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NARRATIVES OF PERSONAL EXPERIENCE IN EARLY PARENT-CHILD INTERACTIONS: DEVELOPMENTAL TRAJECTORIES AND RELATIONS TO HIGHER-ORDER THINKING

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The comedy of man starts like this
Our brains are way too big for our mothers' hips
And so Nature, she divines this alternative
We emerge half-formed and hope whoever greets us on the other end
Is kind enough to fill us in
And babies, that's pretty much how it's been ever since

—Father John Misty

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ABSTRACT

Personal narrative is decontextualized speech where individuals recount stories of personal experiences about past, future, or habitual events. Previous research suggests that the quality and quantity of narrative speech parents use with children relates to their later academic outcomes (Dickinson & Tabors, 2001; Rowe, 2012; Demir et al., 2015). This dissertation proposes that narrative's importance in early parent-child conversations may result from its ability to promote higher-order thinking (HOT), relational language where two representations are linked together, through inferences, comparisons, abstractions, and hierarchies (e.g. Richland & Simms, 2015). In this dissertation, usage of HOT in narrative and non-narrative contexts is examined in a longitudinal dataset of 64 children and their primary caregiver(s). Families were visited every 4 months from 14-58 months, and 90-minute spontaneous parent-child interactions were recorded. Speech from over one million utterances was coded for personal narrative and HOT. At 38- and 50-months, HOT use was also examined in pretend, language during imaginary episodes of interaction (e.g. Rowe, 2012). The key findings are: (1) Parents and children use more HOT in narrative compared to non-narrative speech, for parents from 14-58 months and for children after 38 months. (2) Although narrative and pretend share many theoretical similarities, parents and children do not generally use more HOT in pretend compared to narrative or other speech. Features of narrative speech that might explain its relationship to HOT include: (1) narrative's story-driven nature, (2) its relative saliency, (3) its ability to promote metacognition, and (4) its status as decontextualized, requiring speakers to more precisely indicate relationships between representations. Theoretically, these findings enhance our understanding of the nature of narrative and higher-order thinking. Practically, these findings can be leveraged in interventions with parents that seek to improve the quality of children's early language environments.

CHAPTER ONE: INTRODUCTION AND LITERATURE REVIEW

1. Introduction

For many children, before they start taking charge of their own experiences by spending time with peers outside the home and attending school, almost everything they learn comes from their families, and particularly the language—the ordinary, everyday language—they are exposed to in the home. The role of everyday language may be understood through the lens of *language socialization*, meaning that through language-mediated interactions with more knowledgeable caregivers, children acquire not only language itself, but also important thinking and reasoning skills (Ochs, 1986; Ochs & Schieffelin, 1984). Much research has documented that language socialization practices vary, evident in findings that parents and families differ in both the quantity and quality of language offered to pre-school children. Longitudinal studies have also found that these differences in early language environments may have long-term impacts on children's linguistic and cognitive outcomes (Hart & Risley, 1995; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Huttenlocher, Waterfall, Vasilyeva, Vevea, & Hedges, 2010; Rowe, 2012).

Frequently, research on language socialization examines differences in early language environments by socioeconomic status (SES). Differences in language environments are used to partially explain how and why children from low-SES backgrounds come to school less prepared than their peers. These early disparities in school readiness skills are predictive of later academic success or failure, and the gap between low- and high-SES children widens over time (Saxe, 1999; Huttenlocher et al., 1991; Duncan et al., 2007). Therefore, it is critically important to understand how and why the early language environment serves to socialize children's early thinking and linguistic skills. A greater understanding of language socialization practices enables

researchers, educators, teachers, and parents to understand how to best help all children develop the abilities they will need later.

This dissertation focuses on one pervasive and possibly universal type of ordinary, everyday language: relaying stories or narratives of personal experiences, in which one tells others about events that have happened or will happen to oneself. Prior research has established that almost as soon as children start speaking, they begin participating in telling these narratives of personal experience with their caregivers (Hudson, 1990; Nelson & Ross, 1980; Harley & Reese, 1999; Sachs, 1983). Importantly, the frequency with which parents and families use personal narrative speech with their preschool-aged children, as well as qualitative features of these narratives, has been linked to improved educational outcomes for children (e.g. Dickinson & Tabors, 2001; Demir, Rowe, Heller, Goldin-Meadow, & Levine, 2015; Rowe, 2012).

Despite there being some evidence that narrative speech is important to later educational contexts, much is not yet known about how often narratives appear in spontaneous home contexts, how narrative use varies and changes over time, how narrative practices differ by demographics such as child gender and SES, how they socialize educationally-relevant thinking practices, and how narrative talk relates to other types of language contexts in early childhood such as pretend and higher-order thinking. This dissertation uses a unique longitudinal dataset to begin answering these questions. The chapter foci are briefly described next, followed by a broader framing in the literature to highlight why examining decontextualized narrative talk in home contexts is a rich opportunity to better understand children's early socialization of educationally relevant language and reasoning skills.

This dissertation will explore, in Chapter 2, individual trajectories in the frequency with parents and children engage in spontaneous conversations about past, future, and habitual stories

of personal experience over children's early development, showing that this is a frequent part of most children's home talk experiences, and becomes increasingly more common as children age.

In Chapter 3, personal narrative will be explored as a potentially rich language context in which parents and children begin to invoke *higher-order thinking*, a type of relational language where two representations are linked together, through the use of inferences, comparisons, abstractions, and hierarchies (Richland & Simms, 2015; Resnick, 1987; Freeman, 2015). The key findings from this chapter are 1) that narrative utterances contain more instances of higher-order thinking than non-narrative utterances; 2) that higher-order thinking occurs in narrative more often than expected by chance; 3) some evidence suggests future narratives contain more higher-order thinking than narratives about past or habitual events; and 4) that parents use both more inferences and comparisons in narrative compared to non-narrative speech, while children only use more inferences in narrative compared to non-narrative speech.

Finally, in Chapter 4, personal narrative will be contrasted with a similar yet distinct type of language—pretend, or language during imaginary, non-literal, or imitative episodes of interaction (e.g. Katz, 2001; Demir et al., 2015; Rowe, 2012). In this chapter, I find that although narrative and pretend share many theoretical similarities, pretend contains only about as much higher-order thinking as expected, and generally does not differ from other (non-narrative and non-pretend) speech in terms of how frequently higher-order thinking is invoked. Together, these findings suggest spontaneous narrative speech uniquely affords the use of higher-order thinking such as inferences and comparisons; this fact could be leveraged in interventions seeking to enhance the quality of linguistic input children receive from their parents.

I highlight four characteristics of decontextualized speech to explain this phenomenon: narrative may contain more instances of HOT due to (1) its story-driven nature, (2) its saliency

relative to other kinds of speech, (3) its ability to promote metacognitive skills, and (4) its very status as decontextualized, where speakers describe people, objects, events, and ideas removed from the *here-and-now*. The goal of proposing these characteristics or aspects of decontextualized speech is not to rule them out in favor of one singular explanation, but rather to explore the different affordances of personal narrative speech. Naturally-occurring variation along these dimensions in different types of speech (narrative/non-narrative, past narrative/future narrative, and narrative/pretend) will be exploited to discuss why certain types of speech might be particularly conducive to supporting children's early higher-order thinking skills such as inference and comparison.

The data used in this dissertation is drawn from a longitudinal study of language development, where 64 typically-developing children were filmed interacting in 90-minute naturalistic home observations every 4 months from 14 to 58 months. These children were recruited to represent the ethnic, racial, and socioeconomic diversity of Chicago at the study's initiation in the year 2000. Parent and child speech from these videos was transcribed and coded for personal narrative and higher-order thinking at all twelve time points, as well as for pretend at 38- and 50-months. Once they entered grade school, children completed standardized and non-standardized measures of achievement in different domains, enabling researchers to link differences in individual outcomes to variations in their early home language environments (which will be explored in future research beyond this dissertation).

In the remainder of this introduction, I will provide an overview of the relevant literature on early decontextualized narrative speech as well as higher-order thinking (I will provide a review of pretend in Chapter 4, which will contrast use of HOT in narrative and pretend). Additionally, I will further describe the four aspects of decontextualized speech such as narrative

that might explain why it serves as a rich context where parents and children invoke higher-order thinking. Then, I will provide an overview of the current study, as well as the organization of this dissertation.

2. Review of Relevant Literature

2.1. Contextualized and Decontextualized Speech

Research on parent and child use of early narrative often positions narrative as a type of *decontextualized speech*. Decontextualized speech is language that is not grounded in the present environment, and conveys information removed from the immediate context (Dickinson & Tabors, 2001). It is similar to the *displaced speech* discussed by Bloomfield (1935) and Hockett (1958), which is speech that refers to objects, persons, events, or other aspects of communicative situations that are not immediately perceptual to the interlocutor.

Decontextualized speech is most easily understood by situating it on a language continuum, as done by Westby (1991, 1994). On one end lies contextualized *here-and-now* speech, or speech that refers to objects, events, or people in the immediate or present environment. On the other end lies decontextualized *there-and-then* speech. Decontextualized speech takes many forms, but researchers exploring home language environments have identified the following as categories of decontextualized speech in early parent-child discourse: (1) *narrative*, talk used to recount stories of personal experience about past, future, or recurring events; (2) *pretend*, talk during imaginary, non-literal, or imitative episodes of interaction including making an object represent another; attributing actions, thoughts, or feelings to inanimate objects; and assuming a role or persona; (3) *book reading*, non-immediate talk during book reading, including plot predictions and extended conversation about the story; (4) *explanations*, talk that requests or makes logical connections between objects, events, concepts

or conclusions; or language that explains how something works; and (5) *formal definitions*, talk that provides the literal definition of an unknown word (Dickinson & Tabors, 2001).

Decontextualized speech differs from contextualized speech in both its form and function. As far as form goes: because decontextualized speech relies on linguistic cues to convey meaning, rather than exploiting the context, decontextualized speech typically contains more unique vocabulary words (which allows for lexical rather than deictic references). In addition, decontextualized utterances also tend to be made of more complex syntax (to more precisely mark the temporal and causal nature of non-visible events) compared to contextualized speech (Curenton, Craig, & Flanigan, 2008; Curenton & Justice, 2004; Demir et al., 2015; Snow & Uccelli, 2009). In addition, decontextualized speech makes more use of cohesive ties such as anaphora and intra/inter-sentential connectors such as *however* and *because* (De Temple, Wu, & Snow, 1991). In sum, in its form, decontextualized speech is generally more complex than contextualized speech.

With regard to function, Van Kleek (2014) describes this same contextualized-decontextualized distinction in language but refers to the two ends of the continuum as *casual* and *academic* talk. In her view, the function of academic (or decontextualized) talk is to advance knowledge and better understand one's world, while the function of casual (or contextualized) talk is to 'get things done.' Other researchers describe the same basic distinction in function. As described by Snow (1991), the function of decontextualized speech is to "convey novel information to audiences who are at a distance from the speaker and who may share limited amounts of background information," while contextualized speech serves to "enable negotiation of interpersonal relationships […], honed through face-to-face conversations in which speakers and hearers may draw upon such resources as shared knowledge, gesture, interactive negotiation

of meaning, and listener feedback" (pg. 7). In other words, while contextualized language is used to regulate social interactions, decontextualized language is used to convey information.

To summarize, many researchers have drawn distinctions between talk situated in the *here-and-now* and the *there-and-then*. Decontextualized speech contains many linguistic features that make it distinct from contextualized speech, and also serves a different function, primarily to convey information not known to the listener, while contextualized speech fills more pragmatic purposes. Due to either its form (more syntactically and lexically complex) or its function (conveying information), decontextualized speech may serve as a rich 'breeding-ground' where parents and children begin to invoke and grapple with higher-order thinking.

Why Decontextualized Speech Matters. Prior research has demonstrated that early exposure to and participation in decontextualized speech matters for children's later academic outcomes. Much of this research is drawn from the Home-School Study of Language and Literacy Development (Dickinson & Tabors, 2001). This study found that children who heard more decontextualized language between ages 3 and 5 had larger receptive vocabularies and better narrative production at kindergarten; in addition, parental use of decontextualized language predicted 4th grade reading scores. Additional research from the Language Development Project (the same dataset from which this dissertation draws its data) suggests that the amount of decontextualized language that children are exposed to after 30 months predicts such outcomes as narrative production and vocabulary size at kindergarten (Rowe, 2012; Demir et al., 2015). Thus, early exposure to decontextualized speech has been linked to improved educational outcomes for children.

There are two major hypotheses (which are not mutually exclusive) for why decontextualized speech is so important for children's school entry skills. The first is that

decontextualized speech serves as a precursor to *academic language*. Academic language is the language of instruction used in formal education settings (Cummins, 1983; Snow & Uccelli, 2009; Snow, 2010). Students and teachers use academic language when analyzing texts, formulating arguments, giving a presentation, and discussing unknown concepts and vocabulary words. For example, during a science lesson on how plants work, students and teachers might be using technical and novel words such as 'chlorophyll' (which are unlikely to appear in casual, everyday conversation), and they might discuss concepts and processes that are not immediately observable, such as the process of photosynthesis. On the spectrum from contextualized to decontextualized, these types of conversations fall far along the 'decontextualized' end. Understanding and producing the more formal register required by academic language can be challenging if children have little or no exposure with talking and thinking about ideas removed from the present context, or have little experience using the more syntactically and lexically complex language that is characteristic of decontextualized speech.

The second hypothesis for why decontextualized speech matters for later outcomes is that decontextualized speech might promote *emergent literacy*, which is the development of literacy-related skills before the commencement of formal reading instruction (e.g. Dickinson & Snow, 1987; Snow & Ninio, 1986). This is part of a growing movement that seeks to recognize that oral language is the foundation of early literacy, and much research has found support for the idea that decontextualized language skills relate to later literacy (Snow, 1983, 1987, 1991; Cummins, 1983; Snow, Cancino, Gonzalez, & Shriberg, 1989). Literacy is a second-order language task that requires speakers to be proficient in their oral language competencies (Dyson, 1991; Hall, 1987), and features of decontextualized language make it ideal for facilitating emergent literacy skills.

Talk about print books during non-immediate book-reading—a type of decontextualized speech—can promote children's decoding and comprehension abilities (Demir et al., 2011). In addition, the other categories of decontextualized speech might also relate to emergent literacy; these conversations are organized more similarly as *extended discourse*, which is talk that requires the use of multiple, interlinking sentences to build a larger linguistic structure (Dickinson & Tabors, 2002). In other words, decontextualized speech is more similar to written language than is contextualized speech. Talk about past and future events in narrative, about causal relationships in explanations, and about fictional or imaginary worlds in pretend might expose children to the linguistic forms and macrostructures important to full-fledged print narratives. For example, a beginning, middle, end; plot, characters, setting; rising action, climax, falling action; abstract, orientation, complicating action, resolution, evaluation, coda; etc. Children who are exposed to more decontextualized language are exposed to language that is structured more like written language, as extended discourse, which could promote early literacy skills.

To summarize, decontextualized speech differs from contextualized speech in both its form and function, and has been shown to be beneficial for children's academic outcomes, possibly by preparing children to converse in academic language and/or because it promotes emergent literacy skills. These hypotheses are not mutually exclusive; practice in academic language can also relate to emergent literacy, and vice-versa. A third hypothesis for why early decontextualized speech matters put forth in this dissertation is that decontextualized speech—and narrative in particular—promotes the use of generalizable and relational higher-order thinking skills such as inference and comparison. In the next section I will review some research more specific to personal narrative.

2.2. Personal Narrative

Narrative is a special kind of decontextualized talk where individuals recount personal experiences in their lives. While telling narratives of personal experiences, interlocutors invite their conversation partners to discuss internal representations of events—memories of past events, plans for the future, or generalized routines—rather than the current or present context. These narratives—because they are decontextualized—may contain more complex syntax, more distinct vocabulary, and more cohesive ties than more contextualized speech, and yet are ubiquitous in everyday conversation. The following section will review prior research on parent and children's early use of personal narrative speech, with sections on definitions of narrative; the role of autobiographical memory in narratives; its developmental trajectory; differences between past, future, and habitual narratives; the social context of narratives; parent-child narrative conversations (both spontaneous and elicited); and cross-cultural differences in narrative use.

Defining Narratives of Personal Experience. Researchers differ slightly in what constitutes talk as a 'story of personal experience,' which is particularly challenging when examining spontaneous speech. The definitional focus has primarily been on past narratives. Labov's (1972) definition of a 'minimal narrative' is "matching a verbal sequence of clauses to the sequence of events which (it is inferred) actually occurred" (pg. 359-360). For Eisenberg (1985), a narrative of personal experience was "defined in a broad sense as any description of one or more past events that had taken place prior to researcher's visit to home" (pg. 179). Some researchers specify more the interactional nature of narrative. Miller and Sperry (1988) defined an 'episode of talk about the past' as "one or more child utterances, addressed to an interlocutor and describing a particular past event that had occurred to the child or her associates" (pg. 297).

For Wiley and colleagues (1998), a 'co-narration of personal experience' was defined as "an episode of talk involving three or more utterances, addressed to an interlocutor, describing a particular past event or a class of past events in which the child portrayed himself or herself as a protagonist" (pg. 837). While these definitions all differ in the specifics surrounding what 'counts' as a narrative, what they have in common is the discussion of *events* that are *relevant to the self* that take place in the *past* (generally considered to be prior to data collection), and for children, they typically involve a co-narrator.

Autobiographical Memory. One question often raised in studies of early narrative in children is the role of memory—specifically, a type of episodic memory (where individuals recall something that happened at a specific time and place) known as *autobiographical memory*. Autobiographical memories are episodic memories that have a specific, long-lasting, and usually of significance to one's self-concept (Nelson, 1993). Adults generally report their first memories to be between the ages of 2 and 4 (Dudycha & Dudycha, 1933; Nelson, 1993; Pillemer & White, 1989; Eacott & Crawley, 1998, Usher & Neisser, 1993), a phenomenon known as *childhood amnesia*, which was first described by Freud (1963). The fact that these memories are later lost might suggest that children are not able to retain memories about events that happened before the *here-and-now*, and as such, do not have adequate memory abilities to engage in narrative talk. However, young children do display evidence of having 'memories' prior to age 2, and before they learn language (Ashmead & Perlmutter, 1980). For example, six-month-old infants show nonverbal event recall up to 24 hours after a novel event (Barr, Dowden, & Hayne, 1996; Collie & Hayne, 1999), and nine-month-olds can retain the memory of a novel event for as long as four weeks (Carver & Bauer; 2001). Children demonstrate their memory for events in nonverbal ways before they develop the capacity to *talk* about same events. However, reflecting on past events

requires more than just memory; it also requires speakers to be able to discuss and analyze the events in question, suggesting memory skills are necessary but not sufficient for speakers to be able to engage in narrative talk.

Developmental Trajectory. Prior research on developmental trajectories of narrative speech have several limitations: many studies have only a few subjects, have only a few time points, or both. From this research, however, we can glean an overall trajectory of children's developing personal narrative skills. Children typically begin participating in parent-guided talk about the past almost as soon as they begin talking, around 15-18 months (Fenson, et al., 1993; Hudson, 1991; Nelson & Ross, 1980; Harley & Reese, 1999; Sachs, 1983). However, for very young children, these references to the past are often fleeting (sometimes just a word or two), and typically describe recent activities, such as breakfast this morning (Nelson & Ross, 1980; Sachs, 1983). Eisenberg (1985) described this 'first phase' as one where children are almost entirely dependent on adult participant, where narratives are overwhelmingly elicited and maintained by the adult.

Starting around age two, children begin bringing up past events as topics for conversation, using conventional openers such as, "Do you remember…?" (Hudson, 1991) or "One time…". However, adults continue to provide most of the structure and coherence for these narratives, integrating the bits and pieces contributed by the child (Farrant & Reese, 2000; Fivush & Fromhoff, 1988; Peterson & McCabe, 1992; Reese, Haden, & Fivush,1993; Fivush, Gray, & Fromhoff, 1987). Young children's narratives tend to be disorganized, and children rely on a more knowledgeable conversational partner to add more structure to their narratives.

In addition, Eisenberg (1985) observed (in her sample of two Spanish-speaking girls living in Oakland, CA) that around age 2, narrative conversations often concern 'routines,' where

speakers describe elements common to many instances of an event (e.g. what happens at birthday parties), rather than the specifics of a particular event (e.g. Molly's birthday party). This same phenomenon—of discussing routine but non-specific events—was also described by Nelson for 3-year-olds (Nelson, 1978). In other words, children may first develop the ability to discuss these 'scripts' (Schank & Abelson, 1977), or generic event memory (Nelson, 1993) prior to discussing unique events.

Starting in the third year of life, children develop the ability to talk about unique occurrences in the past, but still have difficulty planning a lengthy discourse (Eisenberg, 1985) and tend to require the use of prompts from adults. Narratives of three-year-olds can tell the listener 'what' happened, and often 'when' and 'where,' but still have difficulty ordering events (Reese, 2009). By around age 4, children are able to provide an understandable account to a naïve listener of a past event that occurred up to one year prior (Fivush, Haden, & Adam, 1995; Peterson & McCabe, 1983). However, it is not until age 6 that children can provide a 'full' narrative of a past event (in terms of describing the formation and execution of goals by protagonists) (Peterson & McCabe, 1983), and oral narrative abilities continue developing well into grade school and even adulthood (Bamberg, 1987; Reilly, 1992; Berman & Slobin, 1994).

Past, Future, and Habitual Narratives. The majority of the research on children's narrative speech has focused on past events. When discussing past events, at least one participant in the conversation must access an event representation in their minds, and then describe that event in a way that enables those present to have a conversation (although the degree to which young children understand that memories are representations of events, and therefore can differ by individual even when they are thinking about the same shared past event, is disputed; Fivush & Nelson, 2006). Conversing about past events comes with distinct challenges for young

children, because they must defocus from the present and negotiate a shared representation of the event with their conversation partners (Fivush & Nelson, 2006). This negotiation happens through language only, making this task quite conceptually challenging for young children.

People may not only refer to events that have happened in the past, but can extend themselves forward in time, and discuss events that will or might happen in the future. Research in this area is still relatively rare (for exceptions, see: Benson, 1994; Hudson, 2002; Hudson, 2004; Lucariello & Nelson, 1987), and has almost exclusively been conducted with middle-class participants in structured (elicited) settings. It is not known whether talk about the future is as frequently used as talk about the past in spontaneous parent-child discourse over early development, although Lucariello and Nelson (1987) found in a sample of 10 parent-child dyads that parents' rate of future (or "planning") talk with 2-year-olds is similar to their rate of past (or "remembering") talk, However, they did find that their future talk tended to concern routine activities (e.g. "You going to take a nap after lunch?"), while their past talk focused more on unique or infrequently occurring events (e.g. "Did you have fun when you went to California?"). One study using data from the Child Language Data Exchange System (CHILDES; MacWhinney, 2000) found that while the percentage of parental talk about the past remained relatively constant at 14-, 20-, and 32-months, percentage of parent talk about the future increased between 14 and 32 months (Benson, Talmi, & Haith, 1999, cited in Hudson, 2002). Another cross-sectional study with 2½ and 4-year-old children found that talk about the future tends to be more temporally complex than talk about the past, because it makes use of hypotheticals and predictions (Hudson, 2002). Thus, future talk presents even more challenges for young children than past or habitual talk, due to the challenges associated with mentally representing more obscure future events.

This difficulty children have in discussing future-oriented events might explain the pattern noticed by both Eisenberg (1985) and Nelson (1978), that children relay a third type of narrative speech: referring to habitual, familiar, and recurring events (Nelson, 1986), which are also called scripts (Hudson & Nelson, 1986; Hudson & Shapiro, 1991; Schank & Abelson, 1977), routines (Eisenberg, 1985), generic narratives (Miller & Sperry, 1988), and generic event memory (Nelson, 1993). These narratives are structurally more similar to past than future event narratives, because speakers can access an internal mental representation of the events. However, they differ from past narratives because rather than focusing on specific instances, they reference what tends to occur in different situations (for example, when you go to a birthday party, you eat cake and open presents). These habitual narratives may be used more frequently early in development, as children are developing their routines, but decrease in frequency as parents and children experience more unique events, and the discussion of routines becomes less interesting.

These three types of personal narratives—past, future, and habitual—offer different affordances for referring to internal mental representations, and no work has yet examined whether, in spontaneous parent-child speech over a wide developmental window with a large sample of diverse subjects, parents and children begin using each of the three narrative types at different child ages. One hypothesis is that children may initially only tell past or habitual narratives, and future narrative talk might occur only after children become proficient at talking about displaced events for which they have access to an internal representation.

Social Context of Narrative. The focus so far of this review has been conversational stories of personal experience between children and their primary caregivers. Young pre-school children's early social experiences take place mostly within the sphere of their families, but families are situated within larger contexts themselves. Bronfenbrenner's bioecological systems

theory (Bronfenbrenner, 1992; Bronfenbrenner & Morris, 2006) states that development (the phenomenon of continuity and change) takes place in the context of the individual's broader familial, social, cultural, and historical environments, systems which all interact with each other. For young children, their family is the core of their *microsystem*, which is the first ecology within which the individual interacts, making early parent-child interactions a logical place to examine children's early experiences and language socialization.

Parent-child narrative talk can be conceptualized as taking place within these different ecologies and systems, as done by Fivush and Merrill (2016). For example, when parents and children discuss shared personal experiences, these narratives are taking place within the familial microsystem. However, in the *exosystem* are experiences which may not have been shared by all members of the family. Parents may share events in their own lives that their children have little to no experience with (such as their experiences at work), or they may also discuss their own experiences as children (a type of narrative called an *intergenerational narrative*, Fivush & Merrill, 2016; or a *communicative memory*, Ashman 1995). When children start having their own unique experiences outside the home—at school, with friends—children also begin relaying their own exosystem narratives (Wang & Song, 2014). By reminiscing and sharing these experiences with their family members, these experiences may be re-evaluated, which illustrates the interlinking nature of the ecological model. Finally, at the *macrosystem* are more extended family histories—for example, about ancestors or great-grandparents. These stories may be passed down from generation to generation, and form part of an individual's and family's broader cultural and historical memory. Listeners and tellers of these 'family myths' still have personal connections to these stories, although the experiences described may not have been directly experienced by anyone present in the conversation.

The focus of this dissertation is on narrative talk that takes place between parents and children, and mostly concerns experiences that were experienced by one or both of the conversational partners. Future work could examine the frequency with which parents and children share narratives situated at each ecological level, or could examine differences between narratives of shared and unshared experiences.

Parent-Child Narrative Conversations. Given the important role that parents have in shaping their children's early experiences, it is no surprise that most of the work on narrative development has focused on the role of parental narrative input. Next, I will review prior research on parent-child narrative conversations. This section is divided into studies that examine narrative speech in naturalistic settings, and studies that examine narrative speech in semi-naturalistic/elicited settings.

(1) Naturalistic. One of the earliest studies to examine naturalistic use of narrative speech was conducted by Eisenberg (1985). She followed two Spanish-speaking girls living in Oakland, CA about once a week for approximately one year, following the onset of two-word utterances (for both girls, approximately ages 2-3). Over the course of the year, she observed the girls moving from telling brief, adult-guided, highly routinized descriptions of past events to mentioning specific past occurrences in long but disorganized formats. However, the small sample size and relatively narrow developmental window means researchers can draw few inferences about these findings to other populations.

The Home-School Study of Language and Literacy Development (Dickinson & Tabors, 2001) remains one of the most exhaustive and long-term examinations of narrative speech (and decontextualized speech more broadly) as it is used in parent-child interactions. The subjects of this study were 74 children from low-income families from diverse racial/ethnic backgrounds

who were eligible for Head Start (though about half used vouchers to attend private pre-schools) in the Boston area. These children were visited in their homes at ages 3-, 4-, and 5-years to examine the effects of their early interactions and experiences on later literacy development.

At each visit, researchers left behind a blank audiotape, and families were instructed to record a typical mealtime interaction. The HSSLLD found that mealtimes were a particularly rich source of both narrative talk and explanations, but that parents varied widely in their use of narrative speech, ranging from 0-64% of their mealtime talk (Beals, 2001). This suggests that family meal times, at least in Western cultures, is a context that lends itself to talking about the personal past (similar conclusions were reached by DeTemple & Beals, 1991). In addition, researchers found that families who more frequently used extended discourse such as narrative had children with better narrative production and higher receptive vocabulary at kindergarten; they also reported relations between early decontextualized (narrative, pretend, and explanatory) talk and reading scores as late as 4th grade (Tabors, Snow, & Dickinson, 2001). This research was instrumental in highlighting the important role played by decontextualized speech in young children's early life experiences.

Another series of studies conducted by Miller and colleagues (Miller & Sperry, 1988; Burger & Miller, 1989; Wiley, Rose, Burger, & Miller, 1998) focuses on differences in narrative use between working-class and middle-class families. The first of these studies (Miller & Sperry 1988) examined five working-class children and their mothers from ages 2-2½ in South Baltimore. Across the five subjects, researchers captured 40 hours of spontaneous-parent child interactions, which was coded for the presence of past narrative talk (researchers also collected 2.5 hours of elicited past narrative talk). Their findings suggest that children talked primarily about negative past events, especially events of physical harm. Rate of talk about the past

increased over development, such that children became able to accomplish such talk independently, and even 2-year-olds were found to communicate their attitude toward the events. This suggests that the roots of the genre of personal narrative lie not only in cognitive and language skills, but in the emotional significance of the depicted event.

A follow-up study (Burger & Miller, 1989) examined how parents and children use narrative speech not only in working-class families, but also middle-class families. Six children each from two communities in Chicago (one working-class, one middle-class) were observed at ages 2½ and 3 in two two-hour sessions, yielding a corpus of 400 naturally occurring co-narrations of past experiences. Interestingly, in this study (in contrast to other work examining naturalistic home interactions), the researcher tasked with visiting families in their homes was not instructed to act "invisible" or adopt a silent stance: rather, "each researcher tried to participate as a family friend who had stopped by for a casual visit; at the same time she was careful not to `push' narrative talk" (pg. 141). The researchers employed this method because they felt the silent presence of the experimenter would undermine the ecological and cultural validity of the interactions.

This study found that in contrast to the negative skewing observed in the Baltimore study, stories of personal experience told by the families in Chicago skewed more in the positive direction. The most common types of stories told by the families were those about emotional gain and material gain, with physical harm coming in third. In addition, families in the working-class community produced twice as many co-narrations compared to those in the middle-class community, and used more negative emotion talk and more dramatic language. These results suggest individuals from lower socioeconomic classes, where typically researchers describe

language deficits in terms of the language quality and quantity offered (e.g. Hart & Risley, 1995), may function differently with regard to use of narrative.

Another paper written on this same corpus (Wiley, Rose, Burger, & Miller, 1998) examined the ways in which families in the different communities encouraged children to construct autonomous selves. In other words, to what extent do families in the two SES-communities differ in the extent to which caregivers intervene in ways that override the children's version of what happened, and therefore limiting the child's rights to author or exercise control over his or her own experience? This study found that even young children were granted the rights to speak about and author their past experiences, and there were no differences between the communities in the extent to which children versus mothers initiated stories about the child's past experience. However, the two communities differed in the degree to which autonomy was automatically granted. Being able to defend one's own perspectives or experiences in the face of opposition was valued more by the working-class families, whereas the middle-class families tended to create spaces where children's feelings and points of view are affirmed without challenge. In essence, for the middle-class children, expressing one's view about past experiences was viewed as a natural right, while it was viewed more as something to be 'earned' in the working-class community. The findings from this study point to another way in which personal storytelling may differ by cultural or socioeconomic backgrounds.

Finally, prior work on using the same data to be utilized in this dissertation (Rowe, 2012; Demir et al., 2015) examined spontaneous parent-child use of decontextualized speech, including personal narrative, at 18-, 30-, and 42-months in a diverse sample of participants from the Chicago area. This research found that beginning when the children are around 30 months old, children's language skills begin to benefit from parents' use of decontextualized language. The

decontextualized language that children hear predicts vocabulary at kindergarten entry, as well as their ability to produce their own narratives. This dissertation will extend these findings by examining parents' and children's use of narrative speech from 14- to 58-months, as well as examining the different contributions of past, future, and habitual narratives.

(2) Elicited. Rather than wait for parents and children to spontaneously engage in talk about past or future events, some researchers elicit parent-child conversations of past experiences. Much of this research has been conducted by Robyn Fivush, Catherine Haden, Elaine Reese, and their colleagues. In one suite of studies (Reese et al., 1993; Reese, Haden, & Fivush, 1996; Fivush et al., 1995; Haden, Haine, & Fivush, 1997), fifteen white middle-class families were visited at 40- and 70-months, and experimenters helped parents to select three special, one-time events to discuss with their child (excluding events such as birthdays or Christmas, because even these events tend to become routines even by age 3½; Hudson, Fivush, & Kuebi, 1992). Eliciting narratives does not answer the question of how frequently parents and children engage in narrative talk in their everyday lives, but does enable researchers to examine differences between individuals when they do engage in these kinds of conversations.

Much of their work has argued that successful narratives include evaluative devices, which are features that give the listener perspective on the story. In other words, these evaluations inform the listener the 'why,' and not just the 'what,' 'where,' and 'when.' Examples of evaluative devices include intensifiers ("It was *really* cold"); internal responses, or comments that reveal the personal feelings or desires of the participants ("It made me sad"); affect modifiers, or statements of subjective or emotional response ("Mommy was wrong"); and emphasis, or comments about something that didn't happen during the event or a forced action or reaction ("It never stopped") (Haden, Haine, & Fivush, 1997). These linguistic features make the

narratives more complex, and also contextualize the conversation for someone who may be unfamiliar with the events being described.

In general, variation in narrative talk is quantified by examining the number, diversity, and quality of evaluative devices used by the storyteller. In their work, they categorize parents as 'low elaborative' or 'high elaborative,' with the contrast being not only in how frequently parents use these evaluative devices, but also the extent to which they encourage their children's participation in telling the stories of personal experience. Low elaborative mothers tend to ask more redundant or yes/no questions, and do not confirm their children's participation in the conversation. This leads to shorter and less frequent narrative episodes that have less of a sense of 'story,' and include only attention to isolated details.

In contrast, high elaborative mothers as more open-ended 'wh'-questions, which results in longer and more detailed narratives where child participation is encouraged. More elaborative mothers also tend to incorporate more emotional information in their narratives (Fivush, 1994). Children of more highly elaborative mothers participate in reminiscing more frequently (Haden, 1998; Peterson & McCabe, 1992), tell longer and more elaborative narratives of their own (McCabe & Peterson, 1991; Hudson, 1990), recall more memory information narratives in grade school (Reese, Haden, & Fivush, 1993), have more secure attachment relationships (Fivush & Reese, 2002), and have better emotion understanding and regulation (Laible, 2004A, 2004B). Mothers who are more elaborative are not necessarily more 'talkative' (Haden & Fivush, 1996; Hoff-Ginsberg, 1999); instead, these differences seem to reflect the parents' goals of reminiscing with their child. Mothers tend to maintain their same style of elaborativeness over development (Harley & Reese, 1999; Reese, 2002; Reese, Haden, & Fivush, 1993) and with all their children

(Haden, 1998). This suggests that elaboration style may reflect an individual's own proclivity and desire to engage in narrative talk.

