationships can be meaningfully classified by patterns of shared time. Chapter 4 uses the relationship types from the previous chapter and develops and tests a predictive model of parent-child relationships, to discover which traditional distinctions are most influential by employing fine-grained distinctions among traditionally defined parent types. Finally, chapter 5 shows how relationship types cohere into families following the methodology laid out in chapter 2.

6.3 Substantive conclusions

This dissertation contributes to the sociological debate around the meaning of family structure for children's day-to-day lives. I find that there are differences, on average between parent-child relationships based on descent from those based on a relationship to the child's mother but not all stepparents "look like" friends. Moreover, a surprisingly large proportion of parent-child relationships are quite sparse. Idealized roles don't match reality in many cases. Motherhood, which is a central cultural construct, exists largely as an ideal. A single relation type exemplifies motherhood, and less than five percent of children in the earliest wave (when they're aged 0-12) have such a relationship with their caregivers. In total, around one fifth of these young children

have a relationship characterized by physical care, or affection, and of course these roles need not be filled by a biological mother. Relations that resemble “Mothers” and “Fathers” exist, but biological mothers and fathers are not the only people to enact those positions and most biological mothers and fathers have different types of relationships with their children.

Analyzing parent-child relations separately from others showed that it is necessary to allow important relationship features to emerge from the relationship to understand how any particular, or combined, parental statuses matter in structuring the parent-child relationship. Distinctions among relationships by parent type emerged but their exact nature would have been obscured using more coarse measures of relationships, or relationships measured by other indicators.

Finally, I demonstrate that systems approach to children’s families can show us features of their environment that we couldn’t otherwise ascertain. I found that children that have a single intense, emotionally supportive relationship would be more likely to have others, while children who had a single perfunctory relationship with also be more likely to have others of the same. This shows the dynamics of a single relationship is amplified and spreads to others. Knowing this and may be important for understanding the child’s holistic experience their family lives, and irreducible of our knowledge of any particular relationship.

6.4 Remaining methodological issues and future work

The method developed and applied in this paper (and throughout the dissertation) used only a single clustering criterion to assign family structures into discrete types. Many criteria are available, and they have been shown to yield different results. Meyer and Wessell (2012) offer one possible solution to this problem by aggregating the results of many procedures using a stochastic consensus clustering algorithm they developed. Future work will use ensemble clustering to ensure that the solution is robust to the clustering method chosen.

Implicit in all these papers is the idea that families have changed somehow over the last few decades. The ATUS has collected detailed time use, and demographic data for the last decade. The survey is connected to the American Community Survey, which is administered by the Census Bureau and which collects detailed demographic data, which allows the researcher to easily ascertain the relationships between the respondent and their alters. This data will allow me to ask what roles exist across time? Three questions are particularly interesting (1) Have the structure of family relationships with the same conventional name changed in the last 10 years (does "own co-resident daughter" today, look like "own co-resident daughter" in 2002)? (2) Have family relations become less institutionalized (the relations grouped together are less defined)

And (3) Have family relations proliferated but are institutionalized (the data can be fit well, but more clusters are required)?

This dissertation tried to make sense of families in flux, when labels may not be appropriate. Future work will characterize families by the types of exchange, it's a different questions and needs a different conceptualization. We have some sense of how a family, as a system should run. Parents should take care of children, children should obey parents and play with one another. This analysis will break family relations into three aspects. People in a family do things for others, have things done by others and do things with each other. The relations "by" "for" and "with" will be used as primitive generators (rather than particular activities), that can both tell us things about the structure of the family as can their products. Then the patterns of those directed relations can be compared across households. Children in families structured by overwhelmingly outbound relations (they do things for everyone else) are likely to have the most emotional stress an least wellbeing for example.