In another variation of "eliciting" narratives, 28 pre-school children with a mean age of 46 months experienced a "standardized' or controlled event (Cleveland, Reese, & Grolnick, 2007). The event was playing in a pretend zoo, where the overall goal was to find a lost baby elephant. Children then discussed the zoo event with their parent later that evening, with parents assigned to either an "outcome-oriented" condition (where parents were told their children would be tested on event-related recall) or a "process-oriented" condition (where parents were told their children's personal perspective would be assessed). In other words, researchers attempted to manipulate the "goal" of reminiscing. While they found no differences between the conditions in elaborative structure, they did find that elaborative structure predicted children's subsequent veridical recall of details about the zoo, which parallels similar findings from Boland, Haden, and Ornstein (2003). In addition, parents in the two conditions differed in the extent to which they supported their children's autonomy. The process-oriented parents became more autonomy supportive compared to a baseline measure, whereas outcome-oriented parents tended to become more controlling. Taken together, these findings highlight the effects of parents' styles of conversing about the past and effects on child's reminiscing engagement as well as subsequent memory.

Other researchers have studied parental elaboration style in different ways. Peterson & McCabe (1994) studied different types of parental orienting questions, and related differences in parental input to children's abilities to provide their own orienting information in personal narratives with an experimenter. In this study, 10 primary-care givers recorded conversations about past events when their children were between 26 and 43 months of age. Parental orienting

questions were categorized as yes/no context questions (e.g. "Did we go to McDonald's?") or ‘wh’-context questions (e.g. "Where did you go?” “What did you eat?”). Children, in conversation with an experimenter, also discussed past events, which were then coded for whether ‘where’ and ‘when’ information was provided. Results found that parents' use of ‘wh’-context questions, but not yes/no context questions, early in development was positively related to children's use of orienting information in experimenter-elicited narratives. Thus, parents who frequently prompted for context information had children who provided more orienting information in their own personal narratives; parents values in narrative are transmitted to their children.

In sum, parents differ in their styles of eliciting talk about the past with their young children, which has impacts on their own likelihood to engage in talk about the past, as well as their narrative and socio-emotional abilities. Future work could examine whether parents’ spontaneous elicitation style of narrative follows these same patterns.

Cross-Cultural Differences. The last section of this review on early parent-child use of narrative speech concerns cross-cultural differences. While this dissertation only examines subjects in North American primarily urban or suburban settings, prior research has established important differences in use and style of narrative speech across different cultural, socioeconomic, and racial/ethnic backgrounds. Additionally, it is also important to keep in mind that cultures and languages vary in the extent to which it is deemed appropriate to engage in child-directed speech (Bornstein, et al., 1992), speaker rights are not automatically granted to children in every culture (Schieffelin & Ochs, 1986), and cultures and even individuals vary in what is considered to be a well-structured narrative (Michaels, 1981; Stein & Policastro, 1984).

(1) Western and Eastern Cultures. Much of the research on cultural differences has compared Western and Eastern cultures. Research suggests that Western middle-class cultures are more elaborative compared to non-Western cultures, such as Korean families (Mullen & Yi, 1995) and Chinese families (Wang, 2001; Wang & Fivush, 2005) (for a review, see Fivush & Haden, 2003). Researchers interpret this in light of Eastern culture's focus on the self as collective and interdependent (Leichtman, Wang, & Pillemer, 2003; Wang, 2001), which results in less focus being placed on individual reminiscing. Differences in elaboration style have long-term effects, such that by middle childhood, children in Western cultures tell more detailed and elaborated stories of their personal past than do children in Eastern cultures (Han, Leichtman, & Wang, 1988). Despite these qualitative differences observed between cultures, a great deal of variability exists even within cultures in the extent to which parents elaborate on narratives with their children.

(2) Socioeconomic Differences. Within the North American context, Miller and colleagues (Burger & Miller, 1989; Wiley et al., 1998) found that working-class white mothers initiate more episodes of past talk than middle-class white mothers, which—as already stated—is interesting in light of linguistic input 'deficits' typically associated with low-SES families (e.g. Hart & Risley, 1995). Additionally, maternal education (which is highly related to SES) does not relate to maternal reminiscing style (Farrant, 2000; Newcombe & Reese, 2004). Taken together, these findings suggest narrative may not fall as cleanly along typical SES-patterns observed in other studies of language socialization.

(3) Racial/Ethnic Differences. Some researchers have examined racial differences in the use of personal storytelling. Oral language traditions, as well as storytelling specifically, are an important part of Black/African American culture (Gates, 1989; Banks-Wallace, 2002; Gardner-

Neblett & Iruka, 2015). However, some cultures differ in what is considered a 'good' story. For example, Black children frequently tell *topic-associating stories*, which are stories of implicitly associated personal anecdotes. This is in contrast to *topic-centered stories*, which are tightly organized on single identifiable topic, and are often more valued in traditional schooling settings (Michaels, 1981; Champion, 1997). Children who come from non-mainstream backgrounds may face challenges once they get to school with experience in narrative styles that are unfamiliar and incompatible with these more mainstream styles (Michaels, 1991).

However, prior research has found no difference in the use of 'literate' language features, such as conjunctions and elaborated noun phrases, in the oral narratives of White and Black 3- to 5-year-olds (Curenton & Justice, 2004). One study using data from the Early Childhood Longitudinal Study (whose subjects are over 6,000 students nationwide) found that oral narrative skills mediated the pathway between early language and kindergarten literacy skills for African American children, but not for children of other racial/ethnic groups. Early narrative skills may be particularly important for certain children as they transition from using oral language to the decoding and comprehension of written language.

These findings should be interpreted cautiously. For one, it is difficult to disentangle the effects of income, parental education, SES, and culture from race in drawing conclusions about different uses of narrative. In addition, as stated above, the cross-cultural variation in both uses and definitions of narratives of personal experiences means not everyone may agree on what constitutes such a story. In anticipation of this, the approach to narrative undertaken in this dissertation was intentionally expansive. Our coding captures small seemingly inconsequential narratives ("Want to go to the park this afternoon?") as well as more expanded narrations that describe multiple interlinking events.

In sum, narrative emerges relatively early in development, though children initially rely a great deal on their parents to structure and support their early narratives. Although most research has been conducted on narratives about past events, narratives can also concern future events, although speakers are not able to rely as much on an internal representation of an event. In the next section, I will review some of the research on higher-order thinking, before discussing why narrative and HOT may be linked.

2.3. Higher-Order Thinking

Decontextualized speech such as narrative is not the only type of language that plays a role in children's early language socialization, as well as later linguistic and academic abilities. Much of the previous research on the early language environment has focused on support for vocabulary and other linguistic skills (e.g. Hart & Risley, 1995; Huttenlocher et al., 1991). In order to succeed in school, however, children also need to know how to use language to link ideas together and support complex thought: in other words, they must be able to use their language for higher-order thinking.

Higher-order thinking (hereafter HOT) is a type of relational reasoning where two representations are linked together in some way (Lewis & Smith, 1993; Freeman, 2015; Richland & Simms, 2015; Resnick, 1987). In this dissertation, I focus on four specific types of HOT—inference, comparison, abstraction, and hierarchy—where the nature of the link between representations differs (described briefly below; a fuller account may be found in Chapter 2).

Inferences relate the two representations through cause and effect or through conditionals. For example, a parent might say, in reference to an event her daughter had witnessed the prior day, "He put the birds in the bucket so no cats would get to it." In this example, the parent is providing an inference for the man's behavior: the reason the man put the

birds in the bucket (representation 1) was to ensure no cats would get to them (representation 2), and these representations are linked by the causal word "so." Comparisons relate the two representations through similarity or difference (e.g. "A tornado is like a mean monster"). Abstractions relate the two representations through generalizations (e.g. "Big kids carry their own plates"). Hierarchies relate the two representations through superordinate/subordinate frameworks (e.g. "A hammer is a type of tool.")

HOT types are not mutually exclusive, and utterances can display more than one type of relational thinking. Another more complex utterance, containing inference, comparison, and hierarchy, that comes from our corpus (while the parent and child are reading a book about worms and discussing plans to get a worm bin) is: "We won't get worms like those because Mommy would want to make sure it was the right kind of worms if we were going to have a worm bin." The parent compares the worms they may get with the worms in the book, and also discusses the 'kinds' of worms they may get using a hierarchy. In addition, the parent uses inferential reasoning and conditionals to describe their worm choice. This manipulation of ideas through language is higher-order thinking. By linking together representations, children become able to represent complex concepts, organize information into knowledge structures, and make inferences based on their knowledge. As such, developing HOT skills is a long-standing educational goal, as these skills can be used to develop knowledge that crosses domains.

Importance of Higher-Order Thinking. The motivation for considering some types of learning and thinking to be more complex than others is a tradition that dates back to Bloom's (1956) cognitive taxonomy of educational objectives. Bloom makes the claim that some types of learning might require more cognitive processing than others, but also have broader benefits. In addition, he believed children shouldn't be taught just facts and concepts to memorize, but

should be taught the kind of thinking skills that can be generalized to novel situations. Under this tradition, some standards-based educational reform initiatives seek to include higher-order thinking skills in their aims and objectives, and HOT skills have become a national educational priority (National Research Council, 2001; 2007; 2012; Richland, Zur, & Holyoak, 2007; Markman & Wood, 2009; Common Core State Standards Initiative, 2010).

Developmental Trajectory. As the vignettes above illustrate, HOT is not only used in school; children also spontaneously invoke HOT early in development, beginning between about the third and fourth years of life (Gentner & Ratterman, 1991; Gopnik, Sobel, Schulz, & Glymour, 2001; Richland, Morrison, & Holyoak, 2006; Freeman, 2015). Little work has traced children's development of early relational reasoning skills through spontaneous interaction with their caregivers, with the exception being Freeman (2015). Using the same dataset to be analyzed in this dissertation, Freeman (2015) found that children begin spontaneously invoke HOT in their speech around 30 months of age. Parents and children use increasingly more HOTs in their speech as the child grows from 14- to 58-months, and children begin using simpler forms of HOT before using more complex forms. Inferences were the most commonly used type of HOT, followed by comparisons, and abstractions and hierarchies were used relatively rarely. A predictor of both child and parent use of HOT speech was family income, suggesting that HOT is another aspect of child development where class inequalities are present.

Freeman (2015) also found that parents who use more HOT (both early and late in the child's development) also encourage more HOT use in their children, and furthermore, that children who use more HOT at 58 months performed better on inferencing and analogy tasks at ages 9 and 11. This suggests that understanding the conditions under which HOT is invoked by parents and children may be essential to understanding how to support the development of

higher-order thinking, as well as differences in HOT skills and outcomes.

2.4. Theoretical Basis for the Relationship Between HOT and Decontextualized Speech

The above review of decontextualized and narrative speech suggest that decontextualized speech is conceptually more challenging for children, which might explain its positive impacts on later outcomes and abilities. Speech displaying higher-order thinking may also prepare children for the kinds of complex thinking skills they will be expected to use in school. In addition, there is both theoretical and empirical evidence to suggest that use of higher-order thinking may be linked to speech context, such that HOT is used more frequently in decontextualized speech such as narrative.

Next, I describe four characteristics of decontextualized speech that could explain the relationship between narrative speech and HOT, as well as highlighting the fact that some may consider higher-order thinking itself to be a kind of decontextualized speech. As stated earlier, the goal in describing these aspects is not to rule them out one-by-one in favor of a single explanation; my goal is to highlight these as features of narrative speech that might explain the relationship between HOT and narrative.

(1) Story-Driven. Narrative speech—although it can be disorganized—is structured into story-like forms, and is an example of extended discourse (Tabors, Roach, & Snow, 2001). In spontaneous speech, narrative generally occurs in long strings of interconnected utterances, and involves, to some extent, the use of story. "Good" stories, as theoretically defined, require the storyteller to coherently link story elements to a cause-and-effect framework (Stein & Albro, 1997); in effect, they require the storyteller to use higher-order thinking—especially inferences—to describe relationships between representations. Indeed, personal narrative has been used as a method to elicit intra- and intersentential connectives such as 'because' (Peterson

& McCabe, 1991).

(2) Saliency. A second characteristics of narrative speech is its relative saliency and relevance to the self, compared to other kinds of speech. Empirical research has shown that making abstract concepts, such as spatial reasoning, more salient by embedding them into storytelling contexts can facilitate learning these concepts (Casey, et al., 2008A; 2008B). Similarly, providing children with mathematics story problems that are more story-driven and relevant to them can increase performance (Gerofsky, 1996). This suggests that people may be more motivated to do more complex thinking when it is more relevant, interesting, or salient to them. Since narrative speech is potentially more self-relevant and salient compared to other kinds of speech, it may be easier for parents and children to embed more challenging language such as HOT in narrative compared to non-narrative speech.

(3) Metacognition. A third characteristic of decontextualized speech that might explain why it stimulates higher-order thinking is because decontextualized speech promotes *metacognition*, or thinking about cognitive processes by monitoring one's own memory or comprehension (Flavell, 1979). When children engage in talk about the past or future, they are encouraged to reflect, predict, question, hypothesize, build awareness, identify goals, anticipate consequences and reactions—all of which involve higher-level thinking and problem-solving skills (National Research Council, 2001). Reflection also consolidates knowledge, enabling thinkers to generalize to other situations (Epstein, 2003). Metacognition lies at the heart of problem-solving and higher-order thinking skills (Brown & Campione, 1978), and programs seeking to enhance students' HOT skills often include metacognition as a significant component (e.g. Zohar & Dori, 2003; Nickerson, Perkins, & Smith, 1985). Thus, because narrative encourages metacognition, it may also encourage individuals to engage in HOT.

(4) Relation to Current Context. The fourth characteristic is quite simply that narrative speech is decontextualized; speakers telling narratives discuss actions, events, and objects not immediately perceptible, which means that they cannot rely as much on present environmental cues to scaffold their language. In these situations, relationships between representations are less explicit; to compensate for this, speakers might use more precise syntactic markings or more specific language to indicate the exact nature of events (Curenton & Justice, 2004). Because narrative speech is removed from the present context, parents and children may use HOT at greater rates in this kind of speech.

(5) Higher-Order Thinking as a Type of Decontextualized Speech. Finally, rather than being a characteristic of decontextualized narrative speech, some may argue that higher-order thinking skills constitute a type of decontextualized talk in itself. Prior work (as described earlier) established that explanations are a type of decontextualized speech. In the literature, explanations are usually described as talk that requests or makes logical connection between objects, events, concepts or conclusions (Beals, 1997; 2001), which is similar to our conception of the HOT type *inference*. In addition, formal definitions, another type of decontextualized speech, bear a number of similarities to the HOT types *hierarchies* and *abstractions*, which are often used in word definitions. This suggests that higher-order thinking—or at least, some types of HOT—might itself be considered to be a type of decontextualized speech.

However, in this dissertation, HOT and speech context (both narrative and pretend) were considered to be, and coded as, completely orthogonal to each other. In addition, prior research has not examined the extent to which explanations/inferences, or other types of HOT, occur in different kinds of speech contexts such as narrative. (In Rowe, 2012 and Demir et al., 2015, who

did examine both explanations and narrative, an explanation occurring in a narrative context counted as an explanation.)

Differences Based on Past and Future Narratives. Above, I have described several features of narrative speech that might explain its ability to encourage higher-order thinking. In this dissertation, I will be comparing not only between narrative and non-narrative speech, but also between past, habitual, and future narrative speech. There are arguments in favor of both past/habitual narratives containing more HOT, as well as future narratives containing more HOT.

Narratives that refer to past/habitual and future events are both story-driven, although future narratives may be somewhat less structured, due to the more indeterminate nature of the events. When describing both past and habitual events, speakers can access an internal mental representation, which provides them with a 'referent' around which to structure their discourse. While no research has directly compared the relative salience of past or future events, past events may be more salient than future events. Negativity is associated with saliency, and individuals tend to focus on positive events in the future (Weinstein, 1980), while they discuss both negative and positive events in the past. Thus, past talk, because it discusses more negative events, may be more salient, possibly resulting in more HOT use.

However, some evidence suggests future narratives may contain more instances of HOT. Narratives of past or habitual events often use the *realis* grammatical mood, indicating that the speaker knows the statement to be a fact ("Yesterday we went to McDonald's"). Future narratives use the *irrealis* grammatical mood, where the speaker indicates that a certain situation or action is not yet known to have happened ("We might go to McDonald's tomorrow"). Because less is known about it, individuals may include more hypotheses, predictions, and conditionals in future narratives, resulting in more HOT use (especially inferences) in future over past/habitual

narrative speech. Additionally, because speakers who are discussing future events do not have an internal mental representation with which to refer to in structuring their discourse, future narratives are arguably more 'removed' from the *here-and-now* than are past or habitual narratives, which might result in more HOT use.

Differences Based on HOT Type. So far, higher-order thinking has been discussed as a singular type of speech, where two representations are linked together. However, in our research, higher-order thinking can take one of four forms, where the nature of the link between the representations differs: inferences, comparisons, abstractions, and hierarchies. Due to the rarity with which parents and children use abstractions and hierarchies (Freeman, 2015), when examining differences based on type, I will only be examining inferences and comparisons. Narrative and more contextualized speech may offer different affordances for using inferences and comparisons; therefore, use of these specific types of higher-order thinking may be incorporated at different rates into different speech contexts.

(1) Inference. It is easy to understand why inferences might be incorporated more into story-driven speech such as narrative. Individuals may use inferential language to explain why characters behaved in certain ways, or to link together events in cause-and-effect frameworks. In addition, as stated already, eliciting stories of personal experience is one method researchers use to get individuals to use connectors such as 'because' and 'so.' Narrative's potential for encouraging the use of inferences may already be recognized, though this literature (to my knowledge) has not been specifically linked to the literature on higher-order thinking.

(2) Comparison. Comparisons might be facilitated by an individual's current environment, possibly resulting in more comparison use in contextualized compared to decontextualized speech such as narrative. However, others have highlighted the role

comparisons play in decontextualized speech (Dickinson & Tabors, 2002), and comparisons might be used as an evaluative device in story-driven speech, acting as a simile or metaphor. In addition, parents may use features of the current context to scaffold their children's narrative speech, including drawing comparisons between present and non-present objects. Comparison use might differ according to speech context, though it is unclear whether parents and children will use more comparisons in decontextualized or contextualized speech.

3. Study Overview

Above, I have discussed the role of early parental linguistic input in shaping children's early language environments, specifically, decontextualized narrative speech and higher-order thinking. Next, I will briefly describe the data to be used in this dissertation, as well as the strengths of this approach, before finally describing the organization of this dissertation.

Language Development Project. This dissertation draws its data from the longitudinal Language Development Project, whose participants are 64 typically-developing children (31 girls) and their primary caregiver(s) recruited to represent the racial, ethnic, and economic diversity of Chicago's monolingual English-speaking population in 2000. These participants were visited every 4 months from 14 to 58 months—the pre-school period—and spontaneous interactions between the focal child and his or her families were recorded for 90 minutes. The goal was to capture everyday parent-child interactions, including playing with toys, having meals, reading books, etc. In addition, these participants were visited annually or biannually once children entered formal schooling, from kindergarten through high school, where standardized and non-standardized measures of academic achievement in a variety of domains were administered.

The unique breadth and depth of the available data about these subjects has resulted in a large number of papers examining the role of the early home language environment in shaping children's later educational outcomes to be published, including examinations of the early use of gesture (Sauer, Levine, & Goldin-Meadow, 2010), predictors of vocabulary growth (Rowe, Raudenbush, & Goldin-Meadow, 2012), math and number talk and relations to later math ability (Glenn, Demir-Lira, Gibson, Congdon, & Levine, 2017; Levine, Suriyakham, Rowe, Huttenlocher, & Gunderson, 2010; Gunderson & Levine, 2007), parental praise and relations to later theories of intelligence (Gunderson et al., 2013), non-immediate book reading talk and relations to later literacy (Demir, Applebaum, Levine, Petty, & Goldin-Meadow, 2011), and other work on decontextualized speech (Rowe, 2012; Demir et al., 2015) and higher-order thinking (Freeman, 2015).

In this dissertation, I will describe early parent and child use of narrative, pretend, HOT, and their co-occurrence. All parent and child speech at all twelve time points was transcribed, then coded for the presence of higher-order thinking and personal narrative (past, future, and habitual). At two time points (38- and 50-months), transcripts were also coded (with the aid of the video) for pretend. The specific aim of this dissertation is to describe the speech contexts in which parents and children invoke higher-order thinking.

Project Innovation. This project is innovative for several reasons. First, the demographic breadth of these participants, recruited to reflect the diversity in race, ethnicity, and income of Chicago when the study was initiated, means this dissertation can explore diversity in early language inputs and developmental trajectories. The findings thus have relevance to the broader national population, particularly for low-SES families.

Second, the videotaped observations of children interacting naturally with their parents at home for 90 minutes, three times a year, for four years, offer an intensive view of how the parents routinely speak to their children early in development. These results are not garnered in a lab, nor in semi-structured interaction tasks, nor were parents and children aware of the researchers' interest in narrative, pretend, or higher-order thinking (potentially allowing them to modulate their speech). This unique approach—to examine language as it is actually used by parents and children in the real world—give these findings the potential for real applied significance.

Third, this research follows through on the same participants to observe long-term academic outcomes. The longitudinal observations from 14-58 months provide a unique opportunity not only to observe development from the initial stages of language learning until school entry, but also to identify early sources of later individual differences once children enter grade school. While this dissertation will not examine outcomes in favor of describing differences in home language environments, this is an important area of future research.

Dissertation Organization. My specific research questions and predictions will be presented in the introductions to each of the following three results chapters. Broadly, Chapter 2 will examine the use of narrative speech in parents and children from 14-58 months; as part of this chapter, I will also describe the use of HOT speech, which will serve to contextualize the findings in the following chapter. Chapter 3 will examine how frequently parents and children invoke higher-order thinking in narrative speech from 14-58 months. In Chapters 2 and 3, I will also specifically examine inferences and comparisons use; these HOT types are both most frequently occurring as well as most educationally relevant. Chapters 2 and 3 will also describe use of past, habitual, and future narratives, and rates of HOT use in these narrative time frames.

Finally, in Chapter 4, personal narrative will be contrasted with another kind of decontextualized speech, pretend, in parent and child speech at 38- and 50-months. In this chapter, I will also provide a review of previous literature on pretend play, and discuss some of the similarities and differences between personal narrative and pretend speech. I will also discuss how narrative and pretend differ along the different characteristics described earlier—story-driven, salient, metacognitive, and decontextualized—and why, based on these criteria, narrative and pretend might offer different affordances for parents and children to incorporate higher-order thinking.

CHAPTER TWO: SPONTANEOUS USE OF NARRATIVE IN PARENTS AND CHILDREN FROM 14- TO 58-MONTHS

1. Introduction

While many researchers have traced the development of children's use of narrative across development, much of this research utilizes only a few subjects and/or only a few time points. The ubiquity and developmental trajectory of this kind of speech in children's everyday home lives has been critically underexplored, particularly for children from diverse backgrounds. This chapter will provide a comprehensive insight into the longitudinal trajectory of narrative speech, as well as describing differences between narratives that are set in different time frames (past, habitual, and future narratives).

In this chapter, I will seek to answer the following three research questions: **2.1)** How frequently do parents and children use spontaneous past, future, and habitual narratives, and does usage change over development? **2.2)** When do children start using narrative speech regularly, and are there differences in when children begin telling past, future, and habitual narratives? **2.3)** Does narrative usage vary according to demographic characteristics, such as child gender, child first-born status, or SES? As part of this chapter, I will also describe how frequently parents and children use HOT, as well as the different kinds of HOT (though see Freeman, 2015 for more full account). My predictions/hypotheses for these three research questions are below.

Research Question 2.1: How frequently do parents and children use spontaneous past, future, and habitual narratives, and does usage change over development?

I hypothesize that children will begin using narrative speech from the very earliest stages of the study period, at 14 months. This is due to the conversational nature of these interactions; even young children may be able to contribute an utterance or two. Parents and children will use

narrative more frequently as their child develops; this reflects the fact that children will become more equal conversation partners, and will be able to provide their own topics for narrative, as they develop and begin having their own experiences outside the home.

Early in development, parents will mostly tell habitual and past narratives, but as their child grows, they will begin incorporating more future narrative talk into their discourse, and frequency of habitual narrative talk will decline. Children will begin by telling more habitual narratives before transitioning to talk about specific, unique events (initially set in the past, and then in the future).

Research Question 2.2: When do children start using narrative speech regularly, and are there differences in when children begin telling past, future, and habitual narratives?

Although children may respond to their parents' narrative utterances, my hypothesis is that they may not become regular users of narrative (e.g. display a *narrative onset*) until later in development, approximately 26-30 months, in line with previous research.

Research Question 2.3: Does narrative usage vary according to demographic characteristics, such as child gender, child first-born status, or SES?

It is an open question as to whether demographic characteristics such as gender, first-born status, and SES (and its related components: race/ethnicity, family income, and parent education) will be related to narrative use. Prior research on gender differences in early use of narrative speech has mostly focused on the use of evaluative devices parents use with boys versus girls. This research suggests that parents talk about emotions more frequently when reminiscing with girls than with boys, and parents place emotional experiences in a more social context with girls than with boys (Adams, Kuebli, Boyle, & Fivush, 1995; Fivush, Berlin, Sales, Mennuti-

Washburn, & Cassidy, 2003; Reese, Haden, & Fivush, 1996; Buckner & Fivush, 2000; Fivush, 1991, 1998). In addition, girls seem to have an advantage when it comes to autobiographical memory; at age 5½, girls recalled past events more vividly and accurately than did boys (Cleveland & Reese, 2008; Fivush & Schwarzmueller, 1998). It is possible that these differences result from the different reminiscing styles parents tend to use with boys and girls (Reese & Fivush, 1993). Thus, parents might use more narrative speech with girls.

Research on children's status as the first-born or only child suggests that patterns of interaction between mothers and children change when a new sibling arrives in the home. Parents pay less attention, engage in less play, and increase in confrontation, after the arrival of a sibling, and children became more responsible for initiating interactions (Dunn & Kendrick, 1980). In addition, Freeman (2015) found that first-born or only children used more HOT speech than later-born children. Though the mechanism underlying this phenomenon is unclear, it is compatible with the hypothesis that when there is only one child at home, the parent is able to provide more individuated input that is appropriate to the child's level of understanding. Alternately, or more simply, when there is only one child at home, parents may spend more quality time interacting with him or her. It is possible that narrative may also be used more with first-born or only children for the same reasons.

As far as SES/income goes, Miller and colleagues (Burger & Miller, 1989; Wiley et al., 1998) found that working-class white mothers initiate more episodes of past talk than middle-class white mothers, suggesting that while middle-class families might use more speech overall, they may not use more narrative speech. Finally, for parent education, no relationship has been established between education level and elaboration style (Farrant & Reese, 2000; Newcombe & Reese, 2004), and this finding might also extend to frequency of narrative speech. This lack of

relations between SES and narrative could reflect the fact that using narrative speech is more a reflection of individual tastes and interests than prosperity or social capital.

2. Methods

2.1. Participants

The participants of this study were 64 typically-developing children and their primary caregiver(s), who were participating in a long-term study on language development at the University of Chicago. Families were recruited through direct mailings sent to approximately 5,000 individuals living in targeted zip codes, as well as advertisements placed in a free monthly parent magazine. Families who responded were asked to confirm they were raising their children in an English-only language environment (approximately 85-90% English, based on parent report). Given that they met this criterion, families were then interviewed for information on their background characteristics in order to create a sample that was demographically representative of the greater Chicago area as reported in the 2000 U.S. Census.

The final sample has 31 girls and 33 boys (36 first-born or only children). The participants are racially and ethnically diverse, including 36 White Non-Hispanic, 8 White Hispanic/Latinx, 14 Black/African American, and 6 children of mixed/other race. At the beginning of the study period, 5 families reported incomes of less than $15,000; 13 had incomes between $15,000 and $34,999; 8 had incomes between $35,000 and $49,999; 13 had incomes between $50,000 and $74,999; 11 had incomes between $75,000 and $99,000, and 14 reported incomes greater than $100,000. Using the midpoint of each income category as an estimate for each family's income, the sample had an average income of $61,000 (*SD* = $32,000).

Parents were asked to report who was primarily responsible for childcare. This person was asked to be home during filming of the home visits. The majority of children (*n* = 56) had

the mother as the primary caregiver, two children had the father as the primary caregiver, and six families reported that both parents equally shared the role (referred to as dual caregivers). Primary caregivers had an average number of years of education of 15.6 years, the equivalent to slightly less than a Bachelor's degree (*SD* = 2.2 years, range 10 to 18 years) (among the 6 dual caregiver families, the mother's education level was used.)

Because family income and parent education are highly related ($r = 0.49$, $p < .001$), I created a standardized composite variable for SES that equally weights parent education and income; below (in Figure 2.1) is the distribution of this variable, which is skewed to the left. Individuals at the far right have 18 years of education and report making more than $100,000 per year (as high as our scales went). The individual on the leftmost side has 10 years of education and makes less than $15,000 per year.

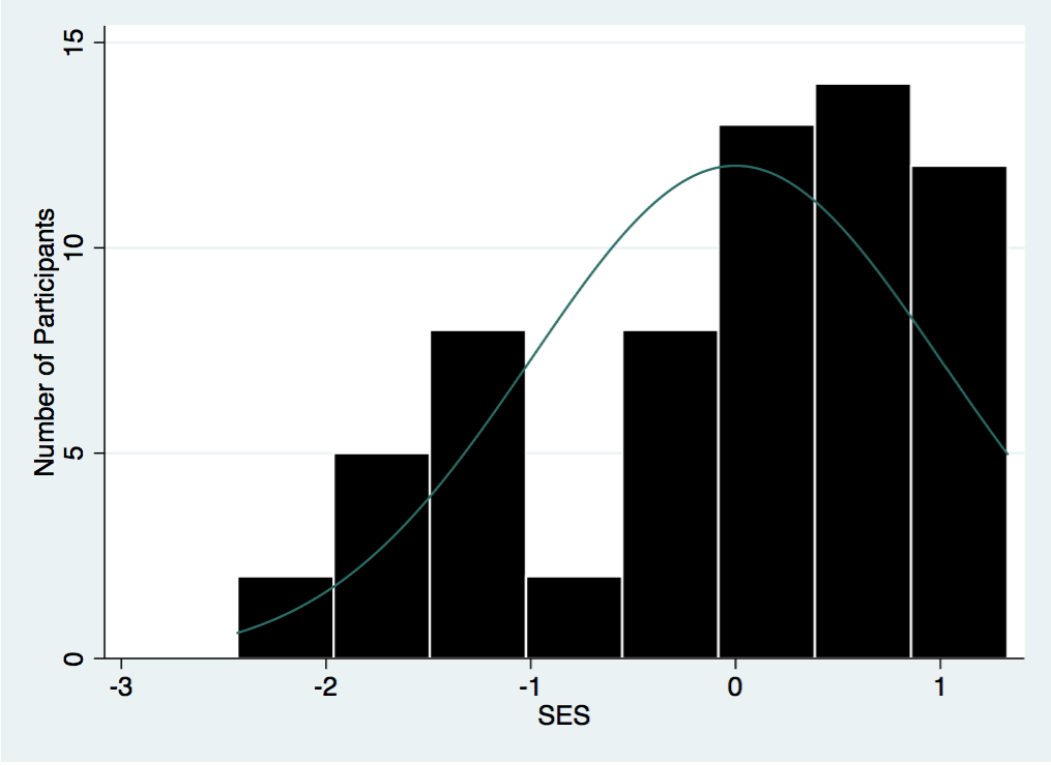

Figure 2.1. Histogram of SES composite variable.

2.2. Procedure

Children were videotaped interacting with the primary caregiver(s) during 90-minute home visits every 4 months from 14 months to 58 months. This range was selected because it represents the period before the child enters school, a time when early parental input is key. During the spontaneous home visits, parents and children were instructed to behave as they normally would; the videos capture typical parent-child interactions such as playing with toys, reading books, preparing and having meals, putting together puzzles, playing board games, and watching television. The videos also capture moments of non-interaction, where the child was left to entertain him- or herself (which became more common as the children grew older.)

Not all participants completed every session. The following table (Table 2.1) shows the number of participants who completed each time point; in total, there are 726 transcripts, with an average length of 88.6 minutes each (*SD* = 4.8 minutes, range 44 to 97 minutes[1]). In total there are over one million utterances by parents and children in the corpus (*n* = 1,015,491).

Child Age (months)	Number of parents (% of sample)	Number of children (% of sample)
14	64 (100%)	64 (100%)
18	63 (98%)	63 (98%)
22	62 (97%)	62 (97%)
26	61 (95%)	61 (95%)
30	61 (95%)	61 (95%)
34	62 (97%)	62 (97%)
38	61 (95%)	61 (95%)
42	60 (94%)	60 (94%)
46	58 (91%)	59 (92%)
50	58 (91%)	59 (92%)
54	54 (84%)	56 (88%)
58	58 (91%)	58 (91%)

Table 2.1. Number of participants with early home visit sessions at each time point.

[1] Shorter session times were to accommodate naps or other scheduling issues, or due to experimenter error or technical difficulties.

Of the 64 participants, 50 have all 12 home visits, and all have at least 4 sessions (M = 11.3 sessions, SD = 1.8 sessions). Two children dropped out after the 26-month visit, and one child each dropped out after the 34-, 38-, and 42-month visits respectively (the child who dropped out after the 42-month-visit is also missing an earlier session). The remaining nine children are all missing one session, except one child who is missing two sessions.

On four occasions (all when the children are much older; once at the 46-month-visit, once at the 50-month-visit, and twice at the 54-month-visit), the primary caregiver does not appear on the video. In these sessions, I analyze only the child's speech and record the parent as 'missing,'[2] which means variability in parent speech to children might be underrepresented.

2.3. Transcription

All speech from the focal child was transcribed. All child-directed speech from the primary caregiver(s) was transcribed; this includes all speech directed to the focal child, as well as speech directed to siblings or other children living in the home under age 13. Parent speech was not transcribed if it was directed towards other adults (e.g. parent-to-parent speech, even in dual caregiver families; parent-to-experimenter speech) or to children age 13 and older. Speech from siblings or other children was not transcribed.

All dictionary words, onomatopoeic sounds (e.g. woof-woof), and evaluative sounds (e.g. uh-oh) were transcribed, as well as verbatim reading from books. Ritualized or memorized speech, such as songs (e.g. singing the ABC's) and prayer (e.g. reciting the Lord's Prayer) was not transcribed. Speech was divided into utterances, defined as any sequence of words preceded

[2] On these occasions, the parents did all 'choose' to be missing, which might reflect their parenting styles.

and followed by a pause, change in conversational turn, or change in intonational pattern. Utterances are the primary unit of analysis in this dissertation.

One out of every three transcripts were checked for agreement; agreement was calculated at the utterance level and the word level, and transcribers had to be at least 90% in agreement for both measures. Ten minutes of each video (randomly selected from the whole video) was transcribed by a second coder. If the first 10 minutes was not at least 90% in agreement, a second 10 minutes was transcribed by the second coder. If the transcript was still not at least 90% in agreement, the transcript was sent back to the coder to be re-transcribed. After re-transcription, another 10 minutes would be transcribed by the second coder. This process continued until all reliability transcripts were at least 90% in agreement for both words and utterance boundaries.

2.4. Coding

HOT Coding. I will discuss the higher-order thinking coding prior to discussing the personal narrative coding, so that instances of higher-order thinking may be noted in the personal narrative examples. Higher-order thinking is broadly defined as talk that links ideas and concepts into a more complex framework. Based on literature reviews as well as data-driven pilot analyses, four types of higher-order thinking were identified: inferences, comparisons, abstractions, and hierarchies (Holyoak & Morrison, 2012; Markman & Gentner, 2001). While there are many types of relations that could be considered part of higher-order thinking, these four related skills are particularly useful for educational application (Halford, Wilson, & Phillips, 2010; Speed, 2010).

All utterances that display higher-order thinking were identified using the written transcripts. Verbatim repeats of utterances were counted (which applies to all coding described in this dissertation). Ninety-seven transcripts (approximately 8 from each time point), constituting

13.4% of the 726 total transcripts and containing 146,621 utterances (14.4% of the utterances in the corpus), were coded by two or more people. Average interrater percent agreement for identification of utterances as HOT or not was 98.1% (range: 96.0-99.3%). Percent agreement is so high because coders were in agreement that most of the utterances were non-HOT.

We also computed Cohen's kappa (Cohen, 1968), which assesses the reliability of assigning observations to mutually-exclusive categories while correcting for chance agreement. It has values ranging from -1 to 1, though Cohen notes that values less than 0 are unlikely in practice, so it generally ranges from 0 to 1; values 0.40-0.59 are regarded as moderate, values 0.60-0.79 are regarded as substantial, and values over 0.80 are regarded as almost perfect (McHugh, 2012). Pooling together the reliability transcripts for each pair of coders, the average Cohen's kappa for identifying utterances as HOT or not was 0.81 (range 0.73-0.87). Disagreements were resolved through discussion or by the more experienced coders.

(1) HOT Type. Each HOT utterance was then categorized as belonging to each of the four HOT categories. A given utterance could contain multiple HOT types. The full coding criteria for HOT may be found in Freeman (2015); the following is an abbreviated version. In addition, see Table 2.2 below for definitions and examples.

HOT Type	Definition	Examples
Inference	Deriving a conclusion not otherwise given by using known premises, including all causal language identifying the relation between one event (the cause) and a second event (the effect), as well as conditionals and speculation.	"Maybe we'll see a rainbow today because there's lots of rain." "How come we only have girl bears?" "I'll put this in front of you so that you can feed the baby." "If you mix up the seeds then we won't know where everything is."
Comparison	Demonstrating similarities or differences between entities by analogy or by example.	"Which of these are the same shape?" "Jasmin has black hair like Daddy." "Are apples healthier than eggs?" "That shirt is way too big for you."
Abstraction	Pointing out mental frameworks or models that could facilitate thinking; making definitions that attempt to describe the meaning of a word or concept, beyond giving a label.	"What animal says 'moo'?" "Big kids carry their own plates." "What happens before crossing the street?" "An outhouse is where people go to the bathroom outside."
Hierarchy	Using hierarchical taxonomies (pointing to an arrangement of categories with a superordinate/ subordinate framework) or partonomies (pointing out the relation between parts and wholes).	"Candy corn is a kind of Halloween candy." "What kind of juice do you want?" "It's a special type of helicopter that can land on water." "Is that piece part of the Play Mobile?"

Table 2.2. Definitions and examples of HOT utterances.

Inference is deriving a conclusion not otherwise given by using known (or logical) premises. For example, in the statement "He put the birds in the bucket so not cats could get to them," the first representation is the action of putting birds in the bucket and the second representation is so that no cats could get to them. These representations are linked through a causal framework (in this case, the word "so"), providing an explanation for the man's behavior. Inferences frequently made use of words such as "so," "because," "why," "how come," "since," "in order to," and "if…then". Average interrater percent agreement for identifying inferences was 99.3% (range 99.1-99.7%) (average Cohen's kappa = 0.86; range 0.79-0.92).

The following example conversation between a 54-month-old and his mother makes use of many HOT types, particularly inferences, but also some comparisons; utterances containing

HOT are marked with a star (as they are in all the following examples). This conversation takes place when the mother and her 54-month-old child are watching a video about bears. Unintelligible speech is recorded as '###.' In this example, the child asks several 'why' questions (in lines 2, 4, and 6), which the parent answers, while also invoking comparisons between the size and strength of humans and bears in line 7. She trails off at the end, but in lines 8 and 10, she discusses a hypothetical event about what would happen if she or her child ran into a bear (which was not coded as narrative because it does not concern a true, likely future event).

Example 1

Line	Parent Speech	Child Speech	HOT	Narrative
1	He's looking for a friend.			
2		Why?	*	
3	Because sometimes there's safety in numbers		*	
4		Why don't people like to go near bears?	*	
5	Huh?			
6		Why don't people like to go near bears?	*	
7	Well because bears are bigger than us and stronger than us and they got big old honking bear teeth.		*	
8	So they got big claws and big teeth and if - we made them nervous and they came running after us -		*	
9		Yeah?		
10	They're bigger than us.		*	

Second, *comparison* is demonstrating similarities or differences between entities by analogy or by example. For example, the statement "a tornado is a like a mean monster" indexes

the representations of ‘tornado’ and ‘monster’ and links them through the word “like,” illustrating their similarities. Comparisons frequently made use of words such as “like,” “same,” “too,” “different,” “also,” “both,” “similar,” or superlatives such as “taller” or “tallest.” Average interrater percent agreement for identifying comparisons was 99.4% (range 99.0-99.9%) (average Cohen’s kappa = 0.71; range 0.58-0.82).

The following conversation between a mother and her 50-month-old daughter, which takes place when the two are in the kitchen making milkshakes (and is very much situated in the present here-and-now), illustrates the use of comparisons as they occur in typical family conversations. In this example, the parent asks her daughter to compare how the ice cream looks before and after they added milk to it, and compares (in lines 16 and 17) the actions they could perform: before they had to scoop it, while now they can pour it.

Example 2

Line	Parent Speech	Child Speech	HOT	Narrative
1	Now, what was the ice cream like when you put it in there?		*	
2		Mm.		
3	Does it look the same?		*	
4		Mhmm.		
5	Does it?			
6	Doesn’t it look a little bit different?		*	
7		Mhmm.		
8	How’s it different than when we, when we put it in there?		*	
9		Um, *[shrugs]*.		
10		I don’t remember.		
11		Flap flap flap.		
12		Flap flap flap. *[C flaps arms]*		
13	Was it — was it kind of hard when we put it in there?			

14	And what's it look like now?		*
15		*[gasps]*	
16	Could we pour it when we put it in there?		
17	No, we had to scoop it, didn't we?		
18	Now can we pour it?		
19		Mhmm.	
20	Yeah.		
21	See that's almost more like - like the milk we put in right?		*
22	Like liquid.		*
23	It's not so solid anymore, is it?		*

Abstraction is defined as pointing out mental frameworks or models that could facilitate thinking, or making definitions that attempt to describe the meaning of a word or concept, beyond giving a label. Frequently, abstractions involve generalizations such as, "Every Halloween you can be something new." Here the two representations, 'Halloween' and what you can be, are linked through the use of the term "every," invoking a generalization about Halloween. Abstractions frequently make use of words such as, "always," "never," "every," and "only," Abstractions also take the form of generalizing statements attempting to ascribe meaning to a concept, such as "Big kids carry their own plates." In this example, carrying one's own places is defined as a quality of big kids. Average interrater percent agreement for identifying abstractions was 99.8% (range 99.4-99.9%). Due to the rarity of abstractions in spontaneous conversations, reliability was slightly lower once we corrected for chance; the average interrater Cohen's kappa was 0.62 (range 0.41-0.81).

The following conversation between a 50-month-old and her mother illustrates the use of abstractions, specifically using the concept of 'big girls' and what they can do, likely in order to

get her daughter to behave. In line 19, the mother also contrasts between what her daughter could do as a baby versus what she could do as a big girl. The actions described are not counted as narrative because they are not specific experiences in the child's life.

Example 3

Line	Parent Speech	Child Speech	HOT	Narrative
1	I thought you wanted to be my big girl, remember?			
2	Got - you know, big girls get to do everything.		*	
3		What do they get to do?	*	
4	They can go skating.		*	
5		What?		
6	Yes.			
7		And what else?	*	
8	They can go to the park.		*	
9		What?		
10	Yes.			
11		I ###		
12	They go swimming.		*	
13		By themselves?	*	
14	No, they go with their Mommy, but they still go swimming.		*	
15		With Mommy?		
16	Yes, and they can jump in the pool by themselves.		*	
17		Ooh.		
18		I could do it by myself.		
19	Yes, if you a big girl, but if you're a baby, you can't do any of those things.		*	
20		Baby could - baby could do like nah nah. *[mimics crying]*		
21	All they could do is just sit in their bed and sleep.		*	

22		Who?		
23	Babies.			
24		And babies drink they bottles.	*	
25	Yes.			
26		And they do like -		
27		They suck their thumb.	*	
28	Yes, some babies suck their thumbs.		*	

Finally, *hierarchy* is defined as an arrangement of categories with a superordinate or subordinate framework, or relations between representations of parts and wholes. An utterance such as, "A hammer is a type of tool," demonstrates a hierarchical relationship by indexing 'hammer' and 'tool,' which are linked through the use of the word 'type,' suggesting hammers belong to a broader category of tools. Hierarchies often made use of words such as "type," "kind, and "part." Hierarchies, like abstractions, were rare; average interrater percent agreement for identifying hierarchies was 99.9% (range 99.8-100%) (average Cohen's kappa = 0.72; range 0.40-1.0).

The following conversation between a mother and her 42-month-old takes place when a mother and child are drawing, and also makes some reference to past events (which are marked in the 'narrative' column). The parent asks the child to identify an animal, which the child has difficulty doing. She only identifies it as a turkey after the parent (in line 10) associates it with the kind of sound it makes.

Example 4

Line	**Parent Speech**	**Child Speech**	**HOT**	**Narrative**
1	What's that look like to you?			
2		Um, a bird.		
3	Yeah, what kind of bird?		*	
4		Um, um, I don't know.		
5	The kind of bird we had on Thanksgiving.		*	*

6	What kind of bird did we have on Thanksgiving?		*	*
7		I don't know.		*
8	What kind of bird did we have on Thanksgiving?		*	*
9		I don't know.		*
10	What kind of bird goes gobble gobble gobble?		*	
11		Um, a turkey.	*	
12	Turkey.			

Multiple HOT Types in the Same Utterance. In addition, utterances could contain multiple HOT types; however, 97% of parent HOT utterances and 98% of child HOT utterances contained only one type. The following table (Table 2.3) presents the frequency with which HOT utterances across the entire corpus belonged to each type or combination of HOT types. This table shows that for both parents and children, inferences are most common, followed by comparisons, then abstractions, then hierarchies. Both parents and children also used inferences and comparisons together in the same utterance with some frequency, while other types of HOT combinations are much rarer (and no child ever produced a HOT utterance with 3 types). More than 85% of both parents' and children's HOT utterances contained at least either an inference or a comparison, which are the two HOT types I will be examining in depth.

HOT Type(s)	% of Parent HOT Utts.	% of Child HOT Utts.	Sample Utterance
Inference alone	61.08%	67.23%	See Table 2.2
Comparison alone	23.40%	19.53%	
Abstraction alone	9.74%	8.39%	
Hierarchy alone	2.71%	2.88%	
Inference + Comparison	2.08%	1.31%	"He gets the most because he's the biggest one in the family."
Inference + Abstraction	0.45%	0.33%	"If somebody asks you a question then you tell something that's not true then you're lying."
Inference + Hierarchy	0.11%	0.08%	"I don't want you to spill, so I'm giving you these kind of cups."
Comparison + Abstraction	0.20%	0.12%	"Baby goats are called kids like you."
Comparison + Hierarchy	0.16%	0.10%	"What kind of pine tree has the sharpest needles?"
Abstraction + Hierarchy	0.04%	0.03%	"What kind of drink is cold and white and we have with cookies?"
3+ types (e.g. Inference + Comparison + Hierarchy)	0.03%	0%	"Let's use this kind of peanut butter because it's better for us."
TOTAL	100%	100%	

Table 2.3. Frequency of HOT type(s) by parents and children.

For the purposes of these analyses, when discussing utterances as HOT or not, utterances with multiple types of HOT will only count as one HOT utterances. When discussing the four types independently (e.g. when describing the proportion of narrative speech that contains inferences or that contains comparisons), an utterance with both an inference and a comparison would count as both.

(2) HOT Format. Finally, each HOT was categorized for format, whether the utterance asked another to reason using higher-order thinking (Ask), or whether the individual was providing the HOT relationship (Give). Given both coders agreed a given utterance was HOT, average interrater percent agreement for the ask/give distinction was 95.6% (range: 94.0-97.2%) (average Cohen's kappa = 0.89; range 0.84-0.94).

For example, a child might ask, “Why are they laughing?” and the parent might respond, “Because he fell down.” In this case, the child’s question would be an Ask Inference and the parent’s response would be a Give Inference. Give utterances can either be in response to an Ask question (where the question provides one representation and the response provides the second representation), or can be statements in their own right (where both representations appear in the same utterance, e.g. “They’re laughing because he fell down”). If an individual asked a yes or no question (e.g. “Did they laugh because he fell down?”), this was categorized as Give.

HOT speech could also be co-constructed by both parent and child without the use of questions and answers, with both coming together to create HOT relationship. In these cases, both utterances were identified, and one marked as Ask and the other as Give. For example, a parent might say, “The reason we don’t run by the pool is…” and the child might respond, “Because we might slip and fall.” In this case, the parent’s utterance would be marked as Ask (because it is soliciting a HOT utterance from the child), and the child’s response would be marked as Give (because the utterance is providing the second representation in the HOT relationship).

Freeman (2015) found that both parents and children provide mostly Give HOTs, though parents use more Ask HOTs over development. For the analyses in this dissertation, I did not differentiate between HOTs that were Ask and those that were Give, nor those that are co-constructed and those that are not, although future research could examine this more in depth.

Personal Narrative Coding. Personal narrative was defined as language used to recount stories of personal experience about the past, future, or habitual recurring events. Personal narrative was coded on the written transcripts; at 38- and 50-months, we also coded the transcripts for pretend utterances, which was aided by watching the video simultaneously.

Appendix A contains the full coding criteria for personal narrative; what follows is an abbreviated version.

In order to count as a personal narrative, there must be some kind of action or event that is associated with some orienting information, either a spatial location (e.g. "at school") or time (e.g. "last Christmas"). An event was considered to be in the past or future if it was a few hours away from the given time of the utterance. The narratives may be about the child, members of the child's family, other people in the child's life (e.g. neighbors/friends), or other people known to the teller of the narrative. Stories of personal experience are frequently construed across multiple utterances. Personal narratives often included discussions of the following (though this is in no way an exhaustive list): talking about unique/novel events in the child's life (such as visiting a zoo), discussing upcoming or past family vacations, talking about experiences surrounding past or future holidays, looking at family photos and discussing about the events in them, and discussing what the child did or is going to do at daycare, at preschool, or with friends on a playdate.

One hundred and three transcripts (which represents 14.2% of the 726 transcripts in the corpus), containing 175,067 utterances (17.2% of the 1,015,491 utterances in the corpus), were coded by two or more people. Pooling together each pair of coder's reliability transcripts, average interrater percent agreement for identification of utterances as narrative or not was 97.6% (range: 95.6-99.2%) (average Cohen's kappa = 0.73; range 0.63-0.83). Disagreements were resolved either through discussion or by the more experienced coders.

Personal Narrative utterances were further coded based on when the event occurred in time, as either Past, Future, or Habitual. Given than an utterance was identified as Personal

Narrative, average interrater percent agreement for time frame was 97.6% (range: 93.6-99.7%) (average Cohen's kappa = 0.93; range 0.87-0.99).

(1) Past. Past Narratives refer to events that have already occurred. The following conversation between a 58-month-old child and her mother represents an example of a past narrative, likely one that they both witnessed (due to the extent to which the parent scaffolds the child's telling of the story). During this conversation, the parent and child are finger painting in the kitchen. The child relies on her mother a great deal to provide specific details (which the mother provides in lines 2 and 4). In lines 10-11, the parent provides an inference for why the man behaved the way he did. This conversation also shows the parent and child negotiating what truly happened during the event (in lines 13-15), as well as discussion of a hypothetical past event (in line 16).

Example 5

Line	Parent Speech	Child Speech	HOT	Narrative
1		Um, there was a — um — um — some birds fell out the tree and then — um — um — a guy —		*
2	[NAME]			*
3		[NAME], he put a bird in our um — in our um —		*
4	Bucket.			*
5		Bucket.		*
6		And then...		*
7		It died.		*
8	It did.			*
9	We wish that it would live, but I think it died when it fell.		*	*
10	So he tried to – he tried to save it, didn't he?		*	*
11	He put it in the — in the little container so no – no cats or — would get to it.		*	*

12		But Coco *[their cat]* did do it.		*
13	Well Coco didn't kill the bird though.			*
14	You said the bird fell out of the tree, right?			*
15		Oh yeah.		*
16	So it wasn't Coco's — but Coco might have eaten him if he found him on the ground.		*	*

Next is an example of a 50-month-old boy in conversation with his mother. This is a conversation about an unshared past experience, where the mother describes her own childhood experiences (an example of an intergenerational narrative). An element of the surrounding context (bug stickers, including bumblebees), instigates this conversation; the first few lines (1-3) are not part of the narrative, which only begins when the mother begins discussing her experiences in line 4. The mother starts off the story by highlighting how this happened when she was little, just like her child (in lines 7 and 8), and then proceeds to tell the story. She provides several comparisons for how she looked: "like a monster" (line 21) and "like I didn't have a nose" (line 23).

Example 6

Line	**Parent Speech**	**Child Speech**	**HOT**	**Narrative**
1		I no like bumblebees.		
2	Yeah, I know.			
3	They kind of sting.			
4	They — they hurt your mama.			*
5		They hurt your mama?		*
6	They hurt me —			*
7	One day I was — when I was a little girl like you.		*	*

8	Not like you, but one day when I was little like you.		*	*
9		### on the bed?		
10	Did I — did I tell you this story already?			*
11	I was smelling a flower one day when I was little.			*
12	And then inside the flower there's a bumblebee and it bit me on my nose.			*
13		Why?	*	*
14	I have a scar right there.			
15		Scar right there?		
16	There's like a little circle?			
17		Mhmm.		
18	And it made my nose swell up, [CHILD NAME].			*
19		Why?	*	*
20	Because it hurt, and the bumblebee, it made my nose swollen, and -		*	*
21	I looked like a monster.		*	*
22		Monster?		*
23	Yeah, your grandma said it looked like I didn't have a nose because my nose swell up.		*	*
24	And she took pictures too, [CHILD NAME].			*
25		Pictures to you when you -		*
26	She took pictures of my swollen nose when the bumblebee bit me.			*
27	She thought it was funny.			*

Interestingly, following the mother's relaying of her own personal experience, her son re-appropriates his mother's experience as his own, and tells his own story about being stung by a fly (though the mother initially assumes he is reacting to her own story, in lines 47-48). This is a phenomenon also observed by Miller, Potts, Fung, Hoogstra, & Mintz, (1990), where one child recounts a personal experience, which is followed by matching claim from his or her friend. And indeed, this might be comparable to the manner in which adults share stories of personal experience—one person telling a story about their experiences with something, which makes us recall our own similar experiences. While children appropriating or 'stealing' other's stories as their own is interesting phenomenon that requires more study, examining this idea further is beyond the scope of this dissertation.

Line	Parent Speech	Child Speech	HOT	Narrative
28		I was smelling a butterfly.		*
29	Say that again?			
30		I was saying -		*
31		Mama?		
32	Yes?			
33		I—I was smelling butterfly and instead ### — and instead it came out for a butterfly.		*
34	Say it again?			
35		Said it came out butt - from a butterfly.		*
36	The sunflower came out of a butterfly?			
37		Yeah.		
38	Is that what you said?			
39		Mhmm.		
40	Okay.			
41	Sometimes I can't understand you.			
42		And there was fly who bit me right on my face.		*

43	Oh there was a fly that bit you on your face?			*
44		Yeah.		*
45		He was -		*
46	Ouch.			*
47	Yes, it was very painful.			*
48	Well I don't – honestly, I don't remember.			*
49		See ### little bumps?		
50	Really?			
51	You got little bumps?			
52		Yeah.		
53	I don’t see it.			
54	I don’t think a fly ever bit you.			*
55	You just liked my story so much that you made it your own story?		*	*

In the following example of past narrative talk, the parent asks her 58-month-old daughter about her experiences at school—experiences the daughter underwent and or which the mother was not present. The child is recovering from chicken pox and had only recently returned to school. In this example, the events described are quite emotional and salient for the child, although the parent has difficulty finding out exactly what happened.

Example 7

Line	**Parent Speech**	**Child Speech**	**HOT**	**Narrative**
1	How was school?			*
2		Good.		*
3		[CLASSMATE NAME] always - [CLASSMATE NAME]’s the only one who laughed at me.		*
4	Why was he laughing?		*	*
5		I can’t remember.		*
6	Was he laughing about your pox or was he laughing about something that was funny?			*

7		He was laughing at something that was funny and I didn't think it was funny.	*
8	What did you say, [CHILD NAME]?		*
9		I just didn’t say anything.	*
10		I just walked away.	*
11	We talked a lot this morning about - [CHILD NAME] was nervous in the car and what people would say about her chicken pox scars.		*
12	And we talked about what to do it she was teased.		*
13	Did that make you feel sad, [CHILD NAME]?		*
14		Yeah.	*
15	[CHILD NAME], did [CLASSMATE NAME] say something - what did he say?		*
16		He just laughed.	*
17	What did he laugh at?		*
18	Was he laughing at something that was really funny or was he laughing at you and your pox?		*
19		I—I—I can’t remember.	*
20	Okay.		*

Later in the session, the parent picks up this same topic of conversation. The mother continues to push the child, and asks her (in lines 26 and 28) how she knew her classmate was laughing at her, an example of metacognition. The child’s response (line 29: “Because he told me”) seems to amuse the mother, whose deadpan response (in line 30) suggests she was expecting something more about the child’s feelings and interpretation of the situation.

Line	Parent Speech	Child Speech	HOT	Narrative
21	So what did [CLASSMATE NAME] say today?			*
22		What?		
23	What did [CLASSMATE NAME] say to you today?			*
24		I can't remember.		*
25		Like how -		*
26	How do you know he was laughing at you?		*	*
27		Because I saw him.	*	*
28	But how do you know he was laughing at *you*?		*	*
29		Because he told me.	*	*
30	He said, "[CHILD NAME], I'm going to laugh at you right now."			*
31		Mama, he just started laughing.		*
32	Yeah, and you thought he was laughing at your spots.			*
33	Did you feel happy about it?			*
34		No.		*

(2) Future. Narratives can also concern events that may or will happen at some point in the future. The following example (which takes place when a 38-month-old boy and his mom are in the bathroom) is an example of talk about fairly nebulous future plans. In this example, the mother asks why the child is afraid of the water park (line 11), and then draws a comparison between the shower and the waterpark (line 12), with the difference being that one can have more fun at the waterpark.

Example 8

Line	Parent Speech	Child Speech	HOT	Narrative
1		### water park.		*
2	You going to go to the water park?			*

3		Yep, and - and swim in the water park ###		*
4	You actually getting in the water this time?			*
5		Yeah.		*
6	With all the other kids?			*
7		Yeah.		*
8	You going to run through there and down the slide and everything?			*
9		No. *[claps]*		*
10		I'm scared.		*
11	Why you so scared of the water park?		*	*
12	It's just like - just like being in the shower except you can have more fun.		*	*
13	You got a slide at the water park.			*
14	You got a big water gun to shoot.			*
15	You can move the snake head.			*
16	You can get everybody else wet.			*
17	It's much more fun than the shower.		*	*

The following conversation between a 50-month-old daughter and her mother is another example of future narrative talk, where the plans for the future are more concrete. Although not explicitly stated, it's possible that in previous visits to the park, the boy the child discusses had pushed her, explaining her fears. The child asks her mother (in lines 7, 9, and 11) what to do in different situations at the park; the mother's last response (line 12) was not coded as HOT, because she is not answering her daughter's question.

Example 9

Line	Parent Speech	Child Speech	HOT	Narrative
1	Hey later at the park I want you to play nice with [NAME], okay?			*
2		Why?	*	*
3	Because he's your friend.		*	*
4		I don't want to.		*
5	Remember, if he starts — being mean, just tell him to be nice, okay?		*	*
6		But -		*
7		What if he pushes me?	*	*
8	Say, please don't touch me.		*	*
9		Well, what if he really — pushes me so hard that I might fall?	*	*
10	Say, please don't push me.		*	*
11		But what if I cry?	*	*
12	You won't cry.			*

(3) Habitual. Finally, speakers can also discuss habitual or recurring events. Habitual Narratives describe recurring events. This is a sample habitual narrative conversation between a 50-month-old and his mother, where they discuss what the child normally does in his bedroom. In line 9, the mother refers to a specific past event—rocking her child in the chair when he was a baby—but most of it concerns what typically or usually happens. There are no instances of HOT in this example.

Example 10

Line	Parent Speech	Child Speech	HOT	Narrative
1		This is my room.		
2	I'll turn on the light.			
3	What do you do in here, [CHILD NAME]?			*
4		I read books and play knights.		*

5	Yeah?		*
6		And I go to sleep in my bed.	*
7	Yeah.		*
8		And Mommy rocks me in the rocking chair.	*
9	Well, we haven't done that since you were a baby.		*
10	Once in a while, right?		*

Below is another example of a habitual narrative, where a mother is talking with her 34-month-old son about why they should pick up their toys, referring to a daily routine.

Example 11

Line	Parent Speech	Child Speech	HOT	Narrative
1	We need to clean up.			
2	You want to know why?		*	
3		Oh.		
4	Because what do we do at the end of the day?		*	*
5		What?		*
6	We clean up.		*	*
7		Yeah.		*
8	Yeah.			*
9	And we put all the blocks away.			*
10	Right?			*
11		Yeah.		*
12	Yeah.			*
13	That's what we do.			*

3. Results

All statistics in Chapters 2, 3, and 4 were performed using IBM SPSS Version 24, Stata SE Version 13, and HLM Version 7.03.

In these analyses, the utterance is the primary unit of analysis. Whenever utterances are used as either an outcome or a predictor, two approaches may be taken: (1) The first is that overall number of utterances is what is important, leading one to consider (for example) the

number of narrative utterances per hour. This approach conceptualizes each instance of a particularly rich utterance as equally important, regardless of the overall amount of talk. (2) The second approach suggests that the relative frequency with which different types of speech are used is what is important, leading one to consider (for example) the proportion of utterances that are narrative. This approach conceptualizes the child as having to interpret the narrative speech (signal) in light of all the other speech (noise).

Approach (1) may lead researchers to draw conclusions about individuals that may be better explained by their overall frequency of talk. Approach (2) more fairly treats individuals who may differ in overall frequency of talk but may also present misleading numbers regarding the density of the talk (e.g. if a parent uses narrative in 10% of his or her utterances, this could refer either to a parent who uses 10 narrative utterances out of 100 total utterances, or a parent who used 100 narrative utterances out of 1,000 total utterances).

However, another benefit of proportions is that it enables clearer comparisons to be made both across individuals (e.g. parent 1 versus parent 2), across time (e.g. parent 1 at time 1 versus parent 1 at time 2), and across different types of speech (e.g. parent 1 usage of pretend at time 1 versus parent 1 usage of narrative at time 1). Nevertheless, since it is not clear which approach is more appropriate, and since each approach comes with both advantages and disadvantages, I will report findings using both approaches where relevant.

3.1. Frequency of Narrative Use

Users of Narrative. In this section, I describe the frequency with which parents and children use narrative (as well as the types: past, future, and habitual) in their spontaneous speech for each time point from 14- to 58-months.

First, I will describe the proportion of individuals who used narrative (as well as each type of narrative) at each time point. Table 2.4 below presents the number of children and parents at each time point who used at least one narrative utterance (of any type), as well as those who used at least one narrative utterance referring to past, future, and habitual events.

Child age (months)	Parents				Children			
	Narrative users	Past users	Future users	Habitual users	Narrative users	Past users	Future users	Habitual users
14	83%	69%	58%	31%	11%	9%	2%	0%
18	92%	78%	68%	37%	30%	21%	14%	3%
22	94%	90%	77%	34%	45%	40%	23%	11%
26	93%	87%	77%	28%	67%	59%	39%	10%
30	93%	90%	90%	36%	82%	75%	56%	15%
34	95%	92%	84%	19%	89%	77%	68%	10%
38	98%	92%	85%	52%	97%	92%	79%	36%
42	92%	88%	77%	18%	87%	85%	65%	15%
46	93%	93%	88%	33%	92%	88%	78%	19%
50	93%	90%	88%	60%	95%	92%	85%	54%
54	93%	91%	76%	30%	95%	93%	77%	25%
58	91%	88%	79%	15%	95%	95%	85%	22%

Table 2.4. Proportion of parents and children who used narrative (and each narrative type) at each time point.

This table supports the argument that narrative is a common part of children's early language experiences; the vast majority of parents used narrative in some form or another in routine, everyday conversations with their children, even from when their children are very young (83% of parents at 14 months) to when they're almost about to enter school (91% of parents at 58 months). After 26-30 months, more than 80% of children use narrative, though it's much rarer for a child to use narrative from 14-22 months.

In regards to the types of narratives being produced, the proportion of parents and children using past narrative utterances follows generally the same patters as narrative overall, with the majority (70% or more) of parents at all time points, and of children after 26-30 months, being users of narrative speech. A smaller proportion of parents use future narrative utterances until age 26 months; perhaps parents don't start discussing future events in earnest until children

are able to talk about past events. At the end of the study period (58 months), around 80% of parents use future narrative speech. Most children only begin using future narratives around 26-30 months. Use of habitual narrative utterances is very irregular for both parents and children; 0% of children at 14 months use habitual narrative utterances (and 30% of parents), but never more than 60% of subjects at each time point tell narratives that refer to habitual events.

Frequency of Narrative Over Time. Next, I will consider how often children and parents used narrative speech during the sessions. Figure 2.2 (number of narrative utterances per hour) and Figure 2.3 (percentage of all utterances that are narrative) below show that both parents and children use increasingly more narrative as the child develops, both in terms of overall number of narrative utterances as well as percentage of utterances that are narrative. Parents use narrative speech with their children even as young as 14 months, though in very small frequencies, and usually only 1-2 utterances (e.g. “Maybe tomorrow we'll go on the swings”; “Remember how the old tree fell down? We had to cut it up into big pieces”). Narrative makes up a very small amount of the language children use prior to 22 months. Even at the end of the study period, parents are still using more narrative utterances than their children, although children have caught up in terms of relative frequency of narrative speech.

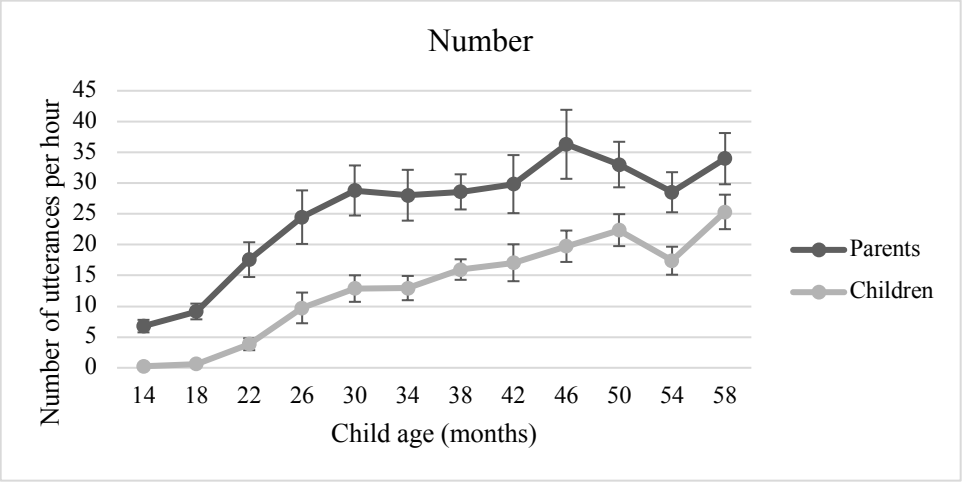

Figure 2.2. Average number of narrative utterances per hour by parents and children from 14- to 58-months.

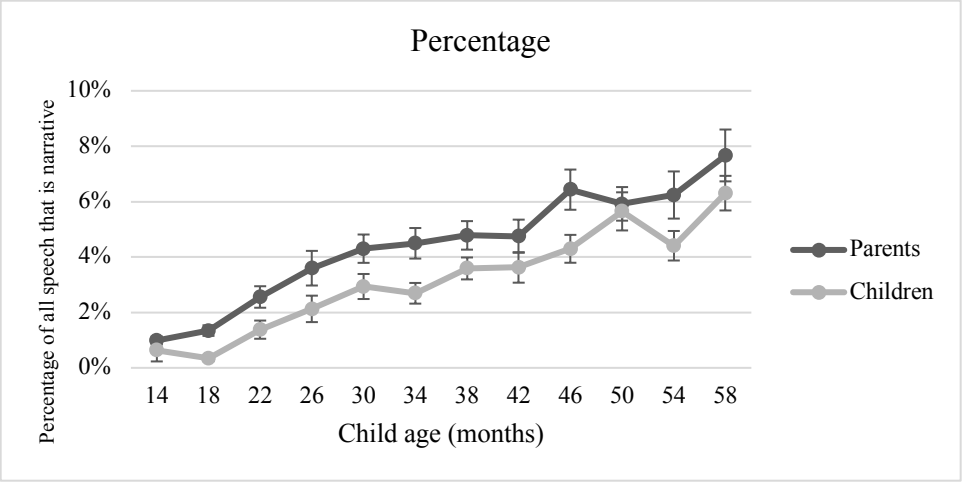

Figure 2.3. Average percent of utterances that are narrative by parents and children from 14- to 58-months.

Frequency of Narrative Time Frames. Next, I explored the frequency with which parents and children referred to past, future, or habitual events in their narrative speech**.** Previous research tends to focus on past narrative, and little is known about the frequency with which parents and children discuss future or habitual events in spontaneous speech. The figures below show the average proportion of narrative utterances that are each type (past, future, and habitual) for parents (Figure 2.4) and children (Figure 2.5). The patterns in these figures are mostly in line with the predicted trajectory, which is that parents and children would use past narratives more

frequently than future narratives. However, I predicted habitual narratives would be told by children before they begin discussing specific past or future events, which is not supported by the data. In addition, I also predicted that both parents and children would increase in their use of future speech over time; while this is somewhat true for children, parents remain very stable in their use of future narrative speech over development (around 30% of all narrative utterances).

Due to the low frequency with which parents and children use habitual narratives, for the remainder of the analyses, these utterances will be combined with past narrative utterances, because both require speakers to make use of an internal mental representation.

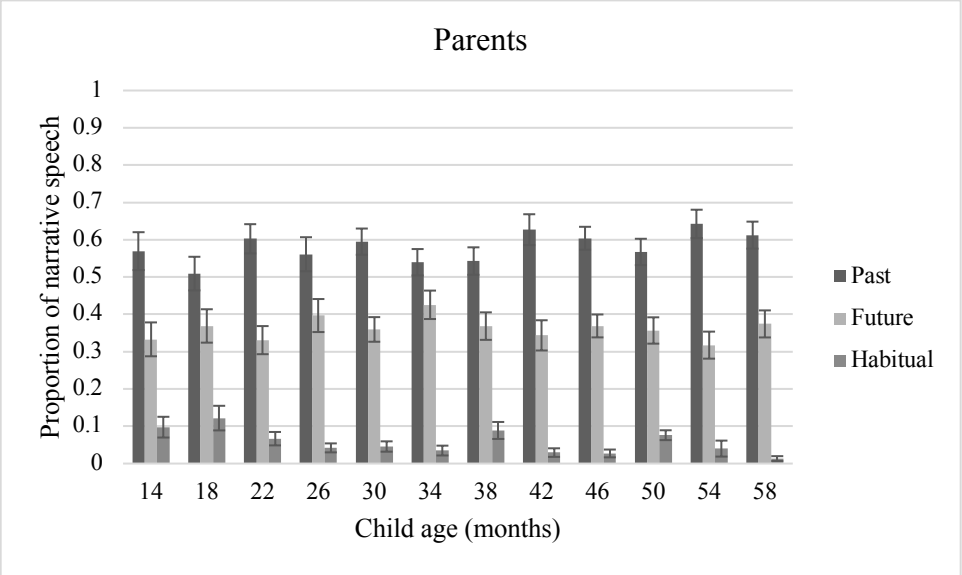

Figure 2.4. Average proportion of narrative utterances for parents that are each type.