Appendix A

Ego network: a network consisting of ties between ego and their alters, information about ties between alters is unknown

Ego: the focal actor (CDS child)

Alters: a set of actors who are potentially tied to ego through one or more relations

Relation: the type of action or domain within which ego and alter may interact

Dyad: a pair of actors (ego and alter) who have the potential to relate to one another

Relation: social content with the potential to bring two or more actors into interaction

Multi-relational dyad: a dyad with the potential to relate to each other in multiple domains

Position: a collection of alters discretely assigned to a group on the basis of their proximity, they share the same pattern of interaction with respect to other alters

Pairwise distance: the extent of dissimilarity between an actor and all other actors

Matching distance: a measure of pairwise distance for binary data which counts the number of present and absent relations on each domain the pair has in common

$$d(x, y) = 1 - (M/N)$$

Where M is the count of nonmissing matches, and N is the number of nonmissing pairs (SAS 2008). The matching metric measures distance as the ratio of the

number of common items matched (either by common presence or absence of an interaction type) divided by the total number of interaction types.

Jaccard distance: a measure of pairwise distance for binary data which counts the number of present relations on each domain the pair has in common

$$d(x, y) = 1 - \frac{x}{p}$$

Where $d(x,y)$ is the distance between observations x and y , x is the number of matching observations and p is the sum of the matching observations and non-zero non-matches (SAS 2008).

Euclidean distance: the length of the line segment between two points measured by taking the squared sum of their differences

Position set: the set of positions that intersect at ego

Local role: a collection of positions discretely assigned to a group on the basis of their proximity, they share a similar set of positions

Appendix B

The table below is a piece of the raw data as downloaded from the PSID CDS time diary cache. Only labels have been added to ease description. The first two variables indicate first the year specific household ID, and then the year specific unique ID of the selected child.

The next two columns indicate the start and end time of each activity the child reports. If desired, these pieces of information allow the researcher to compute how many times each alter does a particular activity with the focal child, or alternatively, how long in total the child and alter spent doing the activity either at each episode, or over the entire period. The analyses in this dissertation collapse the activities and record only their presence or absence.

The next ten columns identify which of ten possible alter types (mother, father, sibling, stepmother, stepfather, stepsibling, friend, grandparent, other relative and other nonrelative) actively participated in the activity with the child. Zeros indicate that particular type of alter did not participate, while NAs indicate that the child was doing an unsocial activity, like sleeping or self-grooming. Finally, the activity code itself, and the location the activity took place in are recorded in the final two columns of the data.