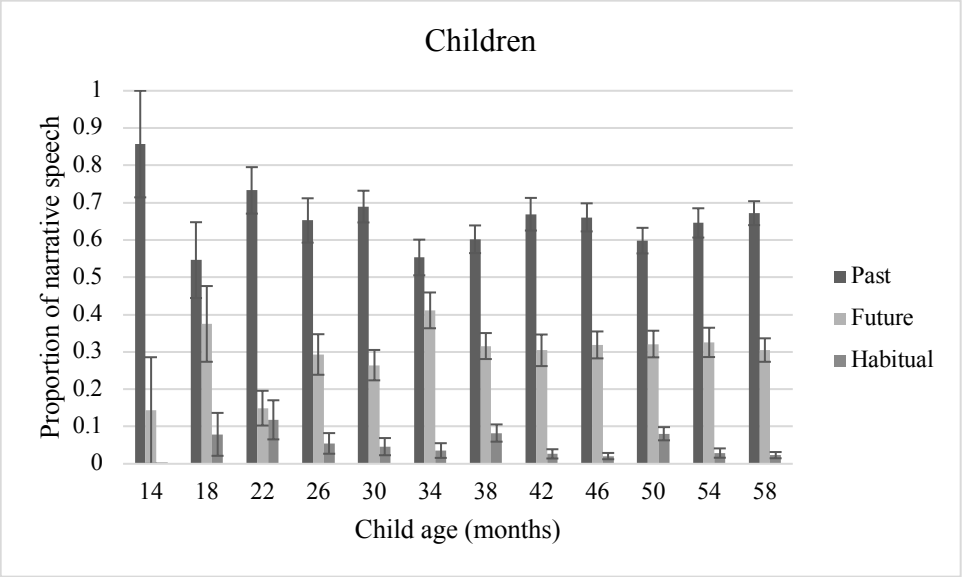

Figure 2.5. Average proportion of narrative utterances for children that are each type.

3.2. Frequency of HOT Use

Users of HOT. Next, I will describe use of HOT in this sample from 14- to 58-months (although a more complete account may be found in Freeman, 2015). This helps to contextualize the findings in the next chapter, where I examine the incorporation of HOT into narrative speech.

First, I will describe the proportion of parents and children who used HOT overall, as well as inferences and comparisons, at each time point. As with narrative, not every subject used HOT at every session. These findings are summarized in Table 2.5 below.

Child age (mos)	Parents			Children		
	HOT users	Inf. users	Comp. users	HOT users	Inf. users	Comp. users
14	98%	98%	84%	14%	0%	0%
18	100%	97%	83%	25%	3%	2%
22	97%	97%	90%	29%	10%	2%
26	100%	98%	92%	51%	30%	23%
30	100%	100%	92%	74%	52%	44%
34	100%	98%	92%	87%	79%	53%
38	100%	100%	98%	95%	90%	85%
42	100%	100%	95%	98%	93%	83%
46	100%	100%	91%	98%	97%	85%
50	100%	98%	95%	100%	100%	93%
54	98%	98%	91%	100%	98%	93%
58	97%	97%	84%	100%	100%	98%

Table 2.5. Proportion of subjects who used HOT (and inference and comparison) at each time point.

These results suggest that using language to link together representations—HOT speech—is a type of language used by almost all parents starting even when their children are 14 months old. It is not until 26 months that more than half of children starting using HOT, which increases to more than 90% by the following year (38 months). In addition, both inferences and comparisons are used by almost all parents at each session; at 30 months, more than 50% of children use inferences, and starting at 34 months, more than 50% of children use comparisons.

Frequency of HOT Over Development. Most parents used HOT in almost every session; starting around the midpoint of the study period (around 38 months), more than 90% of children used HOT as well. Next, I will describe how frequently HOT utterances occurred in spontaneous parent-child speech. As with narrative speech, I present frequency of HOT speech both in terms of number of HOT utterances per hour (Figure 2.6) as well as the proportion of all speech that is HOT (Figure 2.7). These results show that parents tend to increase in their use of HOT over time, considering both the number of HOT utterances as well as the percentage of utterances containing HOT. Children use HOT very infrequently prior to 30 months, when they begin using more HOT utterances. The 'dip' in percentage of speech that is HOT provided by

children between 14 and 30 months is explained by the use of simple abstractions at 14 months by only a few children (e.g. “What noise does the cow make?” “Moo!”). At the end of the study period, parents are still using more HOT utterances than children, both in terms of overall number of HOT utterances as well as percentage of utterances that contain a HOT relationship.

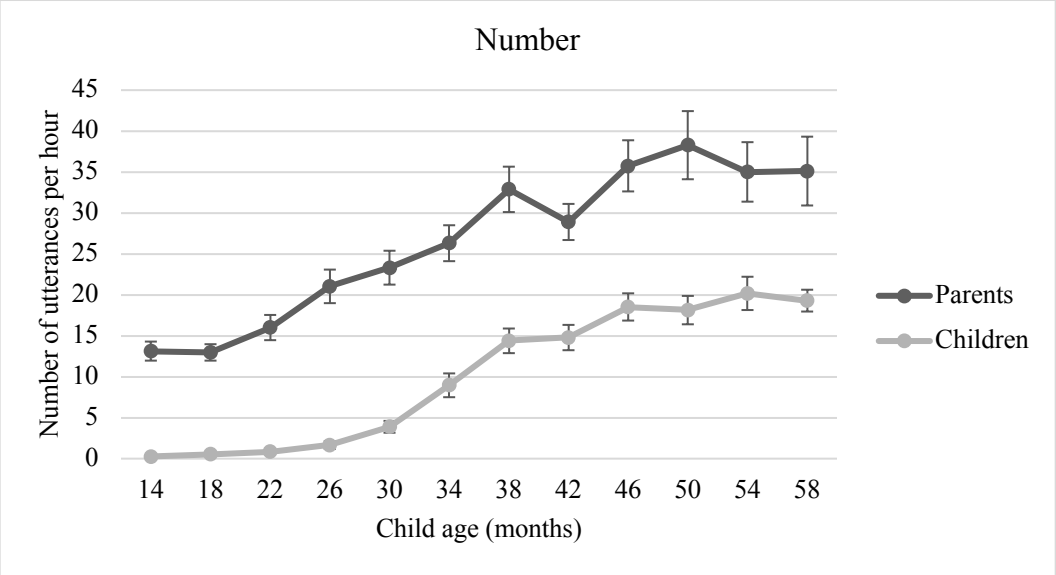

Figure 2.6. Average number of HOT utterances per hour by parents and children from 14- to 58-months.

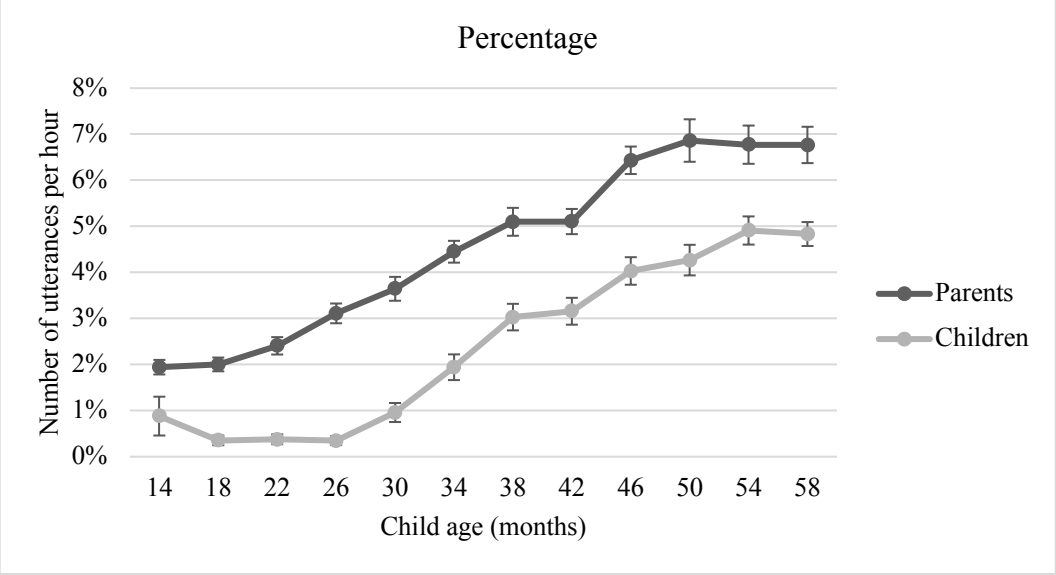

Figure 2.7. Average percent of utterances that are HOT by parents and children from 14- to 58-months.

Types of HOT. Finally, in Figures 2.8 and 2.9 below, I examine the number of inferences and comparisons for parents and children across development. These figures suggest that inferences are used more commonly than comparisons by both parents and children over development. Children greatly increase their inference usage between 30- and 34-months, and gradually increase their use, until they use 10-15 per hour at the end of the study period (which is just over 3% of their overall speech). Parents increase in their use of inferences from 14- to 46-months, and then tend to use around 20-25 per hour (which is just under 5% of their overall speech). Both parents and children steadily increase in their usage of comparisons as the child develops; at 58-months, parents are using around 10 comparisons per hour, and children are using around 5 per hour, less than 2% of parents' and children's speech.

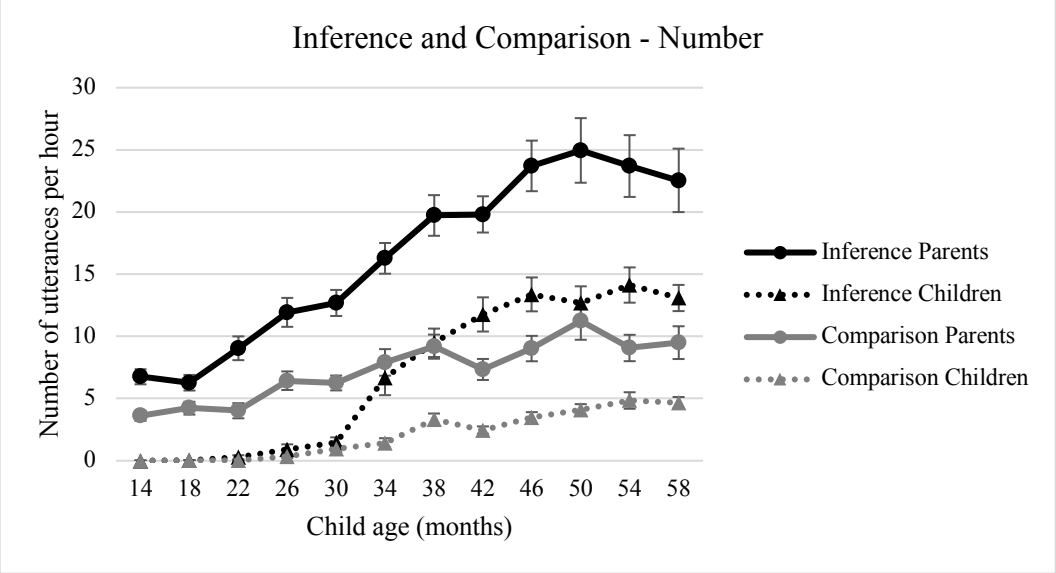

Figure 2.8. Average number of inferences and comparisons per hour by parents and children from 14- to 58-months.

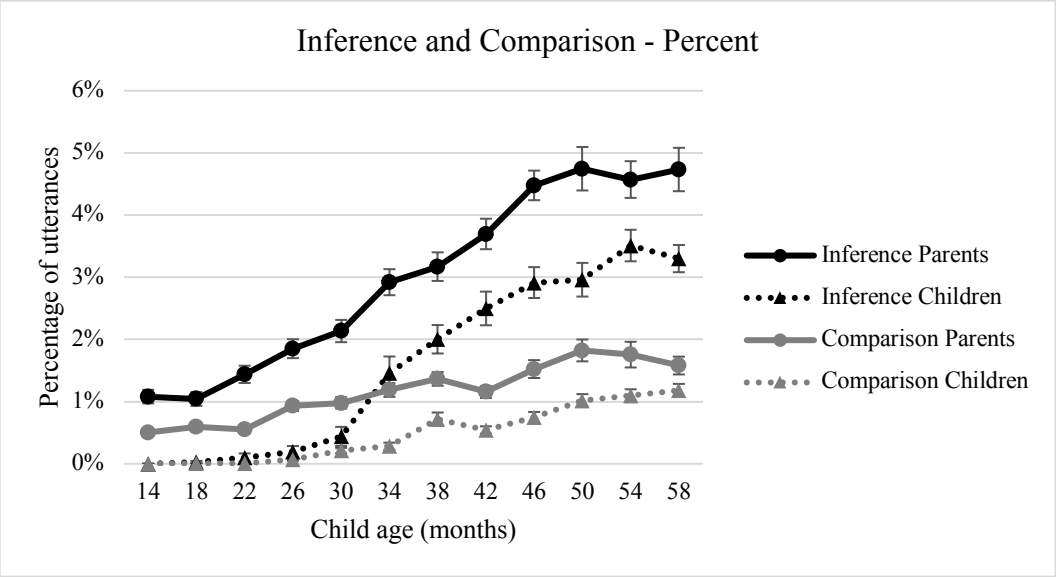

Figure 2.9. Average percent of utterances that are inference or comparison by parents and children from 14- to 58-months.

3.3. Onset of Children's Narrative Speech

Onset of Narrative Speech. The findings above highlight how both narrative and higher-order thinking are used increasingly more frequently by both parents and children as children age. Narratives that refer to past events are more common than future-oriented events, and inferences are more frequent than comparisons.

In this section, I examine when children first begin using narrative speech, as well as past/habitual and future narrative speech. As shown in Table 2.4, not all children use narrative during every session. This section will describe when children begin using narrative speech with some regularity, relations between narrative and HTO onset, and whether different demographic characteristics (child gender, child race/ethnicity, child first/only status, parent education, and family income) relate to onset of children's narrative speech.

Prior work using this dataset (e.g. Cartmill, Hunsicker, & Goldin-Meadow, 2014; Muzard Costa, 2017) established age of onset to be when children use a particular kind of speech two sessions in a row; in other words, the first session will be their age of onset. Muzard Costa

(2017) examined the onset of HOT speech in depth. She reported that typically-developing children have an average HOT onset around 28 months (slightly earlier than the age of 30 months reported by Freeman, 2015, who used three visits in a row as the criteria for HOT onset). When examining the types specifically, she found children typically acquire the four HOT types in roughly this trajectory: inference at 32 months, comparison and abstraction at 35 months, and hierarchy at 43 months.

The focus of this section will be on onset of narrative speech overall, as well as onset of past/habitual and future speech. To have an onset, children must use at least one narrative utterance in two subsequent sessions; thus, this is a measure of their onset of 'participation' in narrative speech (though future work could examine other kinds of onsets, such as onsets for providing novel information in a narrative). Sixty-one children had a measurable overall narrative onset under these criteria (two children dropped out of the study before their narrative onset was established; one child did not have a narrative onset because he only used narrative in one session). The median visit where children displayed an overall narrative onset was 26 months. Using the session in which onset occurs as an estimate for children's 'true' age of onset, average age was 26.9 months (*SD* = 8.2 months, range 14 to 50 months), suggesting narrative emerges sometime between 23-27 months; this is in line with previous research documenting its emergence starting around the second year of life.

When specifically examining onset of past/habitual narratives[3], 3 children who dropped out of the study early did not have measurable past narrative onsets, and the same child described

[3] I also examined past alone narrative onset by looking only at past narrative utterances; only 3 children differed in their age of onset when calculating onset as past/habitual versus past alone. Only 19 children had a measurable habitual narrative onset, reflecting the fact that children talk about these kinds of experiences fairly irregularly.

above also did not have a past/habitual narrative onset. The remaining 60 children with measurable past/habitual onsets had an average onset age of 27.4 months, almost exactly the same as overall narrative onset (median = 26 months, *SD* = 8.3 months, range 14 to 54 months).

Finally, for future narratives, two children did not have sufficient data for us to establish age of onset, and four additional children (in addition to the child described above) did not have a future narrative onset in the study period. Among the remaining 57 children, average age of future onset was 31.0 months (median = 30 months, *SD* = 8.2 months, range 18 to 50 months), around four months later than past/habitual and overall narrative onsets. Children may first acquire the ability to refer to past or habitual events (using an internal mental representation) before being able to discuss future events (which do not come with very clear mental representations.)

Relations Between Narrative and HOT Onset. Next, I explored whether onset of HOT and narrative speech was related. Overall narrative and overall HOT onset are significantly correlated ($r = .32$, $p = .012$). Past/Habitual narrative onset was correlated to overall HOT onset ($r = .474$, $p < .001$), but future narrative onset was only marginally correlated ($r = .219$, $p = .105$).

When examining types of HOT, overall narrative onset was significantly related to inference ($r = .310$, $p = .018$) and comparison onsets ($r = .328$, $p = .011$). These same patterns held when examining relationships between past/habitual narrative onset and inference onset ($r = .476$, $p < .001$) and comparison onset ($r = .427$, $p < .001$), as well as between future narrative onset and inference onset ($r = .315$, $p = .018$) and comparison onset ($r = .481$, $p < .001$). This suggests that children who begin using HOT earlier also begin using narrative earlier, and vice-versa. However, among the 60 children with both HOT and narrative onsets, almost half of the

children (n = 29) had narrative onset before HOT; 16 had HOT and narrative onset in the same session; and 15 had HOT onset prior to narrative.

The table below (Table 2.6) presents the frequencies with which children acquire the other types of narrative and HOT onsets simultaneously or non-simultaneously. These findings suggest that most children begin using narrative overall and past narrative before they begin using HOT (and inferences and comparisons specifically). There may be a period in development where children are telling relatively simple narratives without using any HOT. However, many children acquire HOT before future narratives (as seen in row 3 of Table 2.6), so when they begin discussing future events, they may already begin incorporating HOT into their descriptions.

	HOT Type	Narrative Type	Simultaneous Onset	Narrative Onset First	HOT Onset First	Total Children
1	HOT overall	Narrative overall	16	29	15	60
2	HOT overall	Past Narrative	17	26	17	60
3	HOT overall	Future Narrative	18	12	26	56
4	Inference	Narrative overall	12	40	8	60
5	Comparison	Narrative overall	7	47	5	59
6	Inference	Past Narrative	12	38	10	60
7	Comparison	Past Narrative	7	47	5	59
8	Inference	Future Narrative	13	25	18	56
9	Comparison	Future Narrative	10	33	12	55

Table 2.6. Order of acquisition of different HOT and narrative types.

Predictors of Narrative Onset. I found that age of overall narrative onset was significantly related to family income, such that higher income was associated with earlier ages of narrative onset (r = -0.34, p < .01). Earlier narrative onset was also related to more years of parent education (r = -0.32, p < .05).2 Unsurprisingly, the composite SES variable was also significantly negatively related to narrative onset (r = -0.38, p < .01), suggesting that children with higher SES begin using narrative speech earlier.

In addition, racial/ethnic differences in age of narrative onset were observed ($F(57,3) = 3.58$, $p < .05$), such that children from mixed/other races had the earliest age of narrative onset ($M = 22.7$ months, $SD = 6.9$ months), followed by White children ($M = 25.2$ months, $SD = 7.8$ months), then Hispanic children ($M = 29.3$, $SD = 5.3$), and Black children ($M = 32.5$, $SD = 8.7$). Follow-up *t*-tests with Bonferroni adjustment for multiple comparison showed that Black and White children's onset of narrative speech differed significantly ($p < .05$), while Black children also marginally differed from children from mixed/other races ($p < .10$). Gender and child first-born status were not related to onset of narrative speech (both p's > 0.45).

A multiple regression model with age of narrative onset as the outcome and SES, child gender, child first-born status, and race (dummy coded, with White as the reference category) as predictors significantly predicted age of narrative onset, $F(6,54) = 2.79$, $p < .05$, and explained 23.4% of the variance in narrative onset age. In this model, SES was statistically significant ($\beta = -2.37$, $SE = 1.12$, $p < .05$), and the dummy for Black was significant ($\beta = 5.06$, $SE = 2.22$, $p < .20$). This suggests that both SES and race can explain some of the differences in narrative onset; however, even when controlling for SES, Black children still have narrative onsets approximately 5 months later than their White peers.

The same predictors of overall narrative onset (income, parent education, SES, child race) were also significant at predicting onset of past/habitual narratives. I explored whether different demographics were related to age of future narrative onset, which may be more challenging for children. I observed a marginal effect of gender, $t(56) = -1.8$, $p < .10$, such that boys ($M = 28.9$ months, $SD = 7.2$ months) had slightly earlier future narrative onsets than girls ($M = 32.8$ months, $SD = 8.7$ months). This is in contrast to work suggesting girls may receive richer narrative input from their parents, potentially resulting in earlier narrative onsets. Race

also significantly predicted future narrative onset ($F(53,3) = 3.04$, $p < .05$), such that Black children had a later future narrative onset ($M = 36.9$ months, $SD = 9.8$ months) than White children ($M = 28.9$ months, $SD = 7.0$ months), children from mixed/other races ($M = 30.0$ months, $SD = 9.8$ months), or Hispanic children ($M = 32.7$ months, $SD = 5.5$ months). Follow-up comparisons with Bonferroni adjustment suggested only Black and White children differed significantly from each other ($p < .05$). First-born or only status, parent education, and family income did not relate to future narrative onset age (all p's > 0.18).

A multiple regression model with age of future narrative onset as the outcome and child gender, child first-born or only status, race (dummy coded), and SES as predictors was significant at predicting future narrative onset age, $F(6,50) = 2.43$, $p < .05$, and explained 22.6% of the variance. SES was marginally significant ($\beta = -1.71$, $SE = 0.98$, $p < .10$), and the dummy for Black was significant ($\beta = 7.53$, $SE = 2.76$, $p < .01$), suggesting that even controlling for SES and gender, Black children have future narrative onsets almost 8 months later than their White peers.

Together, these findings suggest that SES is a significant predictor of overall narrative and past/habitual narrative onset, such that children from high-SES families begin using narrative speech earlier. Black children m7ay begin using narrative (both past and future) slightly later than their peers, and this pattern holds even when controlling for other demographic characteristics such as parent education, family income, and gender. This is in contrast to prior research suggesting oral narrative is an important and pervasive aspect of African American culture (e.g. Banks-Wallace, 2002); however, onset is a very unrefined (i.e. not fine grained) way of measuring the pervasiveness of narrative.

I also examined relationships between demographic characteristics and order of acquisition of HOT and narrative as seen in Table 2.6. I found differences based on SES in the order in which children acquire inference and overall narrative (row 4; $F(2,57) = 2.54$, $p < .10$), as well as comparison and overall narrative (row 5; $F(2,56) = 3.41$, $p < .05$). Children who acquire narrative first tend to have higher SES, while children who acquire either HOT first or acquire them simultaneously tend to have lower SES. These same findings also apply to acquisition of inference and past narrative (row 6) and comparison and past narrative (row 7). This suggests that children from higher-SES backgrounds in particular may begin using narrative prior to using specific HOT types.

3.4. Predictors of Narrative Use

The above suggests there are demographic differences in when children begin using narrative speech. In this last results section of this chapter, I explore whether any demographic characteristics (SES, gender, child first-born status) explained variation not only in onset, but in parent and child frequency of narrative use over development. I used Hierarchical Linear Modeling (HLM) to analyze individual variation in usage of narrative speech over time. In HLM, data are modeled in two levels: the Level 1 model accounts for variation over time within each individual, and the Level 2 model represents variation between individuals. In longitudinal models, time points (Level 1) are nested within individuals (Level 2).

I conducted a series of hierarchical two-level longitudinal models, where the number of parent and child narrative utterances at each timepoint was modeled as a poisson outcome (due to the rarity with which these utterances occur). Individuals missing 5 or more sessions were excluded ($n = 5$), resulting in a final sample of 59 parents and children. To reduce noise, pairs of sessions (14-18 months, 22-26 months, 30-34 months, 38-42 months, 46-50 months, 54-58

months) were averaged. If an individual was missing one of the sessions (e.g. 38 months), their values from the present session (e.g. 42 months) were used (once the individuals missing 5 or more sessions were excluded, no subjects were missing two sessions in a row).

In line with the first approach (considering overall number of narrative utterances), and since not all sessions were 90 minutes, session length in hours (averaged across each pair of sessions) was used as an exposure variable. A similar approach was taken by Freeman (2015), who concluded that session length was a better exposure variable than number of utterances, because it accounts for both differences in number of utterances (there is a finite number of utterances that could occur in a set amount of time) as well as differences in number of narrative utterances (within the set amount of time, and given a set amount of utterances, there is a finite opportunity for narrative). Future work could examine total number of utterances as an exposure variable in line with the second approach, in order to consider the relative proportion of all utterances that are narrative.

For the parent models, all time points were used, and age was centered at 36 months, the middle of the 14- to 58-month period. Centering age enables the intercept to have conceptual meaning (e.g. it represents average usage at the study's midpoint). For the child models, only ages 30- to 58-months were used to model growth, due to the rarity with which narrative occurred prior to 30 months; age was subsequently centered at 44 months, the center of this period.

To obtain the best fitting Level 1 model for narrative over time, I examined empirical plots of narrative use over time for parents (Figure 2.10) and children (Figure 2.11). In these figures, each line represents an individual; dyad colors are matched between figures.

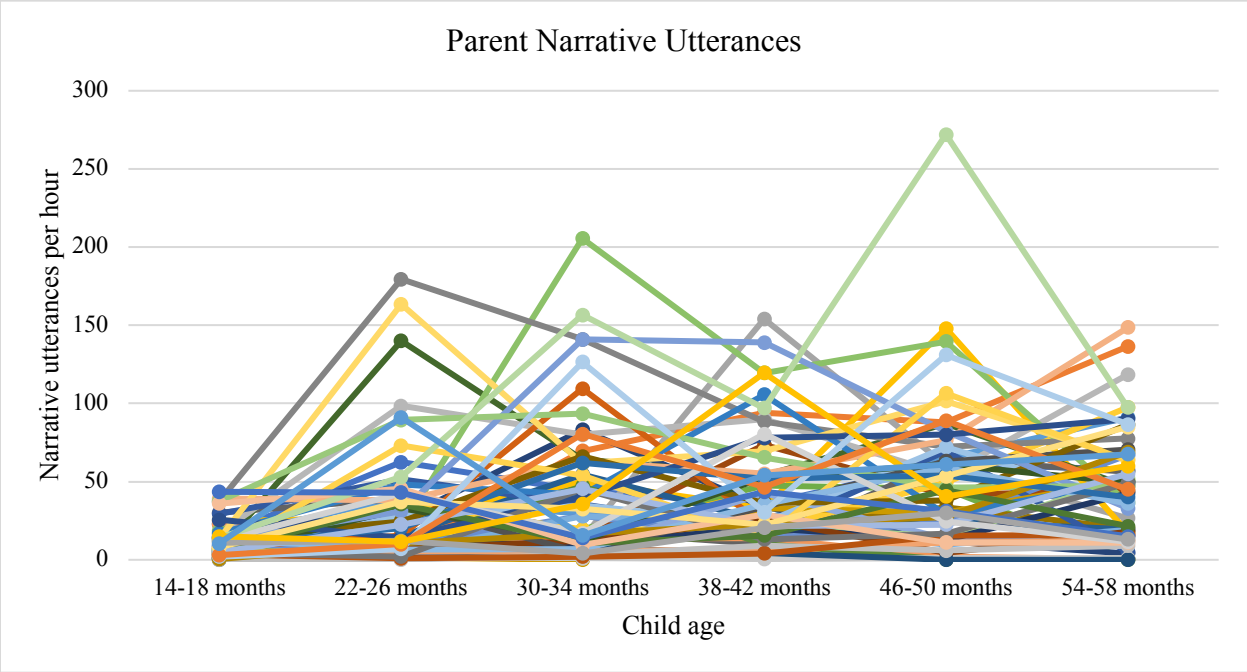

Figure 2.10. Spaghetti plots for parents' narrative usage over 14-58 months, with pairs of sessions averaged together.

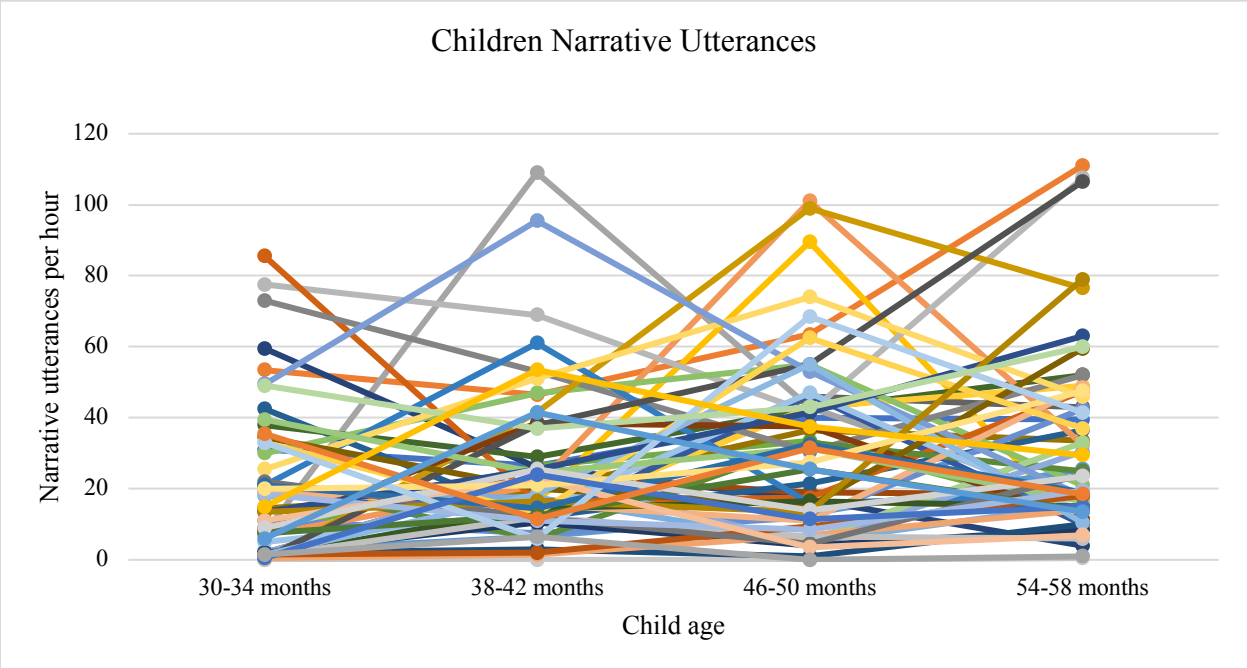

Figure 2.11. Spaghetti plots for children's narrative usage over 30-58 months, with pairs of sessions averaged together.

I fit a quadratic model because for both parents and children because the quadratic age term was significant, and because the plot of the quadratic model best mirrored the plot of the

empirical data—in other words, some individuals increase at one session then decrease at another, so not every individual maintains a steady growth rate. A cubic age term was tested but did not improve the fit of the model.

The simplified unconditional growth model (which applies to all the 2-level models to be described in this chapter) is presented below:

Level 1 Model

$E(Y_{ti}|\pi_{it}) = \lambda_{ti}*sesslength_{ti}$

$\log[\lambda_{ti}] = \eta_{ti}$

$\eta_{ti} = \pi_{0i} + \pi_{1i}*(agecentered_{ti}) + \pi_{2i}*(agecenteredsquared_{ti})$

Level 2 Model

$\pi_{0i} = \beta_{00} + r_{0i}$

$\pi_{1i} = \beta_{10} + r_{1i}$

$\pi_{2i} = \beta_{20} + r_{2i}$

Combined Model

$\eta_{ti} = \beta_{00} + r_{0i} + \beta_{10}*(agecentered_{ti}) + r_{1i}*(agecentered_{ti}) + \beta_{20}*(agecenteredsquared_{ti}) + r_{2i}*(agecenteredsquared_{ti})$

In this equation, the outcome (Y) is, for example, the total number of narrative utterances produced by child i at time t. At level 1, the intercept (π_0), slope (π_1) and acceleration (π_2) are all allowed to vary by individual i.

Children's Narrative Utterances. The model presented in Table 2.7 is the unconditional linear growth model (e.g. the model without any predictors) for child's narrative utterances from 30-58 months. I looked at fixed effects with robust standard errors (as I did for all models reported in this chapter).

This model shows that the results from the hypothesis tests for the fixed effects—the intercept, growth, and acceleration—all have large t-ratios, meaning all three parameters are necessary for describing the children's narrative growth trajectory. In addition, this table also presents the estimates for the variances of individual growth parameters. Using the simplest test of homogeneity, a chi-squared statistic, to test the null hypothesis that children do not vary in their

narrative use at 44 months (i.e. the intercept) results in a test statistic for the intercept term of 1677.93 ($p < 0.001$). This, and the chi-squared statistics from the growth and acceleration rates, suggests that there is significant variation among children, both in average number of narrative utterances, as well as growth and acceleration rates.

Finally, this table also presents the reliability of the OLS regression coefficient estimates (averaging across all individuals the ratio of the 'true' parameter variance to the 'total' observed variance). The estimated reliability for all three parameters is high, suggesting there is substantial signal in these data in terms of describing individual differences in status at 44 months, growth rates, and acceleration rates.

Coefficients in poisson models predict not the raw number of utterances, but the natural log of narrative utterances per hour. After transforming the variable, this model predicts that at 44 months, children use an average of 14.7 narrative utterances per hour. After transforming the slope and acceleration coefficients (which are multiplicative rather than additive), a one-month change in age would result in children at 45 months using 15.1 narrative utterances per hour.

		Coefficient	se	*t*-ratio	*d.f.*	*p*-value
Fixed Effects	Intercept (β_{00})	2.69	0.11	23.50	58	<0.001
	Growth (β_{10})	0.03	0.006	4.84	58	<0.001
	Acceleration (β_{20})	-0.002	0.0008	-2.433	58	0.018
		Variance Component	*d.f.*	χ^2	*p*-value	
Random Effects	Intercept (r_{0i})	0.747	58	1677.93	<0.001	
	Growth (r_{1i})	0.002	58	665.60	<0.001	
	Acceleration (r_{2i})	0.00003	58	713.10	<0.001	
Reliability of OLS Regression Coefficient Estimate	Intercept (π_0)	0.948				
	Growth (π_1)	0.883				
	Acceleration (π_2)	0.885				

Table 2.7. Unconditional model for child narrative utterances.

In order to determine which variables child narrative use over development, several level 2 variables were entered into the model, and their fit in explaining the intercept, slope, and acceleration was evaluated. The level 2 variables I examined were SES (the standardized composite of parental education and family income), child gender, and child first-born or only status. I did not explore differences according to child race due to the lack of variability (e.g. 35 of the 59 participants are White).

Because prior work has examined differences in language environments by socioeconomic status, in the first model, I examined the effects of SES on children's narrative intercept, growth, and acceleration rates. The fixed effects results from the model are presented in Table 2.8 below. The findings from this table suggest that there are marginal SES-differences in children's narrative usage at 44 months, such that a one-unit increase in SES results in 1.3 times more narrative utterances being used per hour. SES did not relate to children's growth or acceleration rates.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	2.69	0.11	24.53	57	<0.001
	SES (β_{01})	0.26	0.14	1.91	57	0.062
π_1	Growth (β_{10})	0.03	0.006	4.84	57	<0.001
	SES (β_{11})	-0.005	0.006	-0.74	57	0.463
π_2	Acceleration (β_{20})	-0.002	0.0008	-2.43	57	0.018
	SES (β_{21})	-0.0002	0.0008	-0.24	57	0.813

Table 2.8. Model for child narrative utterances with SES included.