HHID	NDID	START TIME	END TIME	MOTHER	FATHER	SIBLING	STEP-MOTHER	STEP-FATHER	STEP-SIBLING	FRIEND	GRAND-PARENT	OTHER RELATIVE	OTHER NONRELATIVE	ACTIVITY	LOCATION
1111	39	66900	68400		0	OSIBLING		0	0	0	0	OTHER RELATIVE		OTHERLEISURE	ANOTHER HOME
1111	39	68400	70200		OFATHER	SIBLING		0	0	0	0	OTHER RELATIVE		EAT_DRINK	ANOTHER HOME
1111	39	70200	77400		OFATHER	SIBLING		0	0	0	0	OTHER RELATIVE		TV	ANOTHER HOME
1111	39	77400	79200	MOTHER	FATHER	SIBLING		0	0	0	0	0	0	TRAVEL	TRANSIT
1111	39	79200	86400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	SLEEP	HOME
1111	39	0	34200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	SLEEP	HOME
1111	39	34200	34500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	DRESS	HOME
1111	39	36900	45000		0	OSIBLING		0	0	0	0	0	0	TV	HOME
1111	39	28500	28800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	BEDTRANSITION	HOME
1111	39	65700	66600		0	OSIBLING		0	0	0	0	OTHER RELATIVE		SOCIALIZE	ANOTHER HOME
1111	39	10800	28500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	SLEEP	HOME
1111	39	8100	10800	MOTHER		0	0	0	0	0	0	0	0	CARE	HOME
1111	39	28800	28980	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	MEDICALSELF CARE	HOME
1111	39	70800	72000		0	OSIBLING		0	0	0	0	0	0	ARGUE	HOME
1111	39	50400	51300		0	0	0	0	0	0	0	0	0	OUTDOORMAINTENANCE	HOME
1111	39	55800	59400		0	0	0	0	0	0	0	0	0	TV	HOME
1111	39	51300	52200		0	0	0	0	0	0	0	0	0	PETCARE	HOME
1111	39	77400	86400	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	SLEEP	HOME
1111	39	66600	68400	MOTHER	FATHER	SIBLING		0	0	0	0	0	0	EAT_DRINK	HOME
1111	39	72000	75600		0	OSIBLING		0	0	0	0	0	0	TV	HOME
1111	39	47400	48600		0	0	0	0	0	0	0	0	0	OTHERLEISURE	HOME
1111	39	68400	69600		OFATHER	SIBLING		0	0	0	0	0	0	SPORT	HOME
1111	39	52200	55800		0	0	0	0	0	0	0	0	0	PARTTIMEWORK	OUTDOOR RECREATION
1111	39	48600	50400	MOTHER	FATHER	SIBLING		0	0	0	0	0	0	EAT_DRINK	HOME
1111	39	75600	77400		0	OSIBLING		0	0	0	0	0	0	EAT_DRINK	HOME
1111	39	59400	63000		0	0	0	0	0	0	0	0	0	TV	HOME
1111	39	69600	70800	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	WASH	HOME
1111	39	64800	64920		0	0	0	0	0	0	0	0	0	TRAVEL	TRANSIT
1111	39	66480	66600		0	0	0	0	0	0	0	0	0	TRAVEL	TRANSIT
1111	39	28980	29700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	DRESS	HOME
1111	39	63000	64800		OFATHER		0	0	0	0	0	0	0	WATCHHHTASK	HOME
1111	39	29700	30000		0	OSIBLING		0	0	0	0	0	0	TV	HOME
1111	39	30000	30300		OFATHER		0	0	0	0	0	0	0	TRAVEL	TRANSIT
1111	39	64920	66480		0	0	0	0	0	OFRIEND	0	0	0	PLAYINDOORS	ANOTHER HOME
1111	39	30300	54180		0	0	0	0	0	0	0	OTHER NONRELATIVE		CLASS_DAYCARE	SCHOOL
1111	39	54180	54480		0	OSIBLING		0	0	0	0	OTHER RELATIVE		TRAVEL	TRANSIT
1111	39	45000	47400		0	0	0	0	0	0	0	0	0	RECREATION	OUTDOOR RECREATION
1111	39	54480	55500		0	OSIBLING		0	0	0	0	OTHER RELATIVE		PLAYOUTSIDE	HOME
1111	39	34500	36900		0	OSIBLING		0	0	0	0	0	0	RELAX	HOME
1111	39	0	8100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	SLEEP	HOME
1111	39	55500	56700		0	OSIBLING		0	0	0	0	OTHER RELATIVE		OTHERLEISURE	HOME
1111	39	56700	57600		0	OSIBLING		0	0	0	0	OTHER RELATIVE		RECREATION	HOME
1111	39	57600	58500		0	OSIBLING		0	0	OFRIEND	0	0	0	TRAVEL	TRANSIT
1111	39	58500	61200		0	OSIBLING		0	0	OFRIEND	0	0	0	PLAYINDOORS	ANOTHER HOME
1111	39	61200	61800		0	0	0	0	0	0	0	0	0	TRAVEL	TRANSIT
1111	39	61800	62400		0	OSIBLING		0	0	0	0	0	0	CRAFTS	HOME
1111	39	66600	66900		0	OSIBLING		0	0	0	0	OTHER RELATIVE		AFFECTION	ANOTHER HOME
1111	39	62400	63900		OFATHER	SIBLING		0	0	0	0	0	0	TV	HOME
1111	39	63900	65700	MOTHER	FATHER	SIBLING		0	0	0	0	0	0	TRAVEL	TRANSIT

In the first step of data processing, individual activities (like sleeping) are removed, as are activities that took place inside an institutional setting like work, school or a grocery store.

HHID	INDID	START TIME	END TIME	MOTHER	FATHER	SIBLING	STEP-MOTHER	STEP-FATHER	STEP-SIBLING	FRIEND	GRAND-PARENT	OTHER RELATIVE	OTHER NONRELATIVE	ACTIVITY	LOCATION
1111	39	66900	68400	0	0	OSIBLING	0	0	0	0	0	OTHER RELATIVE	0	OTHERLEISURE	ANOTHER HOME
1111	39	68400	70200	0	OFATHER	SIBLING	0	0	0	0	0	OTHER RELATIVE	0	OEAT_DRINK	ANOTHER HOME
1111	39	70200	77400	0	OFATHER	SIBLING	0	0	0	0	0	OTHER RELATIVE	0	OTV	ANOTHER HOME
1111	39	36900	45000	0	0	OSIBLING	0	0	0	0	0	0	0	OTV	HOME
1111	39	65700	66600	0	0	OSIBLING	0	0	0	0	0	OTHER RELATIVE	0	OSOCIALIZE	ANOTHER HOME
1111	39	8100	10800	MOTHER	0	0	0	0	0	0	0	0	0	OCARE	HOME
1111	39	70800	72000	0	0	OSIBLING	0	0	0	0	0	0	0	OARGUE	HOME
1111	39	50400	51300	0	0	0	0	0	0	0	0	0	0	OUTDOOR MAINTENANCE	HOME
1111	39	55800	59400	0	0	0	0	0	0	0	0	0	0	OTV	HOME
1111	39	51300	52200	0	0	0	0	0	0	0	0	0	0	OPETCARE	HOME
1111	39	66600	68400	MOTHER	FATHER	SIBLING	0	0	0	0	0	0	0	OEAT_DRINK	HOME
1111	39	72000	75600	0	0	OSIBLING	0	0	0	0	0	0	0	OTV	HOME
1111	39	47400	48600	0	0	0	0	0	0	0	0	0	0	OOTHERLEISURE	HOME
1111	39	68400	69600	0	OFATHER	SIBLING	0	0	0	0	0	0	0	OSPORT	HOME
1111	39	48600	50400	MOTHER	FATHER	SIBLING	0	0	0	0	0	0	0	OEAT_DRINK	HOME
1111	39	75600	77400	0	0	OSIBLING	0	0	0	0	0	0	0	OEAT_DRINK	HOME
1111	39	59400	63000	0	0	0	0	0	0	0	0	0	0	OTV	HOME
1111	39	63000	64800	0	OFATHER	0	0	0	0	0	0	0	0	OWATCHHHTASK	HOME
1111	39	29700	30000	0	0	OSIBLING	0	0	0	0	0	0	0	OTV	HOME
1111	39	64920	66480	0	0	0	0	0	0	OFRIEND	0	0	0	OPLAYINDOORS	ANOTHER HOME
1111	39	45000	47400	0	0	0	0	0	0	0	0	0	0	ORECREATION	OUTDOOR RECREATION
1111	39	54480	55500	0	0	OSIBLING	0	0	0	0	0	OTHER RELATIVE	0	OPLAYOUTSIDE	HOME
1111	39	34500	36900	0	0	OSIBLING	0	0	0	0	0	0	0	ORELAX	HOME
1111	39	55500	56700	0	0	OSIBLING	0	0	0	0	0	OTHER RELATIVE	0	OOTHERLEISURE	HOME
1111	39	56700	57600	0	0	OSIBLING	0	0	0	0	0	OTHER RELATIVE	0	ORECREATION	HOME
1111	39	58500	61200	0	0	OSIBLING	0	0	0	OFRIEND	0	0	0	OPLAYINDOORS	ANOTHER HOME
1111	39	61800	62400	0	0	OSIBLING	0	0	0	0	0	0	0	OCRAFTS	HOME
1111	39	66600	66900	0	0	OSIBLING	0	0	0	0	0	OTHER RELATIVE	0	OAFFECTION	ANOTHER HOME
1111	39	62400	63900	0	OFATHER	SIBLING	0	0	0	0	0	0	0	OTV	HOME

The next data processing step (shown below) is a table cross-classifying the activities each alter type does with the focal child. Each child may have a different number of columns (activities) in to represent the activities in their time diary. All the empty rows (individual activities) and columns (step-relations) are excluded. The child in this example did 17 distinct, social activities in the two days (one weekend and one weekday) their time diary was recorded. The sixteenth column represents their TV watching. The third row records interactions with siblings. The cross classification of the two shows that this child watched TV with their siblings five times in the two day period.