Next, gender was added to the model, because prior research suggests parents may differ in their provisioning of narrative speech between boys and girls, which could result in boys and girls using different amounts of narrative speech. The results of the fixed effects from the model are presented in Table 2.9 below.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	2.57	0.17	15.36	56	<0.001
	SES (β_{01})	0.25	0.13	2.097	56	0.041
	Gender (β_{02})	0.28	0.21	1.20	56	0.235
π_1	Growth (β_{10})	0.02	0.008	2.08	56	0.043
	SES (β_{11})	-0.003	0.006	-0.41	56	0.677
	Gender (β_{12})	0.03	0.01	2.31	56	0.025
π_2	Acceleration (β_{20})	-0.0009	0.001	-0.79	56	0.435
	SES (β_{21})	-0.00004	0.0008	-0.47	56	0.643
	Gender (β_{22})	-0.002	0.002	-1.47	56	0.147

Table 2.9. Model for child narrative utterances with SES and gender included.

This model suggests there are marginal differences in children's rates of narrative growth that are attributable to gender ($p < 0.05$), even when controlling for SES (which is also significant, $p < 0.05$). On average, girls grow in their rates of narrative change faster than boys. Neither SES nor gender significantly predicted acceleration.

Finally, child status as first- or only-born was added to the model. Results from the fixed effects are presented in Table 2.10 below.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	2.40	0.26	9.03	55	<0.001
	SES (β_{01})	0.28	0.14	2.09	55	0.041
	Gender (β_{02})	0.31	0.23	1.35	55	0.182
	First-Born (β_{03})	0.25	0.24	1.03	55	0.308
π_1	Growth (β_{10})	0.01	0.01	0.89	55	0.379
	SES (β_{11})	-0.003	0.006	-0.42	55	0.675
	Gender (β_{12})	0.03	0.01	2.47	55	0.017
	First-Born (β_{13})	0.01	0.01	0.83	55	0.411
π_2	Acceleration (β_{20})	-0.005	0.002	-0.29	55	0.772
	SES (β_{21})	-0.0004	0.0008	-0.46	55	0.650
	Gender (β_{22})	-0.002	0.002	-1.45	55	0.153
	First-Born (β_{23})	-0.0005	0.002	-0.27	55	0.790

Table 2.10. Model for child narrative utterances with SES, gender, and first-born status included.

This model shows that even controlling for gender and first-born status, there are still SES-differences associated with children's narrative usage at 44 months ($p < 0.05$), as well as gender differences in rates of narrative use ($p < .05$). No other demographic variables were

significant at predicting children's narrative usage (either the intercept, slope, or acceleration), including child status as first- or only-born.

The final model is presented below.

Level 1 Model

$E(CNARR_{ti}|\pi_i) = \lambda_{ti}*SESS\_HR_{ti}$

$\log[\lambda_{ti}] = \eta_{ti}$

$\eta_{ti} = \pi_{0i} + \pi_{1i}*(AGE44_{ti}) + \pi_{2i}*(SQAGE44_{ti})$

Level 2 Model

$\pi_{0i} = \beta_{00} + \beta_{01}*(SES_i) + \beta_{02}*(GENDER_i) + \beta_{03}*(FIRSTBORN_i) + r_{0i}$

$\pi_{1i} = \beta_{10} + \beta_{11}*(SES_i) + \beta_{12}*(GENDER_i) + \beta_{13}*(FIRSTBORN_i) + r_{1i}$

$\pi_{2i} = \beta_{20} + \beta_{21}*(SES_i) + \beta_{22}*(GENDER_i) + \beta_{23}*(FIRSTBORN_i) + r_{2i}$

Combined Model

$\eta_{ti} = \beta_{00} + \beta_{01}*SES_i + \beta_{02}*GENDER_i + \beta_{03}*FIRSTBORN_i + r_{0i} + \beta_{10}*AGE44_{ti} + \beta_{11}*SES_i*AGE44_{ti} + \beta_{12}*GENDER_i*AGE44_{ti} + \beta_{13}*FIRSTBORN_i*AGE44_{ti} + r_{1i}*AGE44_{ti} + \beta_{20}*SQAGE44_{ti} + \beta_{21}*SES_i*SQAGE44_{ti} + \beta_{22}*GENDER_i*SQAGE44_{ti} + \beta_{23}*FIRSTBORN_i*SQAGE44_{ti} + r_{2i}*SQAGE44_{ti}$

Parent Narrative Utterances. Next, I modeled parents' usage of narrative utterances over time, using the same approach described above. As a reminder, the entire developmental period from 14-58 months for parents was used, with age centered at 36 months.

Table 2.11 below presents the findings from the unconditional model. Similar to the model for children, the results from the hypothesis tests for the fixed effects all have large *t*-ratios, meaning all three parameters are necessary for describing the parent's use of narrative over development. In addition, the chi-squared statistic testing the null hypothesis that parents do not vary in their narrative use is rejected for the intercept, slope, and acceleration. This suggests that there is significant variation among parents in average number of narrative utterances, as well as growth and rates of change of narrative usage over development. In addition, the reliability of the OLS regression coefficient estimates are all high, suggesting there is substantial signal in these data in terms of describing individual differences in status at 36 months, growth

rates, and acceleration rates. Parents at 36 months are predicted to use 22.6 narrative utterances per hour and have similar growth and acceleration rates as children.

		Coefficient	se	*t*-ratio	*d.f.*	*p*-value
Fixed Effects	Intercept (β_{00})	3.12	0.12	26.45	58	<0.001
	Growth (β_{10})	0.03	0.004	6.46	58	<0.001
	Acceleration (β_{20})	-0.002	0.0003	-6.09	58	<0.001
		Variance Component	*d.f.*	χ^2	*p*-value	
Random Effects	Intercept (r_{0i})	0.82	58	5096.97	<0.001	
	Growth (r_{1i})	0.001	58	1056.15	<0.001	
	Acceleration (r_{2i})	0.000001	58	884.71	<0.001	
Reliability of OLS Regression Coefficient Estimate	Intercept (π_0)	0.977				
	Growth (π_1)	0.925				
	Acceleration (π_2)	0.913				

Table 2.11. Unconditional model for parent narrative utterances.

To determine whether any demographic characteristics were related to parents' narrative use, I followed the same analytic approach as I did with children; first I entered SES into the model. The results for the fixed effects for this model are presented in Table 2.12 below.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	3.13	0.11	28.48	57	<0.001
	SES (β_{01})	0.33	0.12	2.80	57	0.007
π_1	Growth (β_{10})	0.03	0.004	6.48	57	<0.001
	SES (β_{11})	0.003	0.004	0.86	57	0.395
π_2	Acceleration (β_{20})	-0.002	0.0003	-6.11	57	<0.001
	SES (β_{21})	0.00002	0.0003	-0.06	57	0.955

Table 2.12. Model for parent narrative utterances with SES included.

This model suggests that, similar to narrative, there are differences in parent's narrative usage at 36 months that are attributable to SES ($p < .01$). SES does not affect either the rate of change of narrative usage, nor does it affect the acceleration.

Gender was next added to the model, which is presented in Table 2.13 below.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	3.19	0.18	17.66	56	<0.001
	SES (β_{01})	0.32	0.12	2.69	56	0.009
	Gender (β_{02})	-0.15	0.22	-0.68	56	0.497
π_1	Growth (β_{10})	0.02	0.005	4.69	56	<0.001
	SES (β_{11})	0.004	0.004	0.93	56	0.325
	Gender (β_{12})	0.007	0.009	0.81	56	0.419
π_2	Acceleration (β_{20})	-0.002	0.0004	-4.72	56	<0.001
	SES (β_{21})	-0.00003	0.0003	-0.09	56	0.925
	Gender (β_{22})	-0.0002	0.0006	-0.36	56	0.724

Table 2.13. Model for parent narrative utterances with SES and gender included.

This model suggests that there are not gender related differences in parents' provisioning of narrative utterances over development. However, even when controlling for gender, there still remains effects of SES ($p < .01$) on the intercept (parent narrative use at 36 months).

Finally, child status as first-born or only child was added to the model, which is presented in Table 2.14 below.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	3.29	0.28	11.88	55	<0.001
	SES (β_{01})	0.32	0.12	2.69	55	0.009
	Gender (β_{02})	-0.18	0.24	-0.75	55	0.455
	First-Born (β_{03})	-0.13	0.24	-0.55	55	0.584
π_1	Growth (β_{10})	0.02	0.008	2.52	55	0.015
	SES (β_{11})	0.004	0.004	0.99	55	0.322
	Gender (β_{12})	0.0008	0.009	0.87	55	0.386
	First-Born (β_{13})	0.005	0.009	0.51	55	0.615
π_2	Acceleration (β_{20})	-0.002	0.0006	-3.04	55	0.004
	SES (β_{21})	-0.00003	0.0004	-0.08	55	0.933
	Gender (β_{22})	-0.0002	0.0007	-0.24	55	0.810
	First-Born (β_{23})	0.0003	0.0007	0.46	55	0.651

Table 2.14. Model for parent narrative utterances with SES, gender, and first-born status included.

This model suggests that controlling for child gender and first-born status, there still are SES-associated differences in parent's narrative use at the midpoint of the study, 36 months ($p < 0.01$). Children's gender or first-born status does not affect parent's average usage or narrative utterances, nor their growth or acceleration rates over time.

The final model for parents is presented below.

Level 1 Model

$E(PNARR_{ti}|\pi_i) = \lambda_{ti}*SESS\_HR_{ti}$

$\log[\lambda_{ti}] = \eta_{ti}$

$\eta_{ti} = \pi_{0i} + \pi_{1i}*(AGE36_{ti}) + \pi_{2i}*(SQAGE36_{ti})$

Level 2 Model

$\pi_{0i} = \beta_{00} + \beta_{01}*(SES_i) + \beta_{02}*(GENDER_i) + \beta_{03}*(FIRSTBORN_i) + r_{0i}$

$\pi_{1i} = \beta_{10} + \beta_{11}*(SES_i) + \beta_{12}*(GENDER_i) + \beta_{13}*(FIRSTBORN_i) + r_{1i}$

$\pi_{2i} = \beta_{20} + \beta_{21}*(SES_i) + \beta_{22}*(GENDER_i) + \beta_{23}*(FIRSTBORN_i) + r_{2i}$

Combined Model

$\eta_{ti} = \beta_{00} + \beta_{01}*SES_i + \beta_{02}*GENDER_i + \beta_{03}*FIRSTBORN_i + r_{0i} + \beta_{10}*AGE36_{ti} + \beta_{11}*SES_i*AGE36_{ti} + \beta_{12}*GENDER_i*AGE36_{ti} + \beta_{13}*FIRSTBORN_i*AGE36_{ti} + r_{1i}*AGE36_{ti} + \beta_{20}*SQAGE36_{ti} + \beta_{21}*SES_i*SQAGE36_{ti} + \beta_{22}*GENDER_i*SQAGE36_{ti} + \beta_{23}*FIRSTBORN_i*SQAGE36_{ti} + r_{2i}*SQAGE36_{ti}$

4. Conclusions

The goal of this chapter was to describe early parent and child use of narrative (and HOT) in their spontaneous speech from 14-58 months. Most parents use narrative at all 12 time points, highlighting the important role that narrative speech plays for children's early childhood experiences. However, not all parents use future narratives early in their child's development, suggesting this type of speech may be viewed as more challenging for children to use and understand. Prior to 22 months, children rarely use narrative, but as they develop, they begin incorporating more narrative into their spontaneous speech. Like their parents, more children begin to use future narratives over development, such that by 58 months, 85% of children and 79% of parents use future narrative speech. This lends support to the notion that children are socialized into talking about personal experiences, particularly about the past, starting when they are very young.

Frequency of narrative utterances increases over development (from parent using an average of only 6 narrative utterances per hour at 14 months—or around 1% of their speech—to

30 narrative utterances per hour at 58 months—or around 7% of their speech). Children use almost no narrative utterances prior to 22 months, but by 58 months are using around 25 narrative utterances per hour and have caught up with their parents in terms of overall percentage of speech that is narrative. This suggests that as children grow, parents and children recognize the important role played by talking about decontextualized personal events.

Average age of overall narrative onset for children was around 26 months; children tended to start using narrative speech by referring to past/habitual events. This is in line with prior research suggesting children may first begin by referring to events in the past or habitually recurring events. Future narrative onset was slightly later, around 31 months, which is also in line with research suggesting talk about future events may be more difficult than talk about past events.

Parents' narrative utterances generally refer to future events about 30% of the time, with the remaining mostly referring to past events (and a very small number of habitual events). Children also rarely use habitual narratives; their narratives tend to refer to past events up to about 26 months, after which they begin to look more similar to their parents in terms of future narrative usage. While the literature suggests parents and children frequently engage in talk about habitual or recurring events—and may even refer to these kinds of events prior to talking about unique events—I found that parents and children most often referred to specific past events in their narrative speech.

Like narrative, parents use HOT at almost every session, and more than 50% of children start using HOT around 26-30 months. HOT use follows a similar trajectory to use of narrative, in that parents and children use increasingly more HOT utterances over development. Parents increase from 15 HOT utterances per hour (or 2% of speech) at 14 months, to around 35 HOT

utterances per hour (or 7% of speech) at 58 months. This suggests that relational thinking makes up an increasingly important part of children's early language experiences as they grow.

Prior to 30 months, children use almost no HOT speech, and when they do they are typically using simple abstractions. Starting at 30 months, children begin using more HOT utterances: they increase from around 5 HOT utterances per hour at 30 months (around 1% of speech) to 15 HOT utterances per hour at 58 months (around 4% of speech). Unlike narrative, even at the end of the study period parents are still using more HOT than children, suggesting HOT still presents challenges for young preschoolers. Parent and child usage of inferences increased across development, as did their usage of comparisons (though inferences were always more common than comparisons).

Most children begin using narrative before they begin using HOT, suggesting that there may be a period in development where children tell fairly simple narratives without using any HOT. Onsets of HOT and narrative were significantly related, suggesting these two types of speech may share similarities in form and function early in development. SES was a predictor of narrative onset, and Black children tend to start using narrative slightly later than their peers, even when controlling for SES. In general, there were no significant gender differences in onset of narrative speech, again in contrast to previous research suggesting girls may be exposed to or use more narrative than boys.

In addition, this chapter suggests that there are differences in overall frequency of narrative use by both parents and children that may be attributable to SES; parents and children from higher-SES backgrounds tend to use more narrative utterances on average. This is in contrast to previous work suggesting there is no relationship between SES and narrative use. However, there are no SES-differences in rates of change or acceleration, nor are there

differences in growth trajectories due to child first-born or only-child status. Additionally, there are not strong differences that may be attributable to child gender (the exception is for children's growth of narrative over time, suggesting girls grow more quickly in their rates of narrative usage over development). Additionally, the fact that parents and children with higher-SES use more narrative utterances may be due to the fact that families with higher SES tend to use more utterances overall. Future work could examine variability in the percentage of speech that contains narrative, or could use total number of utterances as an exposure variable (in contrast to session length), to more fairly account for differences in overall quantity of speech.

In the next chapter, I will discuss not only parent and child use of past/habitual and future narrative utterances, but also how frequently parents invoke higher-order thinking (as well as inferences and comparisons specifically) in their narrative speech.

CHAPTER THREE: INCORPORATION OF HIGHER-ORDER THINKING INTO NARRATIVE FROM 14- TO 58-MONTHS

1. Introduction

The previous chapter explored early use of narrative and HOT independently. In this chapter, I will explore how frequently they are used together, in the same utterance. Exposure to and participation in higher-order thinking may prepare children for the kinds of relational, inferential, and comparative reasoning they are expected to do in school, though no prior research has yet explored the different speech contexts in which HOT is invoked by parents and children.

The four research questions explored in this chapter are**: 3.1)** How frequently do parents and children incorporate higher-order thinking into their personal narrative speech compared to non-narrative speech, and does this change over development? **3.2)** Do certain types of narrative encourage more HOT use? **3.3)** Are parents and children more likely to incorporate certain types of HOT into their narrative speech? **3.4)** Does HOT in narrative usage vary according to demographic characteristics, such as child gender, child first-born status, or SES?

Research Question 3.1: How frequently do parents and children incorporate higher-order thinking into their personal narrative speech compared to non-narrative speech, and does this change over development?

Due to the aspects of narrative outlined in the introductory chapter (narrative's story-driven nature, its saliency, its ability to promote metacognition, and its removal from the present context), parents will use relatively more instances of HOT in narrative compared to non-narrative speech. This pattern will become more extreme over development, as parents and children begin to tell increasingly complex narratives. Children will initially tell simple

narratives without linking representations together using HOT. After they become more capable of using HOT in contexts that are more situated in the *here-and-now*, as well as more proficient users of referring to the *there-and-then* in narrative, they too will begin incorporating more HOTs into their narrative speech, at greater rates than in their non-narrative speech.

Research Question 3.2: Do certain types of narrative encourage more HOT use?

As described earlier, past/habitual narratives may contain more instances of HOT due to more being known about the events, providing them with a more story-like structure. Narratives of past events may also be more salient than narratives of future events. An alternative hypothesis is that future narratives may encourage parents and children to use more HOT than past or habitual narratives, due to the nature of future speech involving more predictions and speculation, and consequently being even further 'removed' from the present context than past or habitual narrative speech.

Research Question 3.3: Are parents and children more likely to incorporate certain types of HOT into their narrative speech?

Relative to non-narrative speech, parents will use both inferences and comparisons more frequently in narrative speech compared to non-narrative speech. Children will also use more inferences in narrative compared to non-narrative speech; however, they may rely more on the present context to scaffold their use of comparisons, such that usage of comparisons will not vary by speech context for children.

Research Question 3.4: Does HOT in narrative usage vary according to demographic characteristics, such as child gender, child first-born status, or SES?

Freeman (2015) found that predictors of children's use and growth of HOT use were family income, and early child language measures (MLU and gesture types) at 14 months. For

parents' use and growth of HOT, the significant predictors were family income, parent verbal IQ, and child first-born or only status. These findings suggest that individual variation in growth and use of HOT may be explained in part by an individual's demographic characteristics, such that individuals from higher incomes grow in their use of HOT more quickly, and that cognitive and linguistic factors also play a role in the use of HOT.

Given this, it is also possible that HOT in narrative use will also be predicted by demographics. Given that parents and children vary in their use of narrative overall by SES, as well as that Freeman (2015) found families with higher incomes used more instances of HOT, it is also possible higher-SES families will also use more instances of HOT in narrative. Additionally, parents may use richer narrative speech with girls or with first-born children, resulting in more HOT in narrative use with these children, over boys or later-born children.

2. Methods

The participants, procedure, transcription, and coding are the same as described in Chapter 2.

3. Results

3.1. Onset of HOT in Narrative

Users of HOT in Narrative. In order to begin exploring the incorporation of HOT into narrative speech, I first examined the proportion of parents and children at each time point who *could* have used HOT in a narrative context—in other words, did they use both HOT and narrative (at least independently) in the same session? I then calculated the proportion of parents and children at each time point who actually *did* use HOT in a narrative context—in other words, did they use at least one HOT utterance in a narrative context in the session? These same

proportions were also calculated for past/habitual narrative and future narrative. The findings are summarized in Table 3.1 below.

Child Age (mos)	Parents						Children					
	HOT Overall + Narrative Overall		HOT Overall + Past/Habitual Narrative		HOT Overall + Future Narrative		HOT Overall + Narrative Overall		HOT Overall + Past/Habitual Narrative		HOT Overall + Future Narrative	
	Could Use	Did Use	Could Use	Did Use	Could Use	Did Use	Could Use	Did Use	Could Use	Did Use	Could Use	Did Use
14	83%	50%	77%	36%	56%	30%	3%	0%	3%	0%	0%	0%
18	92%	59%	84%	44%	68%	37%	13%	0%	11%	0%	6%	0%
22	91%	55%	89%	39%	77%	35%	19%	3%	19%	3%	13%	2%
26	93%	72%	87%	54%	77%	48%	41%	11%	36%	8%	26%	3%
30	93%	74%	92%	59%	90%	56%	66%	13%	62%	11%	48%	3%
34	95%	74%	92%	56%	84%	53%	81%	21%	73%	19%	65%	13%
38	98%	82%	93%	67%	85%	61%	93%	52%	92%	46%	75%	21%
42	92%	82%	88%	72%	77%	50%	87%	48%	85%	38%	65%	25%
46	93%	83%	93%	79%	88%	72%	90%	63%	88%	51%	76%	47%
50	93%	88%	91%	78%	88%	67%	95%	76%	92%	66%	85%	46%
54	92%	81%	93%	70%	76%	63%	95%	66%	93%	50%	77%	45%
58	90%	80%	88%	72%	78%	67%	95%	84%	95%	76%	84%	53%

Table 3.1. Proportion of parents and children who could and did use HOT in a narrative (overall, past/habitual, and future) context at each time point.

These findings suggest that while the majority of parents at every time point could incorporate HOT into their narrative speech, early in development (from 14-22 months) only around 50% of them did so. Starting after 26 months, more than 70% of parents did use HOT in a narrative context. For children, it is only after 30 months that more than 50% of children used both HOT and narrative independently in the same session, and thus could use them together. However, it is not until 46 months that more than 50% of them actually do so. Similar patterns for both parents and children are observed when specifying narratives that refer to past or habitual events.

Incorporating HOT into future narratives seems to be a more difficult task. Even at the end of the study period, only about 70% of parents actually did incorporate HOT into their future narrative speech. For children, it is only at the last session (50 months) that more than 50% of them actually did use HOT in a future narrative. Together, these findings suggest that as children

develop, parents and children are increasingly likely to incorporate HOT into their narrative speech, but that far fewer incorporate HOT into their future narrative speech.

Onset of HOT in Narrative Speech. Next, I explored the average age that children first incorporate HOT into their narrative speech, using the same criteria established in Chapter 2 (at least one utterance two sessions in a row). Onsets were calculated for use of HOT in narrative utterances overall, as well as for HOT use in past/habitual narrative utterances, HOT use in future narrative utterances, and inferences and comparisons into narrative utterances overall. Table 3.2 below summarizes the findings.

	HOT in Narrative Overall	**HOT in Past/Habit. Narrative**	**HOT in Future Narrative.**	**Inference in Narrative Overall**	**Comparison in Narrative Overall**
Not Enough Data	6	6	6	6	7
No Onset	8	15	25	8	30
Never Used	1	1	4	2	11
Measurable Onset (*N*)	49	42	29	48	16
Average Age in Mos (*SD*)	40.4 (7.3)	40.6 (6.8)	43.9 (7.6)	42.1 (6.9)	47.5 (5.2)
Range	22-54 mos	26-54 mos	22-54 mos	22-54 mos	34-54 mos

Table 3.2. Age of onset of HOT into narrative speech.

This table shows that 6-7 children at each time point did not have sufficient data for us to be able to establish their age of onset ("not enough data"), due to missing sessions or dropping out of the study early. Furthermore, many children did have sufficient data for us to establish their age of onset, but did not have an onset during the study period ("no onset"). This is particularly true for use of HOT in future narratives (n = 25), and for comparisons in narrative overall (n = 30). This is known as *censoring*, where the value of interest occurs outside the range of the study. It is likely that many of these children will have an onset of this type of speech later in development, but because we only observe them between 14-58 months, for some children their age of onset is outside the study period.

In addition, there were some participants who never used HOT in narrative overall or past/habitual narratives at all (n = 1), as well as a few who never used HOT in future narratives (n = 4). Only two children did not use inference in a narrative context at all during the 12 sessions, suggesting narrative speech may be a rich place where children begin to invoke inferences. However, 11 children never used a comparison in a narrative context, providing some evidence for the idea children may rely more on the present context to be able to use comparisons.

The remaining children did have measurable onsets (ranging from 49 children with onsets for using HOT in narrative, to 16 children with onsets for using comparison in narrative). I explored demographic factors (gender, income, primary caregiver education, SES, race, and first-born status) that could explain why children fall into one of the four categories (Not Enough Data, No Onset, Never Used, Measurable Onset) as well as comparing children with a Measurable Onset to those in the former three groups.

When comparing the 4 groups for incorporating HOT overall into narrative overall, I found marginal SES differences, $F(3,60) = 2.25$, $p < .10$, such that children with measurable onsets had higher SES-levels than children in the other three groups. When comparing two groups (e.g. collapsing together the three groups who do not have measurable onsets, and comparing them to those with a measurable onset), this SES difference was also significant, $t(63) = -2.41$, $p < .05$. Children with measurable onsets of incorporating HOT into narrative speech tend to have higher-SES levels than those without. No other demographic factors were significant in explaining children's likelihood of having an onset of HOT into narrative speech (for any of the other types of onset).

Among the children who do have measurable onsets, average age of onset of HOT in narrative is around 40 months. Children begin incorporating HOTs into their past/habitual speech at first, which also has an average age of onset of around 40 months. It is not until approximately 4 months later (44 months) that children begin to invoke HOT in their future narratives regularly. Interestingly, the length of this gap is the same as the gap between the onset of past/habitual narrative speech (27 months) and future narrative speech (31 months), suggesting for both types of narrative, children may initially only relay simple utterances in these contexts, before beginning to incorporate HOT.

As far as type goes, average age of onset of incorporating inferences into narrative speech overall is 42 months. Muzard Costa (2017) reported that children begin invoking inferences into their overall speech around 32 months, suggesting there may be periods in development where children begin using narrative speech (around 26-30 months, as established in Chapter 2) and then begin using inferences (around 32 months), but it is not until around 42 months that children incorporate inference into their narrative speech more regularly.

Only 16 children had a measurable onset for incorporation of comparisons into narrative speech, and the average age at which this happened was around 48 months. This again highlights the difficulty children may have with using comparisons in a decontextualized speech context such as narrative. Muzard Costa (2017) reported comparison onset to be around 34 months, again suggesting that children must first learn to use these two types of speech independently before being able to invoke a comparison in a narrative context.

Timing with Narrative and HOT Onsets. In this section, I will discuss different trajectories regarding when children begin incorporating HOT into their narrative speech. Chapter 2 already established several different trajectories children could take when acquiring

HOT and narrative speech independently. They could be acquired simultaneously (n = 16); HOT could be acquired first, then narrative (n = 15); or narrative could be acquired first, then HOT (n = 29) (see Table 2.6 in Chapter 2). Next, I consider the timing of when children could also begin incorporating HOT speech into their narrative utterances. Table 3.3 below illustrates the 6 different orders children could take in their acquisition or HOT, narrative and HOT into narrative speech (as well as the number of children who follow each trajectory). For example, in the first order, all three are acquired in the same visit; in the second order, HOT and Narrative are acquired in the same visit, with HOT in Narrative coming later. This table includes only the 43 children with measurable HOT, Narrative, and HOT in Narrative onsets.

Order	HOT Onset	Narrative Onset	HOT in Narrative Onset	# of children	%
1	Simultaneous	Simultaneous	Simultaneous	0	0%
2	Simultaneous	Simultaneous	Later	10	23%
3	Second	First	Second	5	12%
4	First	Second	Second	2	5%
5	Second	First	Third	19	44%
6	First	Second	Third	7	16%

Table 3.3. Different orders of acquisition of HOT, narrative, and HOT in narrative speech.

Among the 43 children with measurable HOT, Narrative, and HOT in Narrative onsets, almost 44% of them acquire them in three separate sessions, with narrative occurring first, followed by HOT, then HOT into narrative. The second most common order (23%) is where children have the same visit for their HOT and narrative onset, and only then in a later visit are children able to use HOT in a narrative context. Another order followed by 12% of children was to acquire narrative first, and then in a later session acquire HOT and also be able to incorporate HOT into their narrative speech. It was rarer for children to acquire HOT first, then use narrative and HOT in narrative (5%) or acquire HOT, then narrative, then HOT in narrative (16%).

These patterns suggest most children first require the ability to use narrative speech independent of HOT, and only then are they able to incorporate HOT into their narrative speech. Fairly rarely does HOT emerge first, suggesting children must first invoke and grapple with decontextualized speech such as narrative before using HOT speech.

When examining whether any demographic predictors (gender, income, parental education, SES, race, first-born status) were related to belongingness to any of these acquisition orders, the only significant association was between parental education and order, $F(4,38) = 3.08$, $p < .05$. Children of parents with higher education tend to acquire narrative first (orders three and five). (This is also supported by a t-test, where children were divided into those that acquired narrative first ($n = 24$) and those that did not ($n = 19$), $t(41) = -3.33$, $p < .01$.) However, follow-up comparisons among the different orders with Bonferroni adjustment for multiple comparisons do not reveal any significant differences in acquisition order due to parental education level (all p's > 0.17).

Predictors of HOT in Narrative Onset. Next, I explored whether demographic factors (child gender, child race, child first-born or only status, family income, primary caregiver education, SES) could explain some of the variation in age of onset of using higher-order thinking in narrative speech. As shown earlier, there are SES differences associated with overall frequency of use as well as onset of narrative; do demographic characteristics also relate to when children regularly begin using HOT in narrative?

When examining age of onset of HOT into narrative speech, I found family income was marginally negatively related to age of onset ($r = -0.26$, $p < .10$), such that children from families with higher incomes had earlier onset ages. There were also racial differences, $F(3,45) = 3.49$, $p < .05$, such that White children ($M = 38.0$, $SD = 7.3$) and children from mixed/other races ($M =$

39.3, *SD* = 6.1) had earlier onset ages than either Black (*M* = 44.0, *SD* = 6.6) or Hispanic (*M* = 45.4, *SD* = 4.3). This is unsurprising, given differences observed due to child race in overall age of narrative onset. However, follow-up comparisons with Bonferroni adjustment revealed only marginal differences between White and Hispanic children ($p < 0.10$). These same patterns also emerge for onset of HOT in past/habitual narratives. Gender, first-born status, and primary caregiver education level did not relate to onset of HOT in narrative speech (p's > 0.13).

A multiple regression model with age of onset of HOT into narrative speech as the outcome, and SES, race (with White as the reference category), gender, and child first-born or only status as predictors was only marginally significant at predicting age of onset, $F(6,42) = 2.00$, $p < .10$, $R^2 = 22.2\%$. In this model, the dummies for Black ($\beta = 5.28$, $SE = 2.60$, $p < .05$) and Hispanic ($\beta = 7.51$, $SE = 2.93$, $p < .05$) were both significant, suggesting that even when controlling for SES, Black and Hispanic children begin incorporating HOT into narrative speech approximately 5-7 months later than their White peers. Similar conclusions were reached when examining predictors of HOT into past/habitual speech.

Because future narrative speech is so challenging, it's possible that different predictors may explain when children begin using HOT in future narratives. Among the 29 participants (13 girls, 16 boys) with measurable HOT in narrative onset ages, there were marginal effects of gender, such that girls (*M* = 41.4, *SD* = 5.4) have slightly earlier onsets than boys (*M* = 46.0, *SD* = 8.6), $t(27) = 1.68$, $p = .105$. This is consistent with the hypothesis that girls receive richer narrative input from their parents, resulting in earlier use of HOT in future narrative contexts

In addition, there were also significant effects of race/ethnicity[4], $F(2,25) = 3.96$, $p < .05$, such that Whites ($M = 41.1$, $SD = 7.4$) had earlier onsets than either Blacks ($M = 46.6$, $SD = 7.1$) or Hispanics ($M = 51.0$, $SD = 3.8$). Follow-up comparisons with Bonferroni adjustment revealed that only Whites and Hispanics marginally differed from each other, $p < .10$. Maternal education, family income, and child first-born or only status did not predict age of future narrative onset (p's > 0.33).

A multiple regression model with age of onset of HOT into future narrative speech as the outcome, and SES, gender, first-born or only status, child race as predictors was conducted was not statistically significant at predicting age of onset, $F(6,22) = 1.84$, $p = .13$, $R^2 = 33.4\%$, likely due to the small number of children with age of future narrative onsets. In this model, only the dummy for Hispanic was significant ($\beta = 11.2$, $SE = 4.14$, $p < .05$), suggesting that even when controlling for gender and SES, Hispanic children start incorporating HOT into their future narrative speech approximately 10 months later than their White peers.

No demographic factors were significant at predicting age of onset of inferences or comparisons into narrative speech (all p's > .11).

3.2. Use of HOT in Narrative

The above findings suggest that increasingly more parents and children incorporate HOT into their narrative speech, especially their past/habitual narrative speech, over early development. In addition, major predictors of a child's age of HOT into narrative onset include gender, SES, and race.

Next, I will examine not just whether an individual engaged in this kind of speech or not,

[4] One child of mixed/other race was excluded from this analysis because he was the only child with a measurable onset in this racial/ethnic category.

but how often these types of utterances occurred. To explore the frequency with which parents and children incorporate HOT into their narrative speech, I employed two analytic approaches: the first examines the percentage of narrative and non-narrative speech containing HOT, and the second compares each individual's expected versus observed occurrence of HOT into narrative speech.

(1) Percentage of Narrative and Non-Narrative Speech Containing HOT

First, I compared the percentage of narrative and non-narrative utterances that contains higher-order thinking[5]. Figure 3.1 (for parents) and Figure 3.2 (for children) summarize the findings. In these figures, the proportion of non-narrative speech containing HOT is very similar to the HOT growth trajectory shown in Figures 2.6 and 2.7, because the majority of speech is non-narrative (as shown in Figures 2.2 and 2.3). For parents, a greater proportion of narrative speech contains HOT than non-narrative speech, and this pattern holds from 14-58 months. At 30 months, for example, around 3.4% of parents' non-narrative speech contains HOT, while 9.8% of their narrative speech contains HOT. For children, this same pattern—of narrative speech containing more HOT than non-narrative speech—emerges starting at 38 months.

[5] All figures in this chapter contain all participants who used narrative—e.g. even if a person used 0 HOTs in narrative speech, their percentage of narrative speech containing HOT would be 0%. If a person did not use narrative, they are excluded from the figures.

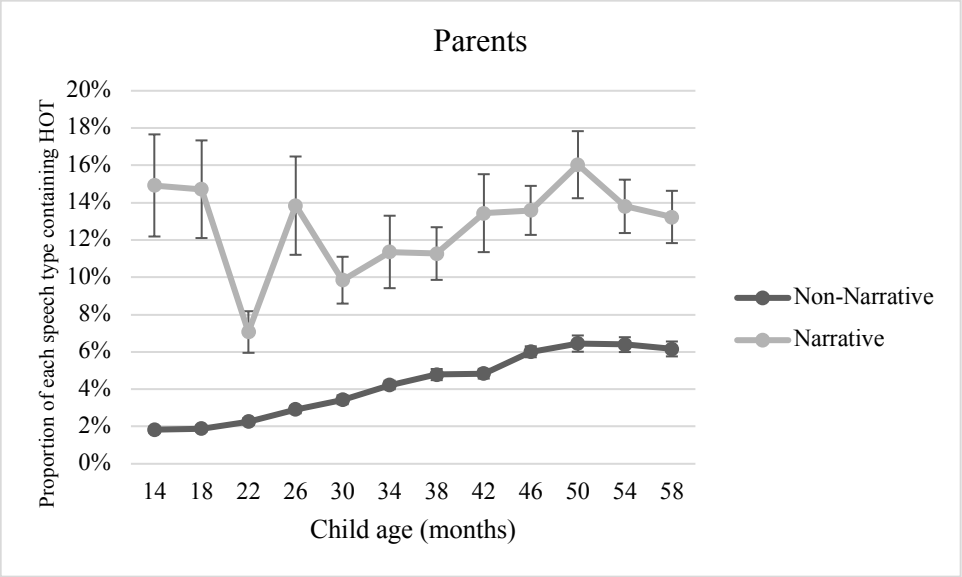

Figure 3.1. Proportion of parents' narrative and non-narrative speech containing HOT.