	AFFECTION	ARGUE	CARE	CRAFTS	DRESS	EAT_DRINK	OTHERLEISURE	PETCARE	PLAYINDOORS	PLAYOUTSIDE	RECREATION	RELAX	SOCIALIZE	SPORT	TRAVEL	TV	WATCH HOUSEHOLD TASK
mother	0	0	1	0	0	2	0	0	0	0	0	0	0	2	0	0	0
father	0	0	0	0	0	3	0	0	0	0	0	0	1	3	2	1	1
sibling	1	1	0	1	0	4	2	0	1	1	1	1	1	4	5	0	0
friend	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0

Finally, the cells in the table are binarized so that the five instances of TV watching between the child and his/her siblings are collapsed into a positive indicator, while the instances of activities the child didn't do with their siblings remain represented by zeros.

	AFFECTION	ARGUE	CARE	CRAFTS	DRESS	EAT_DRINK	OTHERLEISURE	PETCARE	PLAYINDOORS	PLAYOUTSIDE	RECREATION	RELAX	SOCIALIZE	SPORT	TRAVEL	TV	WATCH HOUSEHOLD TASK
mother	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0
father	0	0	0	0	0	1	0	0	0	0	0	0	1	1	1	1	1
sibling	1	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	0
friend	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0

The rows of this table are the units of analysis in the third and fourth papers of this dissertation. They summarize the dyadic relationships children have with their domestic alters.

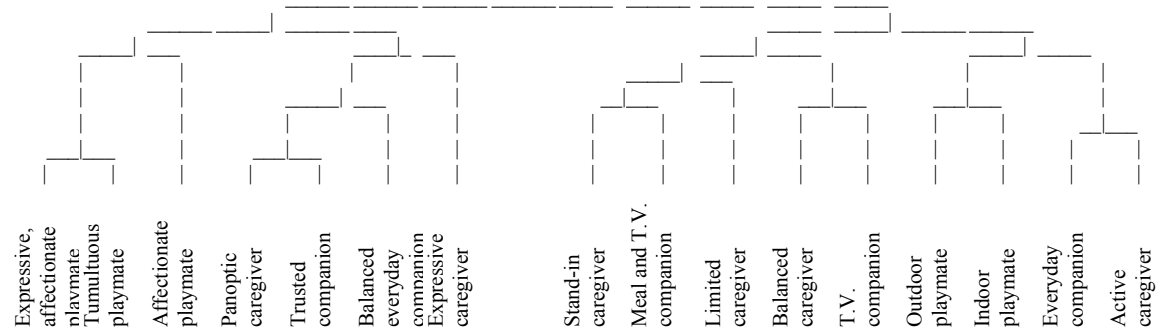
Appendix C

Appendix B: Relationship type cluster fit statistics by year

Number of clusters	Fit statistics for 1997 sample clusters		Fit statistics for 2002-2003 sample clusters		Fit statistics for 2007 sample clusters	
	R squared	Cubic clustering criterion	R squared	Cubic clustering criterion	R squared	Cubic clustering criterion
1	0	0	0	0	0	0
2	0.445	-24.3	0.422	-25	0.382	-22
3	0.528	-40.7	0.539	-32	0.485	-30
4	0.598	-30.8	0.616	-24	0.574	-20
5	0.644	-22.2	0.685	-8.3	0.633	-15
6	0.667	-24.0	0.714	-5.1	0.668	-10
7	0.687	-21.7	0.742	1.89	0.702	-2.8
8	0.705	-16.5	0.768	11.3	0.726	2.52
9	0.718	-14.4	0.788	19.8	0.749	8.71
10	0.729	-11.8	0.802	24.8	0.770	15.5
11	0.740	-8.6	0.814	30.2	0.788	21.7
12	0.750	-4.7	0.825	34.9	0.798	14.5
13	0.760	-1.0	0.834	39.4	0.806	30.5
14	0.770	0.8	0.842	43.1	0.814	33.0
15	0.772	3.5	0.848	46.1	0.821	35.7
16	0.778	6.4	0.854	50.0	0.828	38.4
17	0.784	9.7	0.859	52.2	0.834	41.1
18	0.790	12.6	0.863	62.4	0.840	43.9
19	0.795	15.0	0.866	64.3	0.846	46.9
20	0.799	16.8	0.870	66.1	0.851	55.0