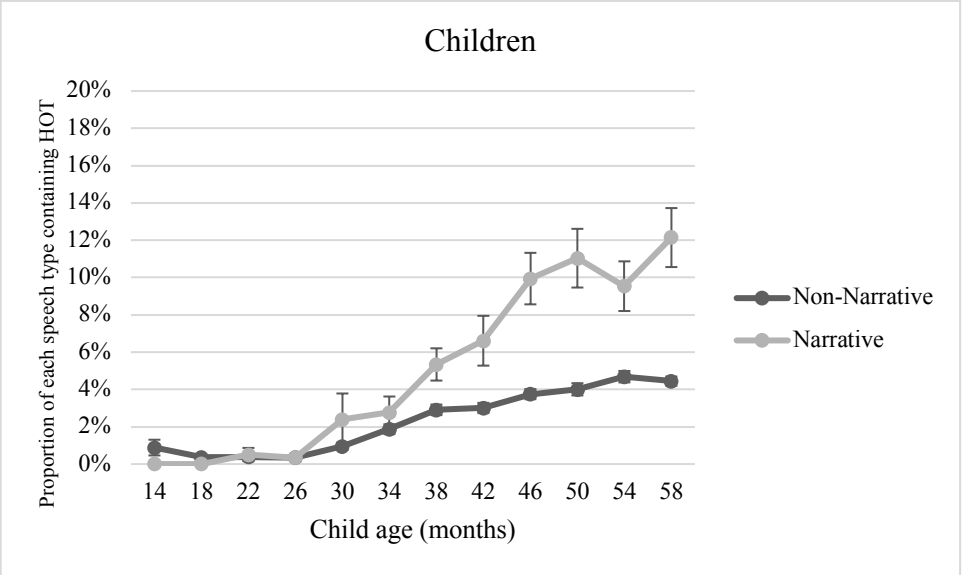

Figure 3.2. Proportion of children's narrative and non-narrative speech containing HOT.[6]

I had originally predicted these patterns—that incorporation of HOT into narrative—would grow more extreme over time, as parents and children use the more complex HOT and narrative speech more frequently. However, these figures show that across development and in

[6] For two children at 26 months, all of their narrative speech contained HOT, so their values were 100%. Because these children are outliers and greatly skewed the results, they have been removed from the figures, as was another child who used HOT in 33% of his narrative speech at 26 months.

general, between 10-15% of parents' narrative speech contains a HOT relationship. For children, however, the pattern is growing more extreme over time, such that they appear much more like their parents at the end of the study period; around 5% of non-narrative speech contains HOT, compared to around 12% of narrative speech.

(2) Expected versus Observed Occurrence of HOT with Narrative

The above findings suggest that HOT makes up a greater proportion of narrative speech than it does non-narrative speech. I employed a second approach to further explore the incorporation of HOT into narrative speech. In this approach, I calculate each individual's 'expected' occurrence of HOT in narrative and compare it to their 'observed' occurrence. This approach adds to the above analyses by accounting for individual differences in people's natural rates of HOT usage.

I calculate the 'expected' values by multiplying, for each individual, their base rates for narrative speech by their base rate for HOT speech. For example, at 38 months, one parent used narrative in 14.7% of her speech (so 85.3% of her speech is non-narrative). This parent also used HOT in 8.6% of her speech (so 91.4% of her speech is non-HOT). Multiplying these values together (14.7% * 8.6%) is the expected percentage of all utterances that is HOT and narrative occurring together. Therefore, if HOT was unrelated to narrative, and only appeared in the same utterance by chance, as a result of people's natural usage of HOT, we would expect a little more than one percent (1.26%) of this parent's speech to consist of HOT in narrative utterances. This parent spoke 546 utterances per hour, meaning we would expect about 7 of her utterances per hour to display a HOT relationship in a narrative context. These numbers might seem small, but given that HOT and narrative occur relatively infrequently in parents' and children's speech, it's unsurprising that the number of co-occurrence utterances would be fairly small.

Next, I calculate the observed occurrence rate of HOT into narrative, by dividing total number HOT in narrative utterances by total number of utterances. This sample parent actually used 15 HOT in narrative utterances per hour, meaning these utterances accounted for 2.74% of her total speech. This is more than twice the value predicted by chance. I performed these same calculations on all parents and children at all time points; values pertaining to percent can be seen in Figure 3.3 (Parents) and Figure 3.4 (Children), and values pertaining to overall number of utterances can be seen in Figure 3.5 (Parents) and Figure 3.6 (Children).

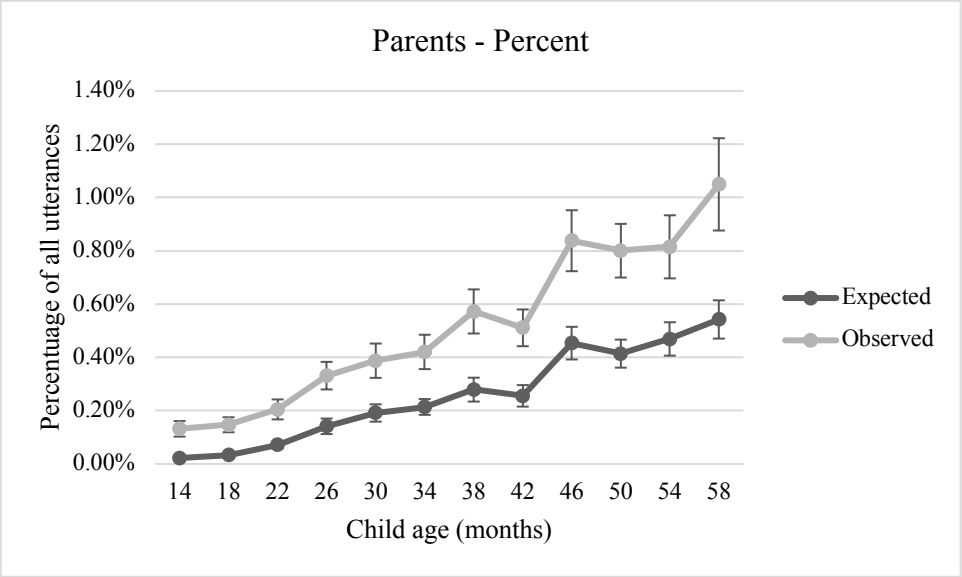

Figure 3.3. Expected and observed percentage of parents' speech containing HOT in narrative utterances.

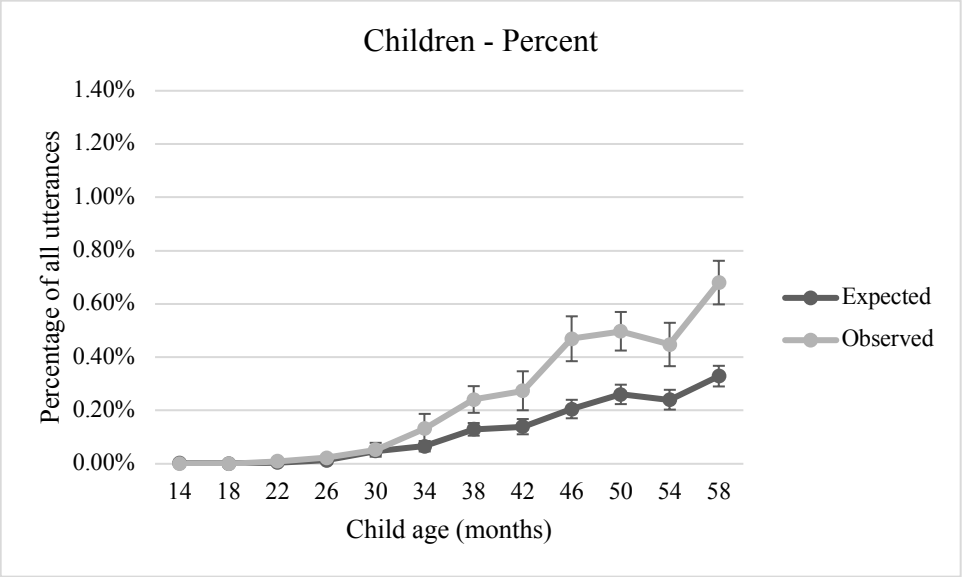

Figure 3.4. Expected and observed percentage of children's speech containing HOT in narrative utterances.

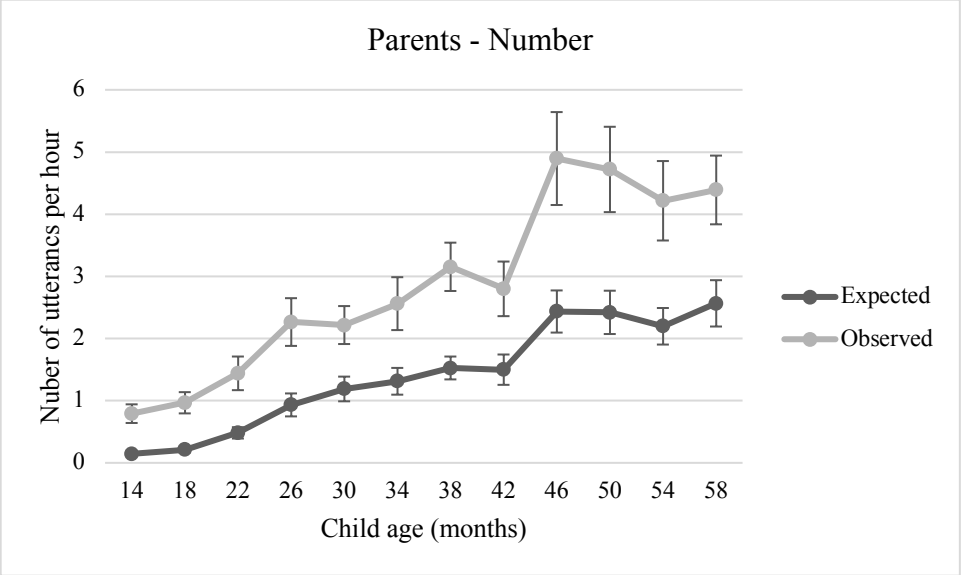

Figure 3.5. Expected and observed number of parent HOT utterances appearing in narrative contexts per hour.

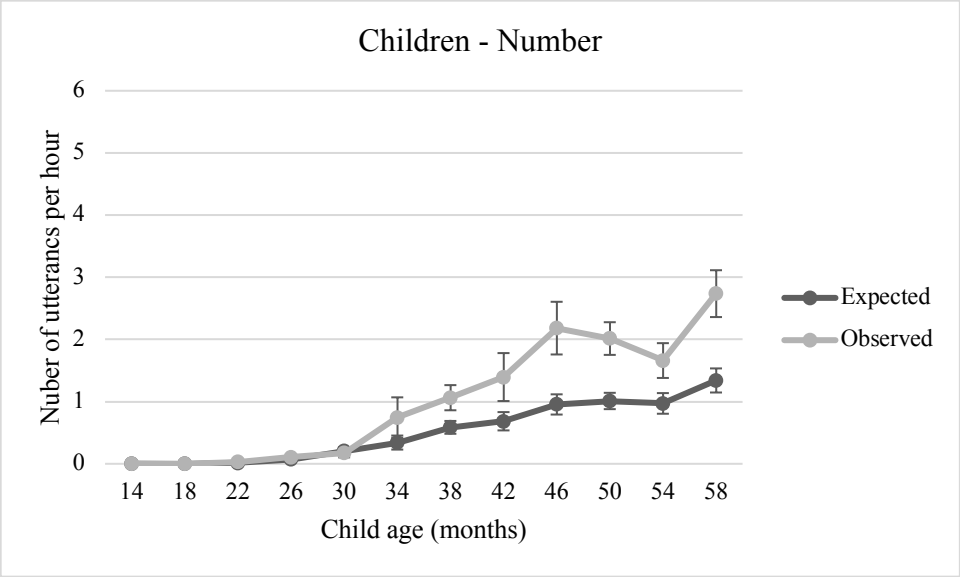

Figure 3.6. Expected and observed number of child HOT utterances appearing in narrative contexts per hour.

As the figures show, the same pattern for this sample parent generally holds for parents in the rest of the corpus, as well as for children's speech starting at 38 months. On average, HOT and narrative appear together in the same utterance at a much greater frequency than expected by chance. However, these figures also suggest that these types of rich utterances—instances of higher-order thinking appearing in a decontextualized narrative context—happen very rarely in spontaneous speech, averaging in parents' speech from around 1 utterance per hour at 14-18 months to 5 utterances per hour from 46-58 months. For children, they tend to use around 1 HOT utterance in a narrative context utterance per hour starting around 34 months, and by the end of the study period they are using 3 of these kinds of utterances per hour.

While these numbers may seem small, it bears mentioning that a child's early experience is made of many of these small moments, and they accumulate over time. Parents and children may interact together in the kinds of ways captured on the video perhaps 8 hours per day on weekdays (assuming 8 hours of sleeping and 8 hours of daycare/school per day) and 12 hours per day on weekends, totaling around 64 hours per week. Even if a child only heard 1 instance of

HOT in a narrative context per hour from 34 to 58 months, then within that 24-month period, they would have heard 6,656 such utterances from their caregiver. If a child heard 5 instances of such talk per hour, within that same 24-month period they would have heard 33,280 such utterances. In other words, these small instances accrue over time.

3.3. Use of HOT in Past/Habitual and Future Narrative

Next, I explored whether these same overall patterns held when examining past/habitual and future narrative utterances. As stated above, past/habitual and future narratives may afford the use of HOT differently; past/habitual narrative may be privileged in HOT use due to its more story-driven nature and saliency, and future narrative may be privileged in HOT use due to being even further removed from the present context, as well as its use of the irrealis mood, which could result in more hypotheses, predictions, and conditionals.

Here, I am only showing the figures from the first analytical approach (proportion of past/habitual and future narratives containing HOT). Figures from the second analytical approach (comparison of expected and observed values) are in Appendix B.

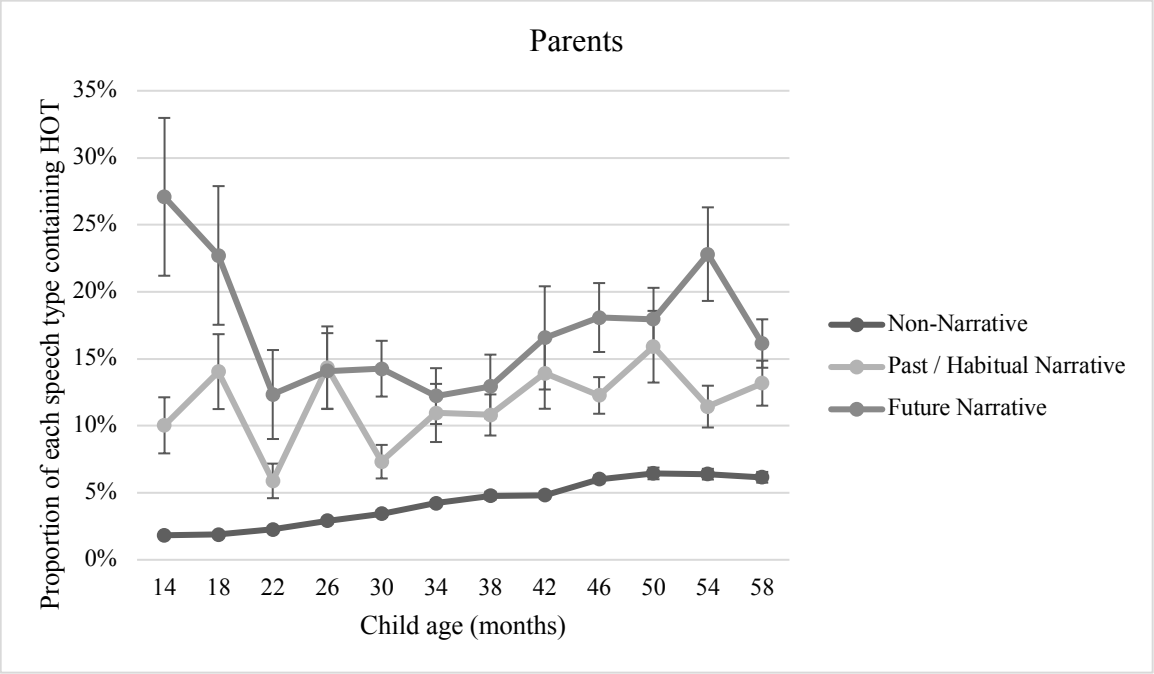

Figure 3.7. Proportion of parents' non-narrative, past/habitual, and future narrative speech that contains HOT.

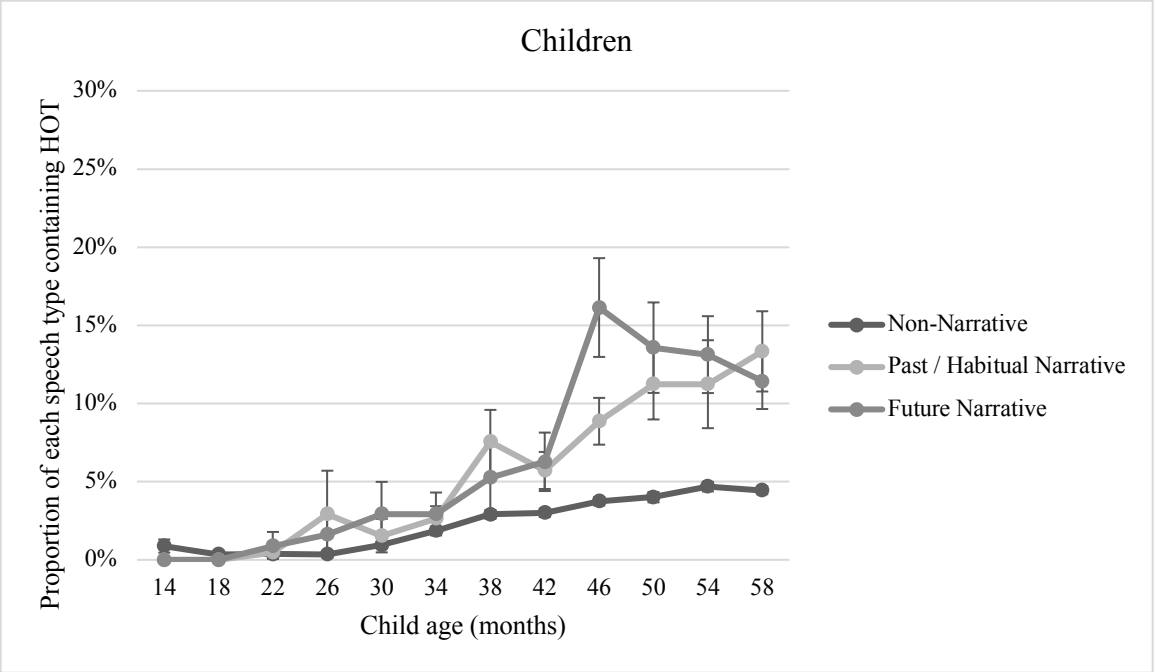

Figure 3.8. Proportion of children's non-narrative, past/habitual, and future narrative speech that contains HOT.

The figures above show that for parents (Figure 3.7), the line for future tends to lie above the line for past. At six sessions (14-, 18-, 22-, 30-, 46-, and 54- months), future narratives may

contain more HOTs than narratives referring to past or habitual events. Past and future narrative utterances contain around the same percentages of HOT at the remaining time points. The figures in Appendix B nevertheless suggest that for all time points, parents are on average incorporating more HOTs into both their past/habitual and future narrative speech than expected by chance, and this pattern holds for all time points (these same patterns hold both when examining the percentage of all utterances that are HOT in past or in future narrative, as well as the total number of utterances in these categories). There is thus mixed evidence for the notion that past and future narratives differentially encourage the use of HOT, though it points to a slight advantage for future narrative speech.

For children, as seen in Figure 3.8, future narratives contain more HOTs than past only at 46 months. At the other time points, the rate of HOT use in past narratives is similar to the rate in HOT use in future narratives. The figures in Appendix B suggest that for children, they only being incorporating more HOTs into past narrative speech at rates greater than expected by chance at 38 months; for future narratives, it is not until 46 months that they use more HOTs in future narrative speech than expected by chance (this interpretation applies when considering both percentage of speech as well as number of utterances). There is not strong evidence that children use more HOT in future compared to past/habitual narratives.

Individuals may incorporate more HOTs into their future narrative speech because they use irrealis moods, including speculation and conditionals (e.g. “If it’s not raining this afternoon, we can go to the park”). These patterns suggest that while parents may use this kind of language frequently, to the point that they occasionally use more HOTs in future than past/habitual narratives, children find it much more challenging; in general, they do not differentially

incorporate HOT into their narrative speech based on when the events took place (and might find it more challenging than their parents do at incorporating HOT into future narrative speech).

3.4. Use of Different HOT Types in Narrative

Finally, I explored whether different types of HOT (Inference and Comparison) are used differentially in narrative speech compared to non-narrative speech. Inferences may be used in narrative speech more frequently due to its story-driven nature, as well as the use of hypotheticals and conditionals in future narratives. Comparison usage may vary by speech context, if individuals incorporate comparisons as similes, or if they draw contrasts between something in the current context and something in a past or future context. Using comparisons in decontextualized speech like narrative might be more challenging for young children, who might rely more on the current context to scaffold their comparison usage.

Users of Inferences and Comparisons in Narrative. First, I will discuss the proportion of each parent and children sample that could and did use inference or comparison in narrative over development (findings are summarized in Table 3.4 below). Individuals that 'could' incorporate an inference into a narrative are those who used narrative and inference together in the same session, at least independently.

Child Age (mos)	Parents				Children			
	Inference in Narrative		Comparison in Narrative		Inference in Narrative		Comparison in Narrative	
	Could Use	Did Use	Could Use	Did Use	Could Use	Did Use	Could Use	Did Use
14	83%	41%	73%	20%	0%	0%	0%	0%
18	90%	49%	76%	25%	2%	0%	0%	0%
22	92%	47%	87%	27%	10%	5%	2%	0%
26	92%	61%	87%	43%	23%	10%	20%	3%
30	93%	69%	85%	34%	48%	18%	39%	3%
34	95%	66%	90%	45%	73%	46%	52%	8%
38	98%	80%	97%	54%	89%	45%	85%	13%
42	92%	77%	87%	45%	85%	58%	75%	15%
46	93%	78%	86%	57%	88%	71%	81%	25%
50	91%	84%	91%	57%	95%	71%	92%	34%
54	93%	80%	89%	56%	93%	63%	88%	31%
58	90%	74%	81%	57%	95%	78%	93%	43%

Table 3.4. Proportion of parents and children at each session who could and did incorporate inferences and comparisons into narrative contexts.

For parents, the majority (more than 80%) could use an inference in a narrative context even when children are 14 months old, although at this age, only 41% of parents did so. Increasingly more parents actually do use an inference in a narrative context over the child's development, such that by the end of the study period around 80% do so at each session. While those who could use comparisons looks similar (more than 70%), even at the end of the study, still fewer than 60% actually do so. Narrative may not invite itself to comparison usage as it does for inference. Children reflect these same patterns; most of them can and do use inferences in narrative, and while most of them can use comparisons in narrative, at most, 43% of children at 58 months actually do so.

Frequency of Inference and Comparison in Narrative. Next, I will explore rates of usage of inference and comparison in narrative. The following figures again only utilize the first analytical approach (through refer to Appendix B for figures using the second analytical approach, as well as Table B.1, which has standard deviations and ranges of usage for all four

HOT types in narrative). In these figures, children appear in grey and parents appear in black; narrative usage is the solid line and non-narrative usage is the dashed line.

(1) Inference. When examining parents' and children's usage of inferences in narrative and non-narrative contexts (Figure 3.9 below), we see that usage of inferences in non-narrative contexts (the dashed lines) increase over development, such that both parents and children are incorporating more inferences into their non-narrative spontaneous speech by 58 months. In addition, parents use more inferences in narrative contexts compared to non-narrative contexts, and this pattern holds across development. (In addition, Figures B.5 and B.6 in Appendix B show that for parents at all time points, they use more inferences in narrative speech than expected by chance for every time point from 14- to 58-months). For example, at 22 months, around 5% of parents' narrative speech contains inferences, compared to less than 2% of their non-narrative speech.

For children, they use inferences very infrequently early in development (from 14- to 26 months) in both narrative and non-narrative contexts. Starting at 30 months, usage of inferences starts to increase, and by 38 months, children's narrative utterances contain more inferences than their non-narrative utterances (also at this time point do children begin using more inferences in their narrative speech than expected by chance; see Figures B.5 and B.6 in Appendix B). By the end of the study period (58 months), around 9% of both parents' and children's narrative speech contains inferences, compared to less than 5% of their non-narrative speech.

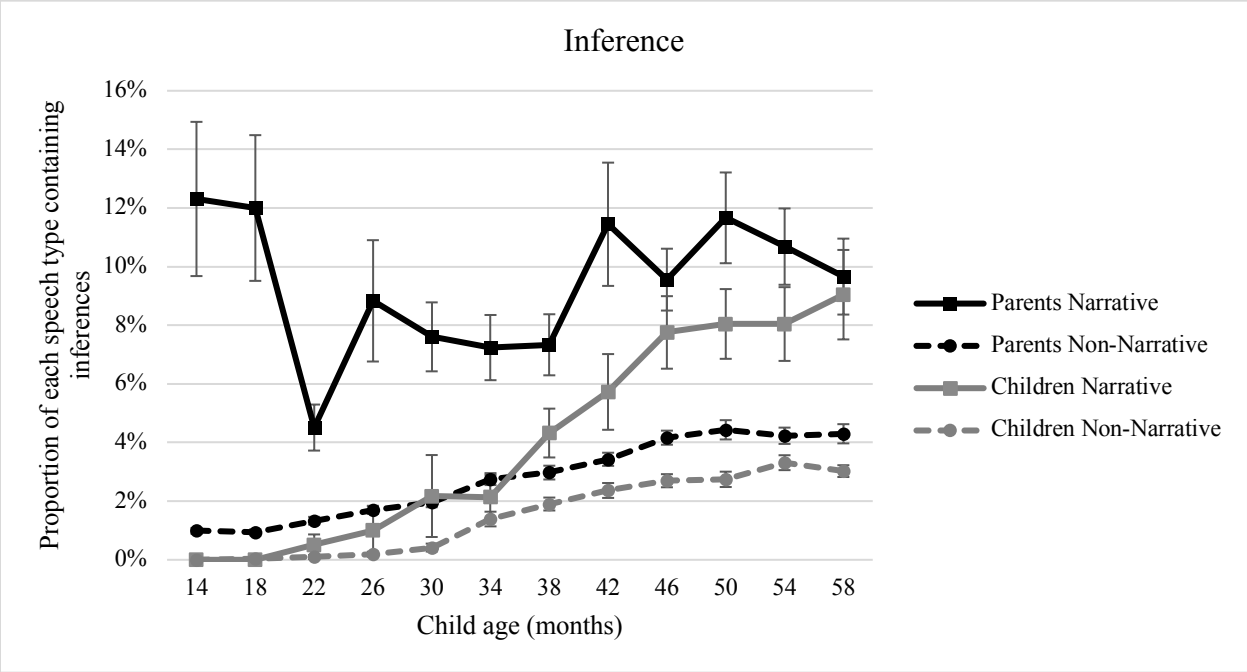

Figure 3.9. Average proportion of parents' (black) and children's (grey) non-narrative (dashed) and narrative (solid) speech that contains inferences.

(2) Comparison. When examining comparisons, Figure 3.10 below shows that similar to inferences, usage of comparisons increases over development, in both narrative and non-narrative contexts. Parents (in black) use more comparisons in their narrative compared to their non-narrative speech from 14- to 58 months (and they also use more comparisons in narrative speech than expected by chance; see Figures B.7 and B.8 in the Appendix). For example, for parents at 42 months, around 3% of parents' narrative speech contains inferences, compared to around 1% of their non-narrative speech.

For children (in grey), comparison usage largely does not vary by speech context, except perhaps at 50 months (similar conclusions are reached when examining the expected co-occurrence of comparison with narrative speech; see Figures B.7 and B.8 in Appendix B). This could highlight the fact that for very young children, who rely more on the concrete and physical world, it might be more necessary to be able to see the things being compared. Prior research on math instruction does suggest that visibility of things being compared can support learning and

schema foundation (Begolli & Richland, 2016). Thus, it might be more conceptually challenging for children to draw comparisons in decontextualized speech such as narrative.

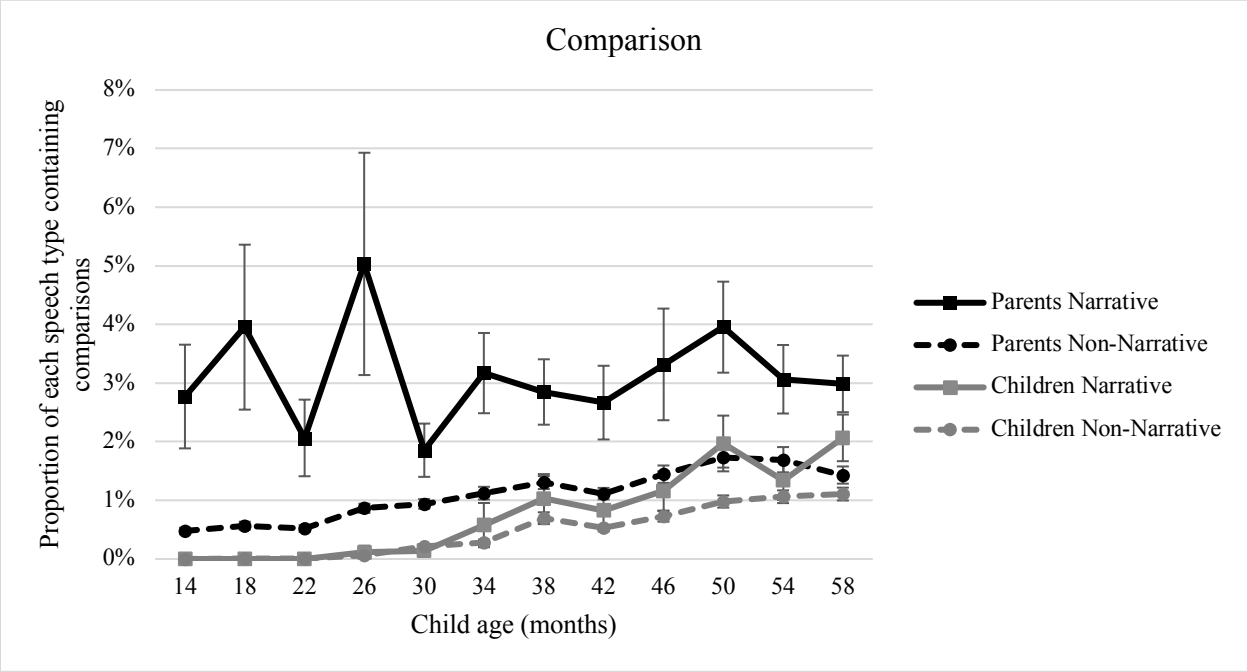

Figure 3.10. Average proportion of parents' (black) and children's (grey) non-narrative (dashed) and narrative (solid) speech that contains comparisons.

3.5. Predictors of HOT in Narrative Use

Next, I employed Hierarchical Linear Models (as explained in Chapter 2) to explore whether parents' or children's usage of HOT in narrative over development could be explained by SES, child gender, or child first- or only status. As before, pairs of successive visits were averaged to reduce noise. Number of parent and child HOT in narrative utterances at each timepoint is modeled as a poisson outcome. Individuals missing 5 or more sessions (n = 5) were excluded, resulting in a final sample of 59 parents and children. I used 14-58 months to describe growth trajectories for parents (with age centered at 36 months), and 30-58 months for children (with age centered at 44 months), due to the low frequency with which narrative and HOT in narrative utterances occurred prior to 30 months.

First, I examined empirical plots of HOT in narrative usage over development, presented in Figures 3.11 (Parents) and 3.12 (Children).

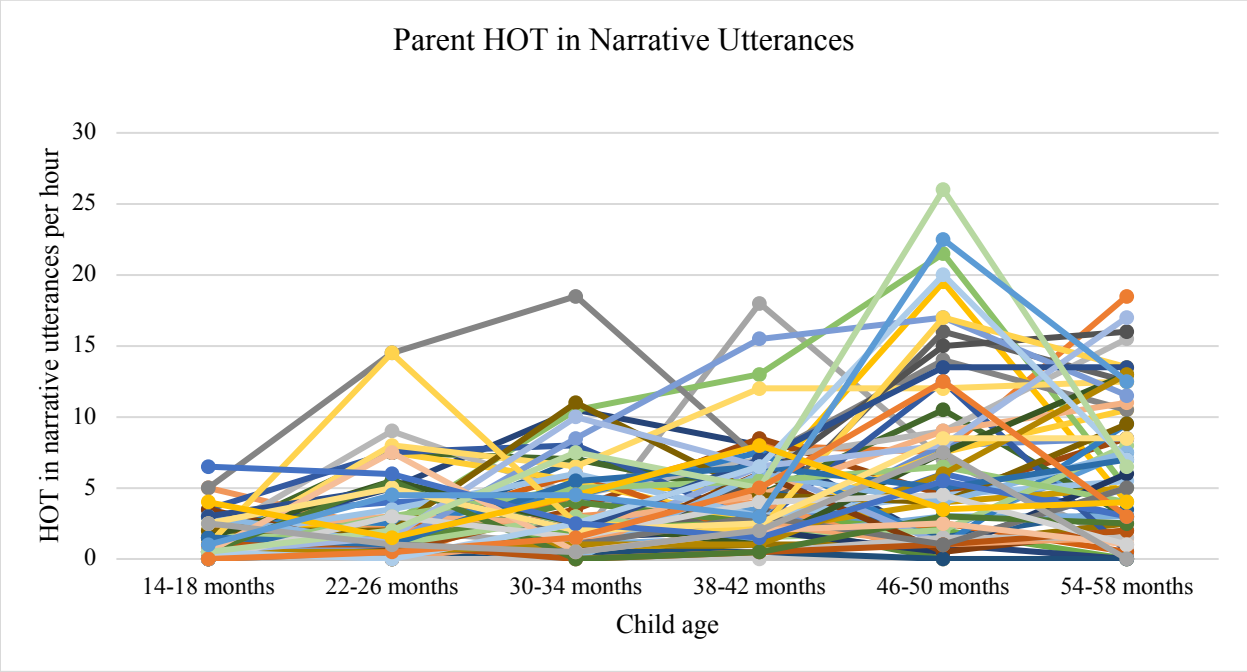

Figure 3.11. Spaghetti plots for parents' usage of HOT in narrative utterances over 14-58 months, with pairs of sessions averaged together.