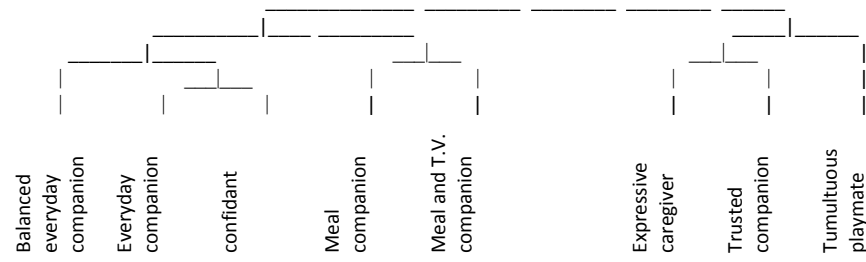
Appendix D

Branching structure for 1997 sample cluster analysis

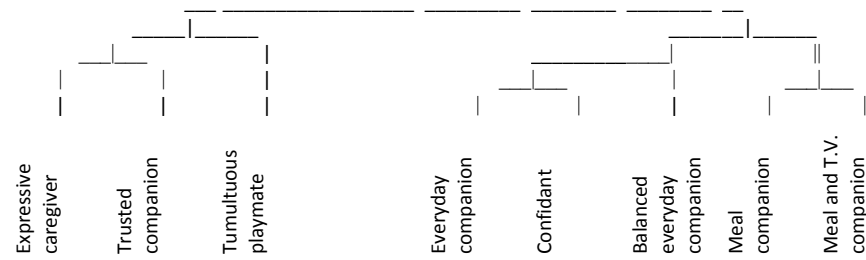


Height is not shown to scale in order to facilitate readability.

Branching structure for 2002 sample cluster analysis



Branching structure for 2007 sample cluster analysis



Appendix E

Composition of five parenting types

Parenting type	Description of parenting type
<i>Caring</i>	
Panoptic caregiver	The role is all-encompassing
Active caregiver	Alters care for, share meals with, and play with the child
Balanced caregiver	Alters care for, share meals with, and play with and watch T.V. with the child
Expressive caregiver	Alters care for and play games with the child
<i>Affectionate</i>	
Affectionate playmate	Alters and children share affection, play games, do chores, and argue
Expressive affectionate playmate	Alters and children share affection, play games and talk
Tumultuous playmate	Alters and children share affection, play games, do chores, argue and impose discipline
<i>Limited</i>	
Meal companion	All alters share meals with the child
Restricted caregiver	All alters share meals, watch TV and care for the child
Meal and T.V. companion	All alters share meals and watch T.V. with the child
<i>Entwined</i>	
Everyday companion	Some alters show affection, all play outside, and talk
Trusted companion	Some alters show affection, some do chores, all play outside and talk with the child
Balanced everyday companion	Some alters show affection, all watch T.V. and share meals, play outside and talk with the child
<i>Friendly</i>	
Stand-in-caregiver	Some alters show affection, some share meals, with a mix of other activities
T.V. companion	Alters watch T.V. and some play games with the child
Confidant	Low care, some games, no TV, no shared meals
Indoor playmate	Alters and the child play indoors
Outdoor playmate	Alters and the child play indoors and outdoors

Appendix F

Relationship types by place in theoretical quadrant

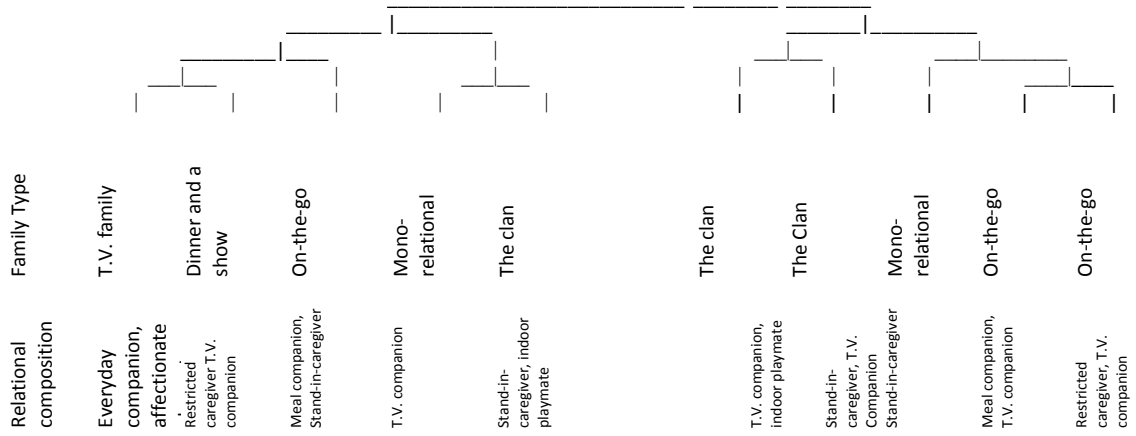
Relationship type	Description
Established	
Everyday companion	Some alters show affection, all play outside, and talk
Panoptic caregiver	The role is all-encompassing
Trusted companion	Some alters show affection, some do chores, all play outside and talk with the child
In-Flux	
Affectionate playmate	Alters and children share affection, play games, do chores, and argue
Expressive caregiver	Alters care for and play games with the child
Peripheral	
Balanced companion	Some alters show affection, all watch T.V. and share meals, play outside and talk with the child
Stand-in caregiver	Some alters show affection, some share meals, with a mix of other activities
T.V. companion	Alters watch T.V. and some play games with the child
Confidant	Low care, some games, no TV, no shared meals
Circumscribed	
Meal and T.V. companion	All alters share meals and watch T.V. with the child
Restricted caregiver	All alters share meals, watch TV and care for the child
Meal companion	All alters share meals with the child

Appendix G

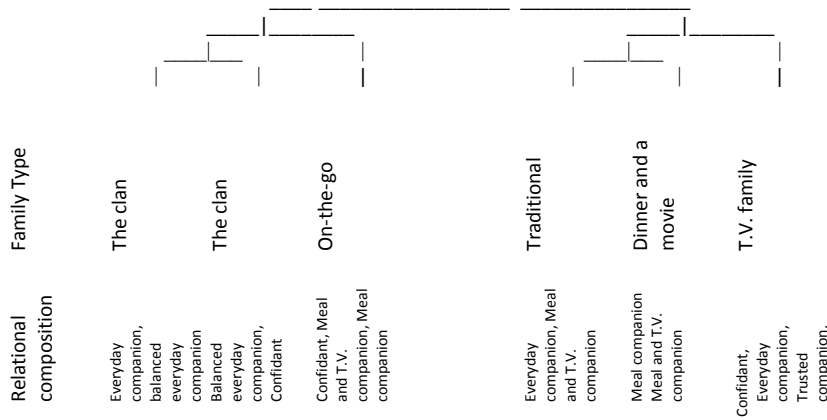
Family type cluster fit statistics by year				
	Fit statistics for 1997 sample clusters		Fit statistics for 2002-2003 and 2007 sample clusters	
Number of clusters	R squared	Cubic clustering criterion	R squared	Cubic clustering criterion
1	0	0	0	0
2	0.210	9.91	0.236	12.3
3	0.281	3.60	0.300	-1.6
4	0.328	-0.09	0.360	-0.83
5	0.367	1.19	0.408	-0.81
6	0.406	7.89	0.450	4.87
7	0.437	13.2	0.491	15.0
8	0.468	19.8	0.528	24.9
9	0.497	26.8	0.562	39.3
10	0.520	35.1	0.584	45.4
11	0.543	41.5	0.607	49.5
12	0.557	44.3	0.624	53.3

Appendix H

Branching structure for 1997 sample family type cluster analysis



Branching structure for 2002-2003 & 2007 sample family type cluster analysis



Appendix I

This analysis supplements table 19. in the fifth chapter of this dissertation. Table 20 below shows the relationship between the independent variables and the log odds of a child having each aggregated family type is consistent with the disaggregated results shown in paper four. In the main paper, the children in the 1997 sample with higher household income are more likely to have disaggregated on-the-go family types compared to the reference family type category, dinner-and-a-movie. In the 2002-2003 and 2007 samples, children with higher household incomes are more likely to have disaggregated clan type families compared to the reference family type category, dinner-and-a-movie. On-the-go family types are circumscribed and peripheral, while clan family types are established and in-flux, so the difference is substantively meaningful.