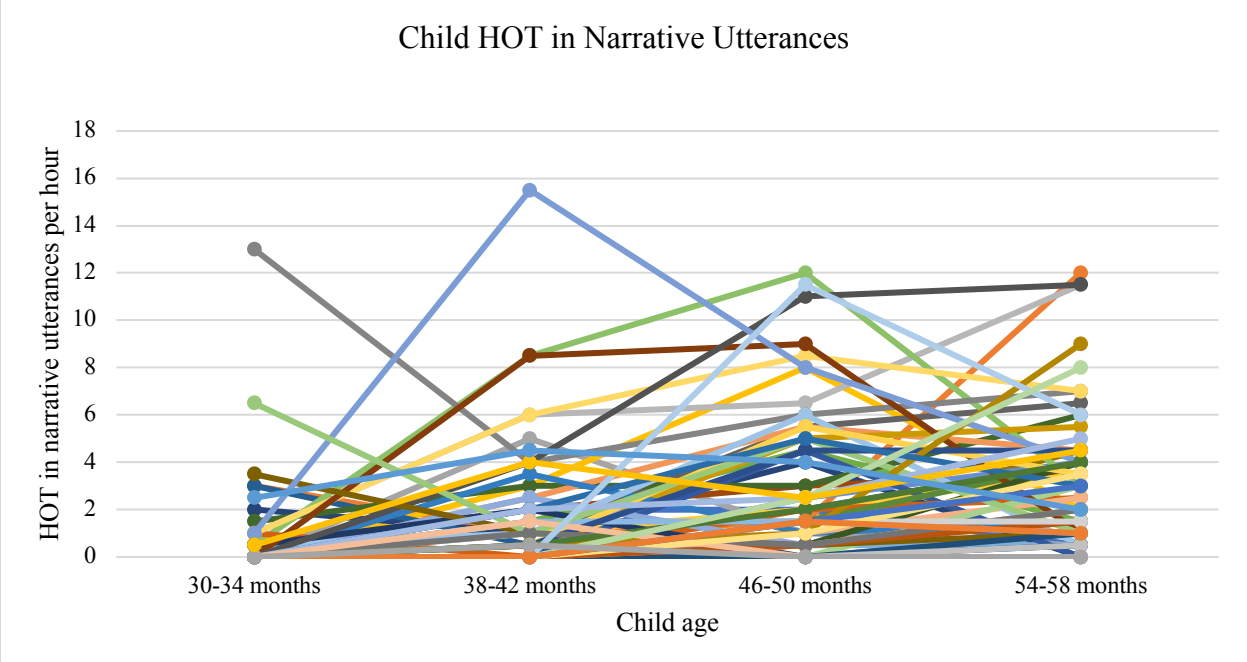

Figure 3.12. Spaghetti plots for children's usage of HOT in narrative utterances over 30-58 months, with pairs of sessions averaged together.

These figures suggest there is significant variability in the rates of usage, both within individuals as well as over time. For both parents and children, I fit a quadratic model, in line with the analyses presented in Chapter 2; while both the linear and quadratic models had similar goodness-of-fit ratios, parents and children do not maintain systematic linear growth rates over development. However, the reliability estimates for the random level 1 coefficients for the quadratic age term were poorer than the estimates for parent and child narrative utterances, likely due to the highly variable nature of HOT in narrative speech.

The simplified unconditional growth model for both parents and children is presented below (which is the same as the one presented in Chapter 2).

Level 1 Model

$E(Y_{ti}|\pi_{it}) = \lambda_{ti}*sesslength_{ti}$

$\log[\lambda_{ti}] = \eta_{ti}$

$\eta_{ti} = \pi_{0i} + \pi_{1i}*(agecentered_{ti}) + \pi_{2i}*(agecenteredsquared_{ti})$

Level 2 Model

$\pi_{0i} = \beta_{00} + r_{0i}$

$\pi_{1i} = \beta_{10} + r_{1i}$

$\pi_{2i} = \beta_{20} + r_{2i}$

Combined Model

$\eta_{ti} = \beta_{00} + r_{0i} + \beta_{10}*(agecentered_{ti}) + r_{1i}*(agecentered_{ti}) + \beta_{20}*(agecenteredsquared_{ti}) + r_{2i}*(agecenteredsquared_{ti})$

The outcome (Y) is the number HOT in narrative utterances for individual i at time t. At level 1, the intercept (π_0), slope (π_1), and acceleration (π_2) all allowed to vary by individual i

Child HOT in Narrative Utterances. The model presented in Table 3.5 is the unconditional model for children's HOT in narrative utterances. I report fixed effects with robust standard errors (as I do for all the models presented in this section). The results from the hypothesis tests for the fixed effects suggest that for children, intercept, growth, and acceleration rates are all necessary for describing children's growth trajectories (though to a lesser extent the

intercept). Additionally, the chi-squared statistic from the random effects suggest there is significant variability among children in their average rates of usage at 44 months, as well as their growth and acceleration rates. Finally, the reliability of the OLS regression coefficient estimates suggests that while these coefficients are not as reliable as describing narrative usage, there is still significant signal in these data in terms of describing individual differences. On average, children at 44 months are predicted to use 1.3 HOT in narrative utterances per hour.

		Coefficient	se	*t*-ratio	*d.f.*	*p*-value
Fixed Effects	Intercept (β_{00})	0.24	0.14	1.75	58	0.086
	Growth (β_{10})	0.09	0.01	7.68	58	<0.001
	Acceleration (β_{20})	-0.004	0.001	-3.70	58	<0.001
		Variance Component	*d.f.*	χ^2	*p*-value	
Random Effects	Intercept (r_{0i})	0.898	58	389.81	<0.001	
	Growth (r_{1i})	0.058	58	120.41	<0.001	
	Acceleration (r_{2i})	0.006	58	90.16	0.005	
Reliability of OLS Regression Coefficient Estimate	Intercept (π_0)	0.684				
	Growth (π_1)	0.444				
	Acceleration (π_2)	0.389				

Table 3.5. Unconditional model for child HOT in narrative utterances.

For children, I next entered several level 2 variables into the model, and their fit in in explaining children's intercepts and slopes were evaluated. As above, the level 2 models I examined were SES, child gender, and child first-born or only status. The model presented in Table 3.6 presents the fixed effects from the model including only SES as a predictor. This table suggests that SES alone does not explain variation in children's average usage of HOT in narrative utterances, nor does it explain their rates of change.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	0.24	0.14	1.72	57	0.092
	SES (β_{01})	0.14	0.17	0.82	57	0.418
π_1	Growth (β_{10})	0.09	0.01	7.62	57	<0.001
	SES (β_{11})	-0.01	0.01	-1.28	57	0.207
π_2	Intercept (β_{20})	-0.004	0.001	-3.82	57	<0.001
	SES (β_{21})	0.0008	0.001	0.600	57	0.552

Table 3.6. Model for child HOT in narrative utterances with SES included.

Next, I added gender to the model, presented in Table 3.7. Neither SES nor gender predicts average usage, growth, or rates or change of children's usage of HOT in narrative.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	0.31	0.19	1.61	56	0.113
	SES (β_{01})	0.13	0.17	0.77	56	0.445
	Gender (β_{02})	-0.15	0.27	-0.56	56	0.580
π_1	Growth (β_{10})	0.07	0.02	4.55	56	<0.001
	SES (β_{11})	-0.01	0.01	-1.08	56	0.285
	Gender (β_{12})	0.03	0.02	1.51	56	0.137
π_2	Growth (β_{20})	-0.004	0.002	-2.63	56	0.011
	SES (β_{21})	0.0007	0.001	0.57	56	0.574
	Gender (β_{22})	-0.0008	0.002	-0.34	56	0.732

Table 3.7. Model for child HOT in narrative utterances with SES and gender included.

Finally, child status as the first- or only-born was added to the model, presented in Table 3.8. Unlike the previous model, in this model, first-born status is predictive of children's average usage ($p < 0.10$) as well as their rates of change ($p < 0.05$), such that children who are the first or only born use more HOT in narrative utterances, as well as increase in their rates of usage faster than other children. In addition, controlling for SES and first-born status, there are also gender differences in children's rates of change ($p < 0.05$), such that girls grow in their rates of HOT in narrative usage more quickly than boys. Both these findings are consistent with the ideas that 1) first-born children receive more individuated input from their parents, resulting in the usage of richer narrative speech, as well as 2) girls, who also produce more narrative utterances overall,

also grow more quickly in their rates of HOT in narrative usage over time, possible due to richer narrative input that they receive from their parents.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	-0.06	0.26	-0.25	55	0.806
	SES (β_{01})	0.13	0.17	0.76	55	0.452
	Gender (β_{02})	-0.03	0.25	-0.11	55	0.914
	First-Born (β_{03})	0.53	0.27	1.95	55	0.057
π_1	Growth (β_{10})	0.04	0.02	2.34	55	0.023
	SES (β_{11})	-0.01	0.01	-1.34	55	0.186
	Gender (β_{12})	0.04	0.02	2.11	55	0.039
	First-Born (β_{13})	0.04	0.02	2.04	55	0.046
π_2	Growth (β_{20})	-0.002	0.002	-0.96	55	0.340
	SES (β_{21})	0.0009	0.001	0.73	55	0.467
	Gender (β_{22})	-0.002	0.002	-0.71	55	0.482
	First-Born (β_{23})	-0.003	0.002	-1.40	55	0.166

Table 3.8. Model for child HOT in narrative utterances with SES, gender, and first-born status included.

The final model for children is presented below.

Level 1 Model

$$E(CHOTNARR_{ti}|\pi_i) = \lambda_{ti}*SESS\_HR_{ti}$$
$$\log[\lambda_{ti}] = \eta_{ti}$$
$$\eta_{ti} = \pi_{0i} + \pi_{1i}*(AGE44_{ti}) + \pi_{2i}*(SQAGE44_{ti})$$

Level 2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}*(SES_i) + \beta_{02}*(GENDER_i) + \beta_{03}*(FIRSTBORN_i) + r_{0i}$$
$$\pi_{1i} = \beta_{10} + \beta_{11}*(SES_i) + \beta_{12}*(GENDER_i) + \beta_{13}*(FIRSTBORN_i) + r_{1i}$$
$$\pi_{2i} = \beta_{20} + \beta_{21}*(SES_i) + \beta_{22}*(GENDER_i) + \beta_{23}*(FIRSTBORN_i) + r_{2i}$$

Combined Model

$$\eta_{ti} = \beta_{00} + \beta_{01}*SES_i + \beta_{02}*GENDER_i + \beta_{03}*FIRSTBORN_i + r_{0i} + \beta_{10}*AGE44_{ti} + \beta_{11}*SES_i*AGE44_{ti} + \beta_{12}*GENDER_i*AGE44_{ti} + \beta_{13}*FIRSTBORN_i*AGE44_{ti} + r_{1i}*AGE44_{ti} + \beta_{20}*SQAGE44_{ti} + \beta_{21}*SES_i*SQAGE44_{ti} + \beta_{22}*GENDER_i*SQAGE44_{ti} + \beta_{23}*FIRSTBORN_i*SQAGE44_{ti} + r_{2i}*SQAGE44_{ti}$$

Parent HOT in Narrative Utterances. I modeled parents' use of HOT in narrative utterances over time, using the same analytic approach described above. For parents, I used the entire study period from 14-58 months, with age centered at 36 months. Table 3.9 below presents the results from the unconditional model. The results from the hypothesis tests for the fixed

effects suggest that the intercept, growth and acceleration parameters are all necessary for describing parents' individual variation in use of HOT in narrative utterances. In addition, the results from the chi-squared test for the random effects suggests there is significant variability in average use, rates of change, and acceleration rates of parents' HOT in narrative use over development. Finally, the reliability of the OLS coefficient estimates are all relatively high (though as noted earlier, they are slightly less reliable than the estimates for narrative overall), suggesting there is signal in these data in terms of describing status at 36 months, and to a somewhat lesser degree the rates of change of HOT in narrative use. Parents are predicted to use 2.5 HOT in narrative utterances per hour at 36 months.

		Coefficient	se	*t*-ratio	*d.f.*	*p*-value
Fixed Effects	Intercept (β_{00})	0.91	0.10	8.83	58	<0.001
	Growth (β_{10})	0.04	0.005	8.06	58	<0.001
	Growth (β_{20})	-0.001	0.0003	-4.13	58	<0.001
		Variance Component	*d.f.*	χ^2	*p*-value	
Random Effects	Intercept (r_{0i})	0.53	58	394.28	<0.001	
	Growth (r_{1i})	0.0009	58	189.94	<0.001	
	Acceleration (r_{2i})	0.000001	58	117.18	<0.001	
Reliability of OLS Regression Coefficient Estimate	Intercept (π_0)	0.811				
	Growth (π_1)	0.651				
	Acceleration (π_2)	0.457				

Table 3.9. Unconditional model for parent HOT in narrative utterances.

Next, SES was added to the model, which is presented in Table 3.10 below. This model suggests that, similar to children, SES alone is not significant at explaining parents' individual variation in usage of HOT in narrative utterances at 36 months, nor growth rates.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	0.92	0.10	8.91	57	<0.001
	SES (β_{01})	0.16	0.12	1.29	57	0.202
π_1	Growth (β_{10})	0.04	0.005	8.11	57	<0.001
	SES (β_{11})	0.006	0.004	1.42	57	0.162
π_2	Acceleration (β_{20})	-0.001	0.0003	-4.12	57	<0.001
	SES (β_{21})	-0.0001	0.0003	-0.43	57	0.671

Table 3.10. Model for parent HOT in narrative utterances with SES included.

Gender was next added to the model, presented in Table 3.11. The results from this model suggest that neither gender nor SES explains variation in parents' usage of HOT in narrative over development; this is interesting given the patterns for children, suggesting girls grow more quickly in their rates of HOT in narrative usage over time. Parents' variation of HOT in narrative input is not explained by their child's gender nor by SES.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	1.01	0.16	6.18	56	<0.001
	SES (β_{01})	0.14	0.12	1.22	56	0.228
	Gender (β_{02})	-0.20	0.19	-1.07	56	0.292
π_1	Growth (β_{10})	0.04	0.006	6.14	56	<0.001
	SES (β_{11})	0.006	0.004	1.37	56	0.176
	Gender (β_{12})	-0.001	0.009	-0.12	56	0.907
π_2	Acceleration (β_{20})	-0.001	0.0004	-3.26	56	0.002
	SES (β_{21})	-0.00009	0.0003	-0.34	56	0.736
	Gender (β_{22})	0.0004	0.0005	0.69	56	0.495

Table 3.11. Model for parent HOT in narrative utterances with SES and gender included.

Finally, child status as first-born or only child was added to the model. This model, presented in Table 3.12, suggests that parents differ in their rates of change of HOT in narrative use over time with first-born versus other children ($p < 0.05$). This mirrors the similar finding for children. However, neither SES nor gender explain variation in parents' use of HOT in narrative utterances over time.

Level 1	Level 2	Coefficient	se	*t*-ratio	*d.f.*	*p*-value
π_0	Intercept (β_{00})	1.06	0.21	5.00	55	<0.001
	SES (β_{01})	0.15	0.12	1.23	55	0.223
	Gender (β_{02})	-0.22	0.20	-1.11	55	0.271
	First-Born (β_{03})	-0.08	0.21	-0.39	55	0.700
π_1	Growth (β_{10})	0.03	0.008	3.201	55	0.002
	SES (β_{11})	0.006	0.004	1.46	55	0.151
	Gender (β_{12})	0.003	0.01	0.36	55	0.723
	First-Born (β_{13})	0.02	0.009	2.05	55	0.045
π_2	Acceleration (β_{20})	-0.002	0.0006	-2.47	55	0.017
	SES (β_{21})	-0.0001	0.0002	-0.39	55	0.698
	Gender (β_{22})	0.0004	0.0006	0.85	55	0.398
	First-Born (β_{23})	0.0003	0.0006	0.573	55	0.569

Table 3.12. Model for parent HOT in narrative utterances with SES, gender, and first-born status included.

The final model for parents is presented below.

Level 1 Model

$E(PHOTNARR_{ti}|\pi_i) = \lambda_{ti}*SESS\_HR_{ti}$

$\log[\lambda_{ti}] = \eta_{ti}$

$\eta_{ti} = \pi_{0i} + \pi_{1i}*(AGE36_{ti}) + \pi_{2i}*(SQAGE36_{ti})$

Level 2 Model

$\pi_{0i} = \beta_{00} + \beta_{01}*(SES_i) + \beta_{02}*(GENDER_i) + \beta_{03}*(FIRSTBORN_i) + r_{0i}$

$\pi_{1i} = \beta_{10} + \beta_{11}*(SES_i) + \beta_{12}*(GENDER_i) + \beta_{13}*(FIRSTBORN_i) + r_{1i}$

$\pi_{2i} = \beta_{20} + \beta_{21}*(SES_i) + \beta_{22}*(GENDER_i) + \beta_{23}*(FIRSTBORN_i) + r_{2i}$

Combined Model

$\eta_{ti} = \beta_{00} + \beta_{01}*SES_i + \beta_{02}*GENDER_i + \beta_{03}*FIRSTBORN_i + r_{0i} + \beta_{10}*AGE36_{ti} + \beta_{11}*SES_i*AGE36_{ti} + \beta_{12}*GENDER_i*AGE36_{ti} + \beta_{13}*FIRSTBORN_i*AGE36_{ti} + r_{1i}*AGE36_{ti} + \beta_{20}*SQAGE36_{ti} + \beta_{21}*SES_i*SQAGE36_{ti} + \beta_{22}*GENDER_i*SQAGE36_{ti} + \beta_{23}*FIRSTBORN_i*SQAGE36_{ti} + r_{2i}*SQAGE36_{ti}$

4. Conclusions

The above chapter explored not just whether individual parents or children use HOT or narrative independently, but how frequently HOT utterances are invoked in narrative speech. I will briefly summarize the findings and relate them back to the characteristics of narrative speech described in Chapter 1.

First, not all parents and children used both HOT and narrative in the same session, and thus actually could use HOT in a narrative context. The majority (more than 80%) of parents could, and by the end of the study period most children could as well. However, not everyone who actually could use HOT in a narrative context actually did so, ranging from 50% of parents at 14 months to 80-90% of parents at the end of the study. No child used HOT in a narrative context until 22 months, but by 58 months, 76% of children could incorporate HOT into narrative. However, at 58 months only 53% of children could incorporate HOT into a future narrative. This again highlights the conceptual challenge of linking together representations in decontextualized speech contexts such as narrative.

In addition, not all children actually displayed an 'onset' (where they used HOT in a narrative context for two sessions in a row). Among the 49 children who did have a measurable onset, the average is around 40 months; among the 29 children with an onset for HOT in future narratives, the average onset is around 4 months later. This suggest that speech that is more removed from the *here-and-now*, such as future narrative talk, is even more conceptually challenging than past/habitual narrative talk, which enables speakers to rely on internal mental representations of events.

The developmental trajectory of narrative, HOT, and their co-occurrence suggests children must first acquire the ability to refer to information not in the *here-and-now* using decontextualized narrative speech before linking together representations using HOT. Children acquire narrative first (27 months), then HOT (28 months), then HOT in narrative (40 months). In addition, among the 43 children with measurable HOT, Narrative, and HOT in Narrative contexts, 55% of them acquired narrative first. Demographic predictors of narrative onset include

race; multiple regression models found that even controlling for SES, Hispanic and Black children have HOT in narrative onsets 5-7 months later than White peers.

When examining growth trajectories for use of HOT in narrative, I found that there were no effects of SES on parents' and children's usage of HOT in narrative over development, which is interesting in light of the significant effects of SES on both parents' and children's overall narrative use. In addition, while there were effects of child first-born status on both parents' and children's rates of change (such that first-born children and parents of first-born children increased in their rates of HOT in narrative use more quickly), variability in overall frequency of HOT in narrative utterances is not explained by children's first-born status. In addition, girls' rates of change were significantly different than boys', such that they grew more quickly in rates of HOT in narrative usage over time. This may be explained in part by the fact that children's total narrative utterances exhibited the same pattern. However, child gender does not explain variation in parents' narrative over development, nor their use of HOT in narrative over development; while first-born children and girls seem to have an advantage when it comes to HOT in narrative usage, it is not generally explained by differences in parental input. This suggests other factors besides demography and input play a role in explaining variability in children's HOT in narrative usage.

A key finding from the present chapter is that a greater proportion of parents' narrative speech contains HOT compared to non-narrative speech, and this pattern held across development. Children's narrative and non-narrative speech contain roughly equal proportions of HOT until age 38 months, after which children's narrative speech also contains more instances of HOT than their non-narrative speech. For parents at all sessions, and for children at 38 months and after, the observed occurrence of HOT with narrative speech is greater than expected by

chance; this suggests that HOT and narrative are not independent, but are in some way linked. In addition, I found that at some time points, parents' future narrative utterances tended to contain slightly more HOTs than their past/habitual narrative utterances, while after 38 months, children did not differ in their use of HOT in past/habitual compared to future narratives.

This could be due to some of the characteristics of decontextualized speech laid out in the introduction: that decontextualized speech such as narrative could encourage the use of HOT due to its (1) story-driven nature, (2) relation to the current context, (3) saliency, or (4) encouragement of metacognition. The present chapter is not able to differentiate among these explanations, and there may not be one reason for why narrative seems to encourage parents and children to use HOT. However, the fact that parents seem to use more HOTs in future narrative contexts—which children find even more challenging—lends some support to the notion that discussing events or representations that are more removed from the present context can lead individuals to use more HOTs, to indicate the precise nature of relationships between representations. This could be particularly useful when describing events to individuals who do not share the same internal representation.

Future research could attempt to further tease apart these different hypotheses; for example, by examining the saliency of the events discussed, to determine whether talking about more emotional or important events encourages individuals to use even more instances of HOT. Sales & Fivush (2006) suggest that individuals who use more causal/explanatory language in their narratives benefit in socio-emotional ways, such that they show lower anxiety and depression compared to individuals who use less of this kind of language. It's possible that using HOT in particularly salient circumstances could benefit not just cognitively, but emotionally.

This chapter also suggests that parents used more inferences and comparisons in their narrative speech compared to their non-narrative speech across development; children used more inferences in narrative speech starting at 38 months, but did not differ in their use of comparisons by speech context. This highlights the difficulty children may have with drawing comparisons between unseen representations, as sometimes happens in personal narrative (for example, in example 6 in Chapter 2, the mother draws a comparison between how she looked when the bee stung her as a child and how a monster looks; the child may not be able to benefit from this comparison, rich though it is, due to his difficulty in imagining both representations, without having clear mental access to either of them).

The above chapter has established that parents and children use higher-order thinking more frequently in narrative compared to non-narrative speech, and this is particularly true for inferences and for narratives referring to future events. The next chapter will compare usage of HOT in narrative and pretend, another kind of decontextualized speech, at 38- and 50-months. Pretend, while similar to narrative, differs from it along some of these features (story-driven, saliency, metacognition, and reliance on present context). A comparison of the two will lead us to better understand why or how some types of decontextualized talk, or certain features of speech, are particularly conducive to encouraging HOT use in parents and children.

CHAPTER FOUR: HIGHER-ORDER THINKING DURING NARRATIVE AND PRETEND AT 38- AND 50-MONTHS

1. Introduction

Chapter 3 suggests that narrative is a rich speech context in which parents and children invoke higher-order thinking at greater rates than expected by chance, particularly inferences and comparisons for parents across their children's early development, and inferences for children after 38 months. In addition, there is mixed evidence that narratives about future events also contain more instances of HOT than narratives about past/habitual events, although the patterns are not clear.

In this chapter, I will explore another kind of decontextualized speech frequently used by parents and children in their everyday lives, *pretend*, to explore whether pretend, like narrative, also encourages parents and children to use more instances of higher-order thinking. Pretend is language during imaginary, non-literal, or imitative episodes of interaction including making an object represent another; attributing actions, thoughts, or feelings to inanimate objects; and assuming another role or persona (Katz, 2001; Rowe, 2012; Demir et al., 2015). While pretend play is built on the features of everyday life and familiar relationships, it treats the current context in a non-literal way, making it decontextualized. For example, by substituting a banana as a phone, an individual must defocus from the present or visible context and instead focus on the pretend or imaginary one.

In the introduction to this chapter, I will review some of the research on pretend play, with sections on definitions of pretend play; its developmental trajectory; the role of parental input; children's play partners; relations to later outcomes; and individual differences (by gender, SES, and across cultures). Then, I will discuss some of the differences between narrative and

pretend, and why these differences might result in different rates of higher-order thinking usage between spontaneous narrative and pretend speech.

1.1. Review of Pretend

Defining Pretend. Pretend play is a famously "fuzzy" concept (Burghardt, 2011; Lakoff, 1973), and the literature has been plagued by a lack of a clear definition that encompasses all instances of it. A variety of terms, such as symbolic play, imaginative play, make-believe, pretense, fantasy play, and dramatic play, have been used to refer to this type of symbolic play behavior (e.g. Singer, 1973; Leslie, 1987; Vygotsky, 1967; Vygotsky, 1978; Piaget, 1962; Paley, 2009; Lillard, 1993), and these terms tend to be used interchangeably (though they might represent slightly different judgments of its value or focus).

Behaviorists, such as Piaget (1962), identify pretend play based on the behaviors one engages in. His three categories (or stages) of pretend play—sensorimotor, symbolic, and games with rules—will be discussed more below. Others have identified other behavioral categories in addition to these three, including rough-and-tumble play (first described by Harlow & Harlow, 1965), which is also observed in animals; physical/locomotor play (such as hops, skips, etc.; Pellegrini, 2011); and construction play (e.g. building structures with Legos or blocks; Smilansky, 1968). Most research has been conducted on symbolic play, or pretense, where children act as if one object or situation is another, including taking on and acting out roles. In general, this is also the type of pretend play we examined during the 38- and 50-month visits in our sample.

Other researchers have further elaborated on different types of symbolic play. Different types of object substitution include literal object substitution (where a child uses one object for another, e.g. substituting a banana for a phone), substitution of properties (in which a child

imagines something has one or more aspects than it actually has, e.g. by pouring a cup of imaginary tea); and imaginary object play (where children imagine something is there when it is not, e.g. running away from "a dinosaur"). A related type of imaginary object play is imaginary companion play, where children establish relationships with imagined entities. Sometimes this takes the form of full-fledged 'imaginary friends,' but more often children embody these beings in stuffed animals or dolls (Taylor, 1999).

The use of behavioral categories to organize pretend play is widespread. However, some criticize using these behavioral categories to identify pretend play, because these categories fail to account for the psychological aspects that many believe are also determinants of pretend. Others take a more functional approach to defining pretend play, by imagining how it functions for the individual rather than how it happens behaviorally. For example, Krasnor and Pepler (1980) argued for thinking about behavior as falling on a spectrum from 'not at all playful' to 'more playful.' Four criteria are used to determine whether a behavior is 'playful'; the more criteria a behavior encompasses, the more playful it is. The four criteria are: 1) intrinsically motivated (the behavior is done for its own sake, and not in service of a goal); 2) non-literal (behaviors lack their usual meaning); 3) positive affect (individuals engaging in the behavior are having fun); 4) flexibility in both form (behaviors may be exaggerated or truncated) or content (individuals may substitute objects for another).

And yet, others have criticized the use of these functional criteria, given that many exceptions exist. For example, children do not always maintain a positive affect while playing, and individuals may make a task with a goal (such as cleaning the house) more 'fun' by embedding it in a pretend scenario, such as pretending to be maids. In addition, much research on children's interpretation of others as pretending or not (e.g. Lillard, 1993) converges on the

general conclusion that—at least for children—pretend is 'what we do' and not 'what we think' (Flavell, 1988). Thus, although exactly what exactly encompasses pretend play is a question that the literature has many divergent opinions on, many researchers do agree that pretend play can be defined based on the behaviors children engage in.

Developmental Trajectory. The idea that play behavior changes between birth and school entry is not new. Piaget (1962) suggested that as children develop from birth to age 6-7, their play behavior progresses through three separate stages: sensorimotor practice (mostly play with single objects); symbolic pretend play, which he also termed *pretense* (e.g. substituting one object for another; taking on another role); and games with rules (including sports, board games, and other routine games like tag and hide-and-seek). As children progress through these stages and begin integrating their increasing real-world knowledge into their play scenarios, their pretend play becomes increasingly sophisticated, mature, logical, and realistic. However, the frequency of pretend play follows an inverted U-shape curve across development, with pretend play beginning to emerge during the second year of life, increasing over the following 3-4 years, and then declining.

Exactly when individuals "stop" pretending is a matter of some debate. While Piaget believed pretend play ceased around ages 6-7, a retrospective survey conducted by Smith and Lillard (2012) suggests children stop pretending much later. In this study, university undergraduates were asked to report, across two-year segments of their childhood, how much they pretended as children, when they stopped pretending "like a child," and various questions about frequency of pretend play. The average age at which individuals reported they ceased pretending like a child was 11 years, 3 months, with 61% reporting that they still pretended at least weekly or even daily at ages 10-11. In addition, almost half of the sample was still

pretending past age 12, into Piaget's formal operations stage when he assumed this type of behavior had ceased. Furthermore, 38% of respondents reported pretending in some way as an adult. There is an extensive cottage industry of roleplay games geared towards adults, such as Life Action Role Play (LARP) or murder mystery dinner parties, and some have argued that activities like this constitute "adult pretend play" (Rognli, 2008). Regardless when children stop pretending, it is well accepted that pretend play makes up a large part of children's early experiences, particularly with their parents.

Role of Parental Input. Vygotsky (1978) argued for the important role played by more knowledgeable caregivers such as parents in children's early experiences, and this view extends to pretend play as well. Research suggests American mothers engage in some form of 'pretend' in front of their children as early as it has been examined (7 months) (Kavanaugh, Whittington, & Cerbone, 1983). Wendy Haight and Peggy Miller's (1993) seminal book on naturalistic pretend play, *Pretending at Home*, demonstrates the important role that pretend play with parents, especially mothers, has on children's early lives and experiences. They examined spontaneous pretend play in a sample of nine middle-class families between 12 and 48 months. They found that during each 3-4 hour observation, parents and children engaged in pretend play for about 45 minutes (or about 8-12 minutes per hour). Every mother pretended in front of her child at 12 months, while only about half of the children pretend themselves at this age, suggesting parents play a role in 'ushering in' this type of behavior. Until 36 months, children's primary play partner was their mother; in contrast to the view (held by Piaget, 1962) that pretending is initially solitary and only later becomes social, this study provided evidence that pretend play, from its initial stages, is largely a social activity. In addition, collaborative pretend play with mothers was longer and more complex than solo pretend play. Mothers and children

both initiated episodes of pretend, and children incorporated mothers' pretend talk into their own play. Thus, pretend play in this sample was very much supported and encouraged by parental engagement. This research suggests mothers and other early caregivers are vitally important to consider when examining pretend play.

Play Partners. While the focus of this dissertation is primarily concerned with how children pretend with their parents, children have many play partners over the course of their lives. Parten (1932) identified five different types of pretend play based on the social context in which it takes place. The categories are 1) *solitary independent play*, also known as solo play; 2) *onlooker play*, where one observes others playing; 3) *parallel play*, where one plays near other children and with the same types of objects but does not directly interact with them; 4) *associative play*, which involves some interaction and similar objects, but is not yet at the level of the fifth type; 5) *cooperative play*, which is organized group play. In our coding, we do not differentiate between children's partners in their pretend play, although future research could examine this more in depth.

Much research has examined differences in pretend play with different play partners, in particular, by comparing children's play with mothers, fathers, and siblings. Play with fathers tends to be more physical than play with mothers (Roopnarine, 2011), and fathers report valuing rough-and-tumble play over pretend play and book-reading, while mothers rank rough-and-tumble play below pretend play and book-reading (Haight, Parke, & Black, 1997). In addition, fathers are particularly physical while playing with their sons over their daughters (Carson, Burks, & Parke, 1993). Sibling play is not as sophisticated as play with mothers (Youngblade & Dunn, 1995). In sibling play, older children typically assign roles to younger ones (Dunn & Dale, 1984). While parents tend to treat children as equal play partners, the power differentials in

sibling relationships often means that play partners are not as attuned to each other in reading and responding to another's signals during an interaction.

Relations to Later Outcomes. Similar to narrative, some research suggests that early pretend play relates to children's later educational outcomes, although the evidence is somewhat mixed. In fact, Piaget (1962), like Montessori (1989), did not view pretend as being 'useful' or necessary for children's later development. Piaget viewed the primary developmental task of children as adaptation to reality; he argued that pretend interfered with this task, and that pretend play served more of an egoistic function, allowing the child to fulfill wishes he or she could not fulfill in reality. The exception is Piaget's third play stage, playing games with rules, which typically emerges during the preoperational stage and predominates in the concrete operations stage. Piaget believed games like this supported development, particularly when individuals must accommodate the rules of others; in this way, children reach an 'equilibrium' in the face of different beliefs in how games should be played.

Vygotsky (1978), in contrast, viewed pretend play as crucial for children's later development. He believed pretend play helped support children's abstract though, because in pretend play, children learn to treat objects and situations non-literally. Children, he reports, have difficulty in separating their language from the present moment, as evidences by challenges faced by children in Stroop-like tasks, where they to say "Tanya is standing up" when she is really sitting down. In pretend play, in contrast, children develop the fluid ability see one thing, but act differently in relation to what he or she sees. A child might see a banana but treat it as a phone in the play scenario. During pretend play, children develop the ability to separate thought from objects, and action arises from ideas rather than things, which are crucial skills for later decontextualized language use. In addition, during pretend play, individuals take on other roles

or personas, and often these roles are older than themselves (for example, children might pretend to be a shopkeeper or a bank teller). As Vygotsky (1978) said:

> Play creates a zone of proximal development of the child. In play a child always behaves beyond his average age, above his daily behavior; in play it is as though he were a head taller than himself. As in the focus of a magnifying glass, play contains all developmental tendencies in a condensed form and is itself a major source of development. (pg. 102)

Despite Vygotsky's strongly held belief that play was instrumental in development, there is not a consensus about whether pretend play is related to children's later cognitive and socio-emotional outcomes. Aspects of development that have been examined in relation to pretend play include theory of mind (Hughes & Dunn, 1997; Astington & Jenkins, 1995; Taylor & Carlson, 1997; Youngblade & Dunn, 1995; Lillard, 2001); symbolic understanding (Lillard & Kavanaugh, 2014); problem-solving (Sylva, 1977); creativity (Pellegrini & Gustafson, 2005); hypothetical thinking (Harris, 2000); abstract reasoning (Singer & Singer, 1992; Harris & Leevers, 2000); intelligence (Saltz, Dixon, & Johnson, 1977; Smilansky, 1968); conservation (Fink, 1976; Golomb & Cornelius, 1977); executive function, particularly inhibitory control (Wellman & Liu, 2004; Bodrova & Leong, 1996; Elias & Berk, 2002); and emotion regulation (Fein, 1989; Bretherton, 1989). Much of this research argues the value of pretend lies in its abilities to encourage children to see the world in non-literal ways, to use decontextualized language that is not dependent on the current situation or reality, and also because it provides access to the minds and emotions of others (either other play partners or characters/roles being embodied).

In addition, pretend play can help develop children's vocabulary. Katz (2001) found, using data from the Home-School Study of Language and Literacy Development, that mothers' and children's use of pretend when the child was 3 years old was positively related to children's vocabulary comprehension and to their ability to provide formal definitions in kindergarten. This

is likely because pretend play involves unique vocabulary words (such as "dragon") that are unlikely to occur in contextualized conversations. A greater percentage of pretend talk at age 4 by mothers was also significantly positively related with the children's ability in kindergarten to create a narrative (Katz, 2001), likely due to the nature of pretend play, like narrative, being structured as story-like extended discourse.

However, in their review of over 150 studies examining the effects of pretend play on children's later outcomes, Lillard and colleagues (2013) concluded, "Despite over 40 years of research examining how pretend play might help development, there is little evidence that it has a crucial role" (pg. 27). They concede that the lack of evidence might be due more to methodological challenges, such as the use of correlational and not causal data; failure to replicate (where the positive finding is cited and the negative finding is not); experimenter bias; small sample sizes; and nonrandom assignment. They also point out that in experimental or training studies, it is difficult to create a fair control condition that differs beyond pretend play. Pretend training studies tend to lead to more adult contact for those in the experimental condition, while those in the control condition are frequently assigned to 'business as usual' (as in Dockett, 1998). In studies like this, it is difficult to disentangle whether the effects of the intervention are due to pretend play or due to increased adult interaction. Smith, Dalgleish, and Herzmark (1981) sought to address this concern by controlling for amount of adult contact between the experimental and control conditions, and found that children in both groups improved on a range of tested outcomes. Thus, the notion that there is a relationship between children's early engagement in pretend play and their later cognitive and developmental outcomes is not generally supported.