Table 20. Effect of income on log odds of family type using aggregated categories

Effect of income on family type using aggregated categories in 1997

Relative to Dinner- and-a-movie	1997 sample			
	On-the-go	Clan	T.V. family	Mono- relation
Child is female	-0.17	0.063	-0.056	0.042
Number of household siblings	-0.069	-0.069	-0.481***	-0.117
Child's age	-0.031	-0.051*	-0.194***	-0.050*
Logged household income	0.467***	-0.14	-0.327**	-0.208
2007 cons	-3.199*	3.409**	5.919***	4.029**

Notes: standard errors adjusted for within-child dependence and data are weighted by child level sampling weights.

Table 20 continued: Effect of income on family type using aggregated categories in 2002-2003 and 2007

Relative to Dinner-and-a-movie	2002-2003 & 2007 sample			
	On-the-go	clan	T.V. family	Traditional
Child is female	0.114	0.331*	0.154	0.149
Number of household siblings	0.014	0.009	0.073	0.013
Child's age	-0.034	-0.057*	-0.083**	-0.002
Logged household income	0.063	0.282**	-0.089	0.250*
2007	0.197	0.102	-0.575**	-0.431*
_cons	0.382	-1.238	2.997*	-1.999

Notes: standard errors adjusted for within-child dependence and data are weighted by child level sampling weights.

Table 20 shows the same effect here, which means we can proceed with the analysis. Once again, using the aggregated categories, children with higher incomes in the 1997 sample are more likely to have on-the-go family types while those with higher household incomes in the 2002-2003 and 2007 samples are more likely to have clan type family types.

I suspect the difference is due to the age differences in the children in the two different samples, since they don't completely overlap. To test this, I begin by combining the samples and restricting them to children aged 5-12 because they are present in both samples. Four of the five aggregated family types are substantively similar – the mono-relational family type in 1997 is not found among the 2002-2003 & 2007 sample, and the

traditional family type that emerges in 2002-2003 & 2007 sample is not found among the 1997 sample.

The first model in table 21 below shows that among the combined, age restricted sample, household income raises the log odds of a child having an on-the-go family type relative to a dinner-and-a-movie family type. The second model asks if the effect of household income is different by sample year. The interaction terms 2002*income and 2007*income do not show a statistically significant difference among the three comparable family types. Substantively, this lends weight to the idea that the effect of income is consistent once the age composition is restricted.

Table 21: Effect of income on log odds of family type using aggregated categories in combined sample with restricted age range

Effect of income aggregated family type with restricted age range				
	Main effect of household income on combined sample			
	On-the-go	Clan	T.V. family	Mono-relation
Child is female	-0.255	0.021	-0.001	-0.121
Number of household siblings	0.049	0.055	0.008	0.113
Child's age	0.011	-0.052	-0.208***	-0.025
Logged household income	0.299**	-0.054	-0.233*	-0.139
2002	-0.36	0.323	0.908***	-0.751***
2007	-0.895**	0.529	2.082***	0.07
2002*income				
2007*income				
cons	-1.947	2.213*	4.225***	2.654*

Notes: standard errors adjusted for within-child dependence and data are weighted by child level sampling weights.

Table 21. continued: Effect of income aggregated family type with restricted age range Continued

	Interaction model of household income on combined sample			
	On-the-go	clan	T.V. family	Traditional
Child is female	-0.259	0.022	-0.006	-0.119
Number of household siblings	0.045	0.056	0.011	0.114
Child's age	0.011	-0.052	-0.206***	-0.025
Logged household income	0.518**	-0.253	-0.326	-0.326
2002	4.624	-3.733	1.652	-7.050**
2007	2.423	-2.24	-5.026	-4.271
2002*income	-0.451	0.374	-0.072	0.579*
2007*income	-0.294	0.253	0.632	0.393
_cons		-4.372*	4.359*	5.237**

Notes: standard errors adjusted for within-child dependence and data are weighted by child level sampling weights.

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Biography

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