Individual Differences. Pretend play differs not only based on the child's play partner, but also sometimes due to individual differences. In this section, I will describe differences in pretend play based on different groups: by gender, by socioeconomic status, and across cultures.

(1) Gender. Much research has examined differences in the ways that boys and girls engage in pretend play. Rubin, Fein, and Vandenberg (1983) noted that boys and girls tend to engage in stereotypically masculine or feminine behavior in their pretend play; for example, boys and girls generally play with different kinds of toys (e.g. trucks and dolls respectively). Boys prefer play scenarios that are more adventurous (such as pretending to be astronauts or train engineers), while girls often act out more domestic routines (McLoyd, 1980; Pulaski, 1973). Boys also tend to be more aggressive and physical in their pretend play than girls (Maccoby, 2002; Pellegrini & Smith, 1998). This likely reflects the role of social influence (Dunn & Dale, 1984), as well as conforming to stereotypes (Fagot & Leinbach, 1989). In addition, some research suggests that girls engage in more episodes of pretend play than boys, and girls tend to focus more on person pretend play rather than object pretend play (McLoyd, 1980; Matthews, 1977).

(**2) Socioeconomic Status.** Pretend play has been examined in different populations of SES. Researchers have noted that children of lower parent income and/or education level (key determinants of SES) tend to pretend less than those from higher levels (Göncü, Mistry, & Mosier, 2000; Tudge et al., 2006). In addition, a study of 5- to 7-year-old children in Canada found that not only did middle class children engage in more episodes of pretend play, but also that their play episodes were longer. Similar results have been found in other cultures, including the United States (Fein & Stork, 1981; Griffing, 1980), Israel (Smilansky, 1968), Great Britain (Smith & Dodsworth, 1978), and South Africa (Udwin & Schmuckler, 1981).

Feitelson (1977) argued that four reasons explain this variation in pretend play by socioeconomic status: 1) availability of time; 2) availability of resources; 3) availability of space; 4) adult endorsement. Material wealth impacts the first three, such that parents and children from higher-SES backgrounds tend to have more free time to engage in pretend play, have many different object, sets, and costumes children can use in their pretend play, and often have dedicated spaces (sometimes whole rooms) devoted to pretend play. In addition, Mexican mothers also reported valuing play less than American mothers (Farver & Howes, 1993), which led to less overall engagement in pretend play. Thus, pretend play behavior varies by both gender as well as SES.

(3) Cross-Cultural Differences. Play is believed to be a ubiquitous childhood activity across cultures (Eibl-Eibesfeldt, 1989; Fein, 1981), though the frequency with which children engage in it differs. In every culture in which it has been studied, pretend play emerges by age 3 and tends to peak a few years later (Power, 2000). Pretend play may exist because it helps development in some way (Pellegrini, Dupuis, & Smith, 2007), or it may exist because it keeps children out of adult's way (Gosso, et al., 2005). However, there are many challenges in studying pretend across cultures because pretend play is culturally determined. In Western cultures, Piaget's categories are often privileged, but less common forms of play which are prevalent more prevalent in other cultures—such as finger, sound, and language play (Heath, 1983)—are generally excluded.

Regardless of its definition, the amount of time that children engage in pretend play has been found to vary by culture, often based on that culture's valuation of pretend as an activity. For example, many non-Anglo cultures—such as the Yucatac Maya—do not view pretend play as being an important childhood activity (Gaskins & Göncü, 1992; Lancy, 2007). Yucatac

Mayan adults do not participate in pretend play, nor do they provide the time, resources, or space for it. Other explanations for the differences observed in frequency of pretend play across cultures is that in many cultures, children are expected to contribute to their family's well-being fairly early, and thus have less time to engage in pretend play. For example, work is highly valued in the Yucatac Mayan culture, and as soon as children are deemed mature enough to perform a task (such as helping to prepare meals), they willingly abandon play to do so (Gaskins, 1999).

One survey of parents in 16 countries that found in only five (the United States, the United Kingdom, Ireland, Portugal, and Argentina) do the majority of mothers say their children (ages 1–12) often participate in imaginative play (Singer, Singer, D'Agostino, & Delong, 2009). On the spectrum of play engagement and valuation of play, the United States and other Western cultures are on the high end, possibly because attitudes toward pretend play align with a culture's valuation of schooling and/or creativity. Thus, in the American context in which this study takes place, pretend play is valued, possibly due to parents' beliefs that it helps promote abstraction and creativity. However, engagement in it might be determined by other individual factors such as child gender and SES.

I have just reviewed some of the previous research on pretend play in childhood. Although there is not a universal consensus about what exactly constitutes "pretend play", many agree it can be defined based on the behaviors one engages in. In addition, pretend play has been found to differ based on contextual factors such as the child's play partner, as well as individual differences such as gender, SES, and culture, although it does not generally relate to later cognitive and developmental outcomes. In the next section, I will review reasons for the possible

relationship between HOT and pretend, and discuss why pretend, like narrative, might also encourage parents and children to use more HOT.

1.2 Comparing the Affordances of Narrative and Pretend for Higher-Order Thinking

Narrative and pretend are both decontextualized, meaning both use language to refer to people, actions, or things not in the immediate or current environment, and both more syntactically and lexically complex than contextualized speech (Rowe, 2012; Demir et al., 2015). Narrative and pretend share a number of similarities, but they also share some differences. I will structure my discussion of these similarities and differences around the four hypotheses outlined in Chapter 1, for why narrative might differentially encourage the use of higher-order thinking.

(1) Story-Driven. Pretend, like narrative, tends to be story driven. In their pretend play, parents and children create or embody 'characters' which tend to have some goal in mind. In this way, parents and children may link together representations using HOT—particularly inferences—during pretend play, much in the same way that they do in narrative, in order to move the 'story' along. More broadly, both are structured as extended discourse, meaning they have more "story-like" forms, and parents and children hold the same subject of conversation for an extended period of time (Dickinson & Tabors, 2001; Dickinson & Tabors, 2002).

However, narratives of personal experience tend to be more organized and structured than pretend play at ages 4-5, such that 'plotted' narratives take place more frequently in storytelling contexts than play contexts (Benson, 1993). For this reason, narrative may contain more instances of HOT, particularly inferences, compared to pretend.

(2) Saliency. As described earlier, some evidence suggesting that parents and children might be able to reason better if abstract concepts are embedded into storytelling contexts (Casey et al., 2008A; 2008B). In addition, when logical syllogisms (e.g. "Dogs live in trees. Rex is a

dog. Does Rex live in a tree?") are embedded into fantasy contexts, as opposed to realistic settings, children generally perform better (Dias & Harris, 1988, 1990; Hawkins, Pea, Glick, & Scribner, 1984; Kuczaj, 1981; Richards & Sanderson, 1999). One possibility is that the fantasy manipulation encouraged children to consider the premises more carefully (Harris & Leevers, 2000). Thus, parents and children may also be motivated to incorporate HOT into their pretend as well as their narrative speech, due to these speech context's particularly salience for individuals in early childhood. However, due to the fact that personal narrative concerns the self, narrative may be more salient or self-relevant than pretend, which could lead to more HOT use in narrative compared to pretend.

(3) Metacognition. Both narrative and pretend make use of metacognitive skills. In narrative, individuals reflect on their past experiences or anticipate future experiences. When individuals pretend, they often take on another role or persona, and must use perspective-taking skills to imagine another's thoughts and feelings, skills central to both metacognition and theory of mind (Bergen, 2002; Leslie, 1987; Whitebread & O'Sullivan, 2012). In this way, children engaged in pretend play are practicing the meta-cognitive skills that are crucial for higher-order thinking, much in the same way that narrative promotes these same skills. For this reason, it is possible that narrative and pretend may equally invite parents and children to use HOT.

(4) Relation to the Current Context. Both narrative and pretend are decontextualized, because they are not situated in the present context. While narrative refers to displaced actions or events that either happened in the past or will happen at some point in the future, pretend draws upon familiar features of the surrounding context, but treats the current environment in a non-literal way; in this way, pretend speech is decontextualized by creating a *new* contextualization. This suggests that pretend speech may rely more on the *here-and-now* than narrative, though it is

a non-literal here-and-now. In this way, narrative and pretend differ in the extent to which they rely on the current or present context, with pretend potentially relying more on the here-and-now than narrative.

Some empirical evidence supports this idea. Parents and children negotiate their pretend frame primarily through the use of language, similar to how events are discussed in narrative. However, during pretend play, parents and children frequently rely on paralinguistic cues such as adopting a character's voice (usually referred to as *voicing*; Friedman, Neary, Burnstein, and Leslie, 2010), and might also use objects in their present environment to scaffold the pretend play, such as wearing a princess costume. In addition, in many situations, parents and children use replicas of objects (such as replicas of tea sets or of trains) which are then used extensively during the pretend episode. For these reasons, pretend is arguably *more* situated in the present context than narrative. Thus, if the relationship to the current context is what drives parents and children to incorporate HOT into their speech, we might expect parents and children to use more HOT in narrative than in pretend.

In sum, pretend represents an interesting contrast to narrative. Both emerge relatively early in development, although children initially rely a great deal on their parents to structure and support their narratives and pretend play. Both are decontextualized and promote metacognition, although they differ in the extent to which they are story-driven, in their relative saliency, and in the degree to which they rely on the current context or environment.

Differences Based on HOT Type. The above has discussed HOT as a singular construct, as a type of relational thinking. In addition, in this chapter, I will be examining whether parents and children differ in their use of inferences and comparisons in pretend, compared to narrative

or other speech. At 38- and 50-months, parents' and children's may differ in the rates in which they incorporate inferences and comparisons in their narrative and pretend speech.

(1) Inferences. If the story-driven nature of narrative and pretend is what encourages individuals to use more HOTs, we might expect inferences to occur in roughly equal proportions in narrative and pretend. However, as noted above, narratives tend to be more organized and structured than pretend (Benson, 1993). We might expect that narrative will encourage the use of the most inferences, followed by pretend, with more contextualized speech containing relatively fewer inferences.

(2) Comparisons. As discussed in Chapter 3, parents, but not children, incorporate more comparisons into their narrative than in their non-narrative speech. This suggests that children may need to rely more on the present context to scaffold their use of comparisons. However, because pretend relies more on the present context than does narrative, we might expect to see relatively more comparisons in pretend speech. Individuals may also use comparisons when setting up and communicating about pretend play ("This banana looks like a phone"), or by drawing comparisons between objects being used literally and non-literally. Pretend may actually serve as a privileged place for comparison use.

Differences Based on Demographics. As discussed above, pretend play varies on the basis of demographic characteristics such as gender and SES. Prior research suggests that girls tend to rely more on language in their pretend play, whereas boys rely more on objects (McLoyd 1980; Matthews, 1977). If language's relation to the current context is what drives individuals to use more HOT, we might expect that girls will use more HOT in pretend play than boys. In addition, because families with more resources tend to engage in more pretend play, and Freeman (2015) established that HOT use was related to income, we might also expect that

families of higher SES (and its related components, maternal education and family income) will use more pretend play, as well as more HOT in pretend. Finally, we might also expect that first-born or only children will use more instances of HOT in pretend, because their play partners are more attuned to their needs, and they receive more individuated input when there are no other children, or only younger children, in the home.

1.3. Research Questions.

This chapter will explore the following three research questions: **4.1)** How frequently do parents and children invoke HOT in pretend speech at 38- and 50-months, and is this different from personal narrative or other speech? (By "other" speech, I refer to any utterance that is neither narrative nor pretend). **4.2)** Are parents and children more likely to incorporate certain types of HOT into their pretend speech, and is this different from narrative or other speech? **4.3)** Does incorporation of HOT into pretend contexts vary by demographics such as child gender, child first-born status, family income, or parent education level?

I will explore these questions when the children are 38- and 50-months. As established in Chapter 3, 38-months is the first age at which children begin invoking HOTs into their narrative speech significantly more often than expected by chance. I will also explore use of HOT in pretend at this age, as well as a year later, at 50 months, to see if the pattern stays the same or changes.

Research Question 4.1: How frequently do parents and children invoke HOT in pretend speech at 38- and 50-months, and is this different from personal narrative or other speech?

Due to the liminal nature of pretend speech—not as structured as narrative and more tied to the present context, but still more organized than other speech—I hypothesize that pretend

will contain more instances of HOT than other speech, but narrative will still contain more HOT than pretend speech. This will be true for both parents and children at 38- and 50-months. Families of higher incomes may incorporate more instances of HOT into their pretend speech, because income (and not parent educational level) is related to parent and child HOT use (Freeman, 2015).

Research Question 4.2: Are parents and children more likely to incorporate certain types of HOT into their pretend speech, and is this different from narrative or other speech?

My prediction is that parents will use more inferences in their pretend speech compared to other speech. Similar to narrative, parents will organize their pretend play into story-like forms that include inferences that link together cause-and-effect. In addition, parents will also invoke more comparisons in pretend speech compared to non-narrative and non-pretend 'other' speech. However, children will not vary in their comparison use by speech context (due to their reliance on the present context to scaffold their use of comparisons), and as such will not use more comparisons in pretend or narrative compared to other speech.

Research Question 4.3: Does incorporation of HOT into pretend contexts vary by demographics such as child gender, child first-born status, family income, or parent education level?

Prior work examining gender differences in pretend at age 4½ suggests that girls engage in more episodes of pretend play than boys, and their focus tends to be on person pretend play, while boys tend towards object pretend play (Jones & Glenn, 1991). Another related finding is that boys and girls differ in the degree to which their pretend play relies on the objects in their immediate environment, with girls using ideational modes and boys using material modes

(McLoyd 1980; Matthews 1977). Taken together, this suggests girls may be relying more on their language to set up the pretend scenario, while boys may be relying more on objects in the current environment. If language's relationship to the present context drives the incorporation of HOT into speech, this would suggest that similar to narrative, girls may use more instances of HOT in pretend relative to boys.

There may also be differences in use of HOT in pretend according to socioeconomic status and its related components, parent education and family income level. Individuals from higher SES-backgrounds may use more instances of HOT, which may also extend to using more HOT in pretend as well as in narrative. In addition, children who are the first-born or only child may also be exposed to and/or use more HOT in pretend speech, because they use more HOT language overall (Freeman, 2015), and their parents may able to provide them with more one-on-one individuated input.

2. Methods

2.1. Participants

This chapter will analyze the 61 parents and children who completed the 38-month session, and the 59 children and 58 parents who completed the 50-month session[7]. The procedure and transcription are the same as described in Chapter 2.

2.2. Coding

HOT Coding. The HOT coding remains the same as described in Chapter 2.

Personal Narrative Coding. The narrative coding teams differed slightly between Chapters 2-3 and the present chapter (although the narrative data in this chapter are the same as

[7] As a reminder, one of the parents at 50-months did not appear on the video, so for this session I analyze the child's speech and record the parent as missing.

those presented in Chapters 2-3), so here I will report the reliability for the narrative coding done only at the 38- and 50-month-visits (although it generally did not differ from the reliability for the entire corpus). Twenty-one transcripts (18%), containing 40,980 utterances (representing 22.1% of the 185,309 utterances at the two time points) were coded by two or more coders. Pooling together each pair of coder's reliability transcripts, the average interrater percent agreement for identifying utterances as personal narrative was 97.3% (range 96.7-98.3%) (average Cohen's kappa = 0.72, range 0.65-0.83). Disagreements were resolved through discussion or by the more experienced coders. Because the previous chapters discussed the differences between past/habitual and future narratives, this chapter will treat narrative as a single construct, to facilitate comparison to pretend.

Pretend Coding. Pretend was defined as language during imaginary, non-literal, or imitative episodes of interaction. The full coding criteria for pretend may be found in Appendix A. We emphasize a behavior approach to symbolic pretend play, including representing or substituting one object as another; taking on the role or persona of another; attributing actions, thoughts, or feelings to inanimate objects; telling stories about fictional or made-up characters; and negotiation/communication about any of the above. Some aspects of construction pretend play were also included if additional details in speech or action were deemed sufficient to "dramatize" the play (e.g. discussing what 'the people' in the tower are doing). Games with rules (such as hide-and-seek) were not coded as pretend play.

The same narrative coding team for the 38- and 50-month visits also coded for pretend. Because aspects of our coding manual relied on paralinguistic cues such as voicing, as well as other aspects of how parents and children were interacting with their surrounding environment (e.g. holding and moving toys), coding of pretend was done on the written transcripts with the

aid of the video. Twenty-two transcripts (18%), containing 42,476 utterances (or 22.9% of the 185,309 utterances at these two time points) were coded by two or more people for pretend. Average interrater percent agreement for identification of utterances as pretend was 94.0% (range 93.4-95.3%) (average Cohen's kappa = 0.79, range 0.76-0.83).

Pretend interactions often made use of objects in the present environment. In the following example, the parent and 38-month-old daughter are playing with a set of blocks, but treat them as monsters and children—an example of literal object substitution (although both the parent and child mix up their referents as well as their use of pronouns). In this example, the mother asks her daughter to make an inference (in lines 13-14) for why one block-monster scared all the other blocks away. The mother also provides feedback on the child's choice of reason ("s/he killed them," line 15), instead suggesting that instead, the monster "just roared at them" (line 19).

Example 12

Line	Parent Speech	Child Speech	HOT	Pretend
1		They can - the monster came.		*
2	The monster came?			*
3	At the park?			*
4		Yeah.		*
5	Well who's the monster?			*
6		This.		*
7		Him. *[C picks up block]*		*
8	Oh, okay.			*
9	And what did the monster do?			*
10		Um, she scared all the people away		*
11	He scared all the people away — or scared all the blocks away?			*
12		Yeah.		*
13	So how did he scare all the blocks away?		*	*

14	What did he do to scare all the blocks away?		*	*
15		She - he killed them.	*	*
16	Oh.			*
17	He did?			*
18	I don’t like that word.			*
19	How about he just roared at them?			*
20		Yeah.		*
21	Okay.			*
22	Can you – can he roar at them?			*
23		Rarr!		*
24	And then what did the blocks do?			*
25		They ran away.		*
26	They ran away?			*
27	Ahh! Ahh!			*
28		They have to get on school bus!		*
29		Let's get on the school bus!		*
30		Hurry up!		*
31		The monster going to get us!		*
32		Let's get on - let's get on school bus!		*
33		Come on, kids!		*
34		And off they went.		*
35	And off they went to get on the school bus?			*
36		Yeah.		*
37		And they went back to the school and they went home and eat lunch.		*

Pretend play with objects could also use replica objects, as in the following example when the mother and her 50-month-old son are playing with toy rockets and spaceships; this interaction is driven mostly by the child, whereas above both the parent and child were active participants in the pretend scenario. The child in this example provides many inferences for why the rocket might crash, as well as draws comparisons between the amount of fuel needed for different ships based on the length of their journey.

Example 13

Line	Parent Speech	Child Speech	HOT	Pretend
1		Five four three two one zero blast off.		*
2	What happened to the other one?			*
3		Mommy, you know what happened to the other one?		*
4	Hmm?			*
5		The other one had to get filled up longer.	*	*
6	Oh, more fuel?			*
7		Because it's filled -	*	*
8		Uhhuh.		*
9		I think that one got that - that got filled ###		*
10		That's why that one didn't go up.	*	*
11		Mommy they land - they land the spaceship early.		*
12		Really really early.		*
13	They ran it early?			*
14		No.		*
15		No, they landed it early		*
16	Oh, landed it.			*
17		Early because the rocket boosters were placed on the wrong side.	*	*
18	Oh.			*
19	That could be a problem.			*
20		Okay.		*
21		They are in mission control.		*
22		Mommy, the countdown is for both rockets.		*
23		But the other — I'm afraid the other rocket's going to crash.		*
24	Why?		*	*
25	Why don't they just take off at		*	*

	exactly the same time?			
26		No Mommy.		*
27		They have to take of differently at the same time because - because you know what?	*	*
28	What?			*
29		This one is too ###	*	*
30		It goes a longer - way to this one.	*	*
31		This one needs to be filled with a lot of fuel for its mission.	*	*
32	So it has a longer journey?		*	*
33		Uhhuh.		*
34		No that one has a shorter journey.	*	*

Parents could also sustain and support their children's pretend play, even while only engaging in it through conversation. In the following example, the child is wearing princess costume, while her mother is in the kitchen doing dishes. The mother provides some abstractions of what 'princesses' tend to do; they clean toilets for their moms (line 11). The parent intends the reason for this to be because they help people (lines 6 and 8), but the child's explanation for why princesses might clean the toilet is because their evil stepmothers and stepsisters makes them (line 12).

Example 14

Line	**Parent Speech**	**Child Speech**	**HOT**	**Pretend**
1	Are you going to be a nice princess or an evil princess?			*
2		A nice princess.		*
3	What are you going to do that's nice?			*
4		Um, I don't know.		*
5		What real princesses do.	*	*
6	Sometimes they go		*	*

	help people.			
7		What?		*
8	Sometimes they help people.		*	*
9		[BROTHER NAME] um - I'll help [BROTHER NAME].		*
10	Sometimes they clean the floor.		*	*
11	And they clean the toilets for their moms.		*	*
12		Because they have evil stepsisters and evil stepmothers.	*	*
13	Hmm.			*
14		And Mom, you're going to be the mean stepmother.		*
15	Okay, then that means we get to go clean the toilets.		*	*

Children could also play on their own, without interacting with their parents or other children, as in the following example of a 50-month-old boy playing by himself with a train set. He seems to be taking on the role of 'crash engineer,' and discusses why one should perform crash tests (line 6: "to build better trains in the future"), as well as discusses different "sorts" of disasters (lines 29-31). He also discusses how he tried crash tests with loads in them (lines 32-34), presumably to examine the different effects of crash tests with and without loads.

Example 15

Line	**Parent Speech**	**Child Speech**	**HOT**	**Pretend**
1		It tried — I tried crash ### to make more trains better.	*	*
2		### future.		*
3		That's why you do a crash test.	*	*
4		That's why you shove the train for my crash test.	*	*
5		To make them go off canyons.	*	*
6		See, I can crash test it to build	*	*

	better trains in the future		
7	To -		*
8	Bam.		*
9	That's right they go bam bam.		*
10	I even tried slope crash testing.		*
11	Crash test.		*
12	Even try slope crash test.		*
13	I even try remote control crash tests.		*
14	Wait the crash test wasn't working.		*
15	I'll try crash test this.		*
16	Even like real choo choo trains.		*
17	The generator's connected to a fuel car.		*
18	These just if you want to get a fuel car.		*
19	You go here.		*
20	This is the fuel place.		*
21	Even if we try these kind of crash tests.	*	*
22	That was a good one.		*
23	That was a better one.	*	*
24	They could crash.		*
25	Now I got to slam into the side of the mountain.		*
26	Aim right at it.		*
27	This is just a crash test.		*
28	It it it it get all kind —		*
29	It get all sorts of different disasters.	*	*
30	They get all sorts of different disasters.	*	*
31	They even try - these kind of crash tests.	*	*
32	With loads in them.		*

33	I tried some with loads in them.	*
34	Crash tests with loads in them.	*
35	Let's go try a real crash test.	*
36	Pretty dangerous.	*
37	Even try bad crash tests.	*
38	Big jumping -	*
39	Big big jump crash.	*
40	Test this.	*
41	These crash tests ###	*
42	First I get everything set up.	*
43	With loads in them.	*
44	They going downhill.	*
45	Without your seatbelts buckled on the table.	*
46	It's going to crash.	*
47	That's a crash.	*

Finally, very rarely, parents and children might tell full-fledged fictional stories with plots, as in the example below, which features a 50-month-old and his mother. As reported by Benson (1993), plotted narratives such as these occur very rarely during spontaneous pretend play in 4- and 5-year-old children. In our corpus, telling stories like this—purely through language, without the aid of objects or any pretend enactment—did indeed occur very infrequently. In this example, the parent tells her own story about a dinosaur and a frog, and the child follows up with a story about a dinosaur and a fish. The dinosaur eats the fish and grows into a big giant until he couldn’t see anyone (line 24), because he was too big (line 26).

Example 16

Line	Parent Speech	Child Speech	HOT	Pretend
1	A dinosaur met a frog and they - maybe they didn't have much in common when they first met, and then they — you know, asked questions and found out that they got a lot in common.			*
2	Maybe they became friends.			*
3		The end.		*
4	That's it?			
5	That's my story.			
6	What's your story?			
7		I don't know what to say?		
8		Hmm.		
9	Um -			
10		I think I'll say - hmm.		
11	Think of something.			
12		I'll say um a dinosaur had a fish.		*
13	Mhmm.			*
14		And he was swimming in the water and he found another fish and throwed it in the basket.		*
15	Mhmm.			*
16		And then he at them.		*
17	Ate them?			*
18		Yum yum yum yum yum yum.		*
19	Oh wow.			*
20		And he grow bigger and bigger and bigger like a big old giant.	*	*
21	Because fish is good for you, right?		*	*

22		Yeah and he growed to a big old giant.		*
23	Mhmm.			*
24		And he couldn't see anyone.		*
25	Because he was too small?		*	*
26		No because he was too big.	*	*
27	Oh.			*
28		He was too big to see anyone.	*	*
29		He only gets -		*
30		And then he saw a big - big dinosaur that carry him down and he fell.		*

3. Results

3.1. HOT Use in Narrative and Pretend

Users of HOT in Narrative and Pretend. First, I will report the number and percentage of parents and children at 38- and 50-months who used pretend, as well as those who used HOT in pretend. Values pertaining to narrative, HOT, and HOT in narrative are also presented. The findings are summarized in Table 4.1 below.

		Parents		Children	
		38 months *n* = 61	50 months *n* = 58	38 months *n* = 61	50 months *n* = 59
Used HOT		61 (100%)	58 (100%)	58 (95%)	59 (100%)
Used Pretend		52 (85%)	50 (86%)	57 (93%)	59 (100%)
Used Narrative		60 (98%)	54 (93%)	59 (97%)	56 (95%)
HOT in Pretend	Could Use	52 (85%)	50 (86%)	54 (88%)	59 (100%)
	Did Use	34 (56%)	37 (64%)	38 (62%)	43 (73%)
HOT in Narrative	Could Used	60 (98%)	54 (93%)	57 (93%)	56 (95%)
	Did Use	50 (82%)	51 (88%)	32 (52%)	45 (76%)

Table 4.1. Number and percentage of subjects who used each type of speech, as well as those who could and did use HOT in narrative and pretend.

This table shows first that HOT was used by almost all parents and children at both time points (the exception is three children at 38 months who did not use HOT). In addition, most

parents and children (more than 90%) used narrative. Parents were slightly less likely to engage in pretend (around 85%) at both time points than their children, most (more than 90%) of whom did engage in pretend.

As far as incorporating of HOT into narrative or pretend contexts: most participants could have used a HOT utterance in a narrative or pretend context, since almost all of both parents and children used both narrative and HOT, or pretend and HOT, independently. However, more parents did use HOT in a narrative context (around 80-90%) than those that did use HOT in a pretend context (around 55-65%). This suggests parents may view narrative more so than pretend as a place to invoke complex language. Only around 52% of children actually did use HOT in a narrative context at 38 months, compared to 62% who used HOT in a pretend context. At 50 months, around 75% of children used a HOT in a narrative or a pretend context, suggesting that as children age, they are able to incorporate increasingly sophisticated talk into decontextualized speech contexts like narrative and pretend.

Next, I will discuss whether individuals used HOT only in narrative, only in pretend, in both types of speech, or in neither. Among parents, 29 (47%) used HOT in both narrative and pretend contexts at 38 months; 6 parents (10%) used HOT in neither, and the remaining 26 parents (43%) used HOT in either narrative or pretend, with most (n = 21) using HOT only in narrative. At 50 months, 36 parents (62%) used HOT in both types of decontextualized speech contexts, 6 (10%) used HOT in neither, and 16 (28%) used HOT in either narrative or pretend, with most (n = 15) using HOT only in narrative.

For children, 24 (39%) used HOT in both narrative and pretend at 38 months; 15 (or 25%) using HOT in neither, and the remaining 22 children (36%) used HOT in one or the other, with most (n = 14) using HOT only in pretend. At 50 months, 35 children (59%) used HOT in

both narrative and pretend, 6 (10%) used HOT in neither, and the remaining 18 (31%) being fairly balanced in using HOT in either narrative (n = 10) or pretend (n = 8).

Use of Pretend and Narrative. Next, I will explore usage whether parents and children used both narrative and pretend, since the analyses presented later in this chapter will examine HOT use in these different speech contexts, conditional on parents and children using both narrative and pretend. The results are summarized in Table 4.2 below. This table suggests the majority of parents and children at both sessions used both narrative and pretend; more parents than children used only narrative, although one parent at 38-months and two parents at 50-months used neither narrative nor pretend, while no child used neither at either visit. Four children at 38 months used only narrative and not pretend, and two children at 38 months and three children at 50 months used only pretend. In addition, across both sessions, there were 44 parents and 52 children who used both narrative and pretend at both time points.

	Parents		Children	
	38 months n = 61	50 months n = 58	38 months n = 61	50 months n = 59
Used both narrative and pretend	52 (85%)	48 (83%)	55 (90%)	56 (95%)
Used only narrative	8 (13%)	6 (10%)	4 (7%)	0
Used only pretend	0	2 (3.5%)	2 (3%)	3 (5%)
Used neither	1 (2%)	2 (3.5%)	0	0

Table 4.2. Use of either narrative and/or pretend by parents and children at the two time points.

Together, these findings suggest that while HOT, narrative, and pretend are fairly commonly used by both parents and children, not all individuals incorporate HOT utterances into their narrative or pretend speech. In addition, most parents and children use both narrative and pretend in the same visit. Parents are slightly more likely to use HOT in narrative than in pretend at both time points, which suggests parents may view narrative as a more intuitive discourse context to invoke HOT. However, more children use HOT in pretend than narrative at 38

months. This suggests children may initially incorporate HOT into their pretend, possibly because they engage in it more often, or possibly because at this age, pretend 'lends' itself more to HOT use, due to pretend's greater reliance on the present context. But by 50 months, roughly equal proportions of children incorporate HOT into their narrative and pretend speech.

3.2. Frequency of Narrative, Pretend, and HOT

Next, I will report the average number of utterances by parents and children at 38- and 50-months that are pretend, as well as the standard deviation and range. I will also report the same statistics for percentage of utterances that are pretend. The findings are summarized in Table 4.3 below. This table also contains the same values for narrative and HOT (previously described in Chapter 2).

		# of Utterances Per Hour				Percentage of Utterances			
		Parents		Children		Parents		Children	
		38 mos	50 mos	38 mos	50 mos	38 mos	50 mos	38 mos	50 mos
Pretend	Average	53	37	63	53	7.7%	5.5%	12.7%	11.3%
	SD	64	64	64	66	8.3%	7.8%	11.2%	13.4%
	N	61	58	61	59	61	58	61	59
	Min	0	0	0	1	0%	0%	0%	0.2%
	Max	254	294	256	227	29.5%	29.1%	42.6%	63.4%
Narrative	Average	29	33	16	22	4.5%	5.9%	3.6%	5.6%
	SD	22	28	13	20	4.0%	4.6%	3.1%	5.3%
	N	61	58	61	59	61	58	61	59
	Min	0	0	0	0	0%	0%	0%	0%
	Max	97	137	61	93	20.2%	24.6%	15.3%	22.2%
HOT	Average	33	38	14	18	5.1%	6.8%	3.0%	4.3%
	SD	22	32	12	13	2.4%	3.5%	2.3%	2.5%
	N	61	58	61	59	61	58	61	59
	Min	3	1	0	1	1.3%	0.9%	0%	0.2%
	Max	95	176	47	66	12.0%	21.1%	10.0%	13.3%

Table 4.3. Frequency of pretend, narrative, and HOT use (both number and percentage of utterances) by parents and children at 38- and 50-months.

This table suggests that in terms of both number and percentage of utterances, pretend makes up a much larger part of children's language than either narrative or HOT, and also has

considerably more variation, as the large range and standard deviations show. For example, at 38 months, almost 13% of children's utterances were pretend (and the maximum percentage of utterances from any given child that are pretend is almost 43%, or more than 200 utterances per hour). This is in contrast to both HOT and narrative, which tend to encompass around 3-5% or less of a child's utterances on average (or around 15 utterances per hour) Between 38 and 50 months, the average percentage of children's utterances that are pretend declined slightly, from 12.7% to 11.3%, whereas both HOT and narrative increased between 38 and 50 months (both in terms of number and percentage of utterances). This is some evidence that as children age, they engage in less pretend play.

For parents, pretend makes up a much smaller part of their language than children's at 38 months; around 8% of parents' utterances were pretend, in contrast to around 5% for both HOT and narrative. By 50 months, parents also declined in their usage of pretend (to 5.5%) but increased in their usage of both HOT (6.8%) and narrative (5.9%). Parents do not show as large ranges for pretend play; the maximum percentage of utterances that were pretend given by a parent in a given session was around 30%.

Correlations between HOT, Narrative, and Pretend Use. In this section, I will explore whether an individual's usage of narrative (alone) is related to his or her usage of pretend (alone). In other words, do people who use narrative also tend to use pretend, or do they represent such distinct types of language such that usage of one is not related to usage of the other? In addition, I explored whether HOT (alone) usage was related to either narrative or pretend usage. Table 4.4 below presents the results from the correlations, which were performed for both parents and children at 38- and 50-months, using number of utterances in each category as well as the percentage of all utterances that are each category.

		Number of utterances				Percentage of Utterances			
		Parents		Children		Parents		Children	
		38 months	50 months	38 months	50 months	38 months	50 months	38 months	50 months
Narrative	Pretend	0.07 *n* = 61	0.32** *n* = 58	-0.01 *n* = 61	-0.01 *n* = 59	-0.06 *n* = 61	-0.02 *n* = 58	-0.13 *n* = 61	0.23^ *n* = 59
Narrative	HOT	0.27* *n* = 61	0.50*** *n* = 58	0.36** *n* = 61	0.19 *n* = 59	0.38** *n* = 58	0.05 *n* = 58	0.30* *n* = 61	0.15 *n* = 59
Pretend	HOT	0.20 *n* = 61	0.30* *n* = 58	0.10 *n* = 61	0.36** *n* = 59	-0.02 *n* = 61	0.10 *n* = 58	-0.08 *n* = 61	0.03 *n* = 59

Table 4.4. Pearson's correlations between an individual's use of different speech types within the same session. ***$p < .001$; **$p < .01$; *$p < .05$; ^$p < .10$.

These findings suggest that narrative is not generally related to pretend use. The exceptions are a positive relationship for number of utterances for parents at 50 months, and a marginally significant *negative* relationship in percentage of children's speech that is narrative and pretend at 50 months. These findings suggest narrative and pretend are unique constructs, and people who use one do not necessarily use the other.

In addition, HOT use was sometimes related to narrative use, in particular for parents at 50 months (although the relationship is greatly diminished when examining the percentage of utterances that are HOT and narrative). At 38 months, however, both children's number and percentage of utterances that are HOT and narrative are significantly related, suggesting that usage of one might encourage usage of the other at this early age.

In addition, number of pretend and HOT utterances was related for both parents and children at 50-months (although percentage of utterances that are HOT and pretend are not related for either parents or children at either time point). This is additional evidence in support of the idea that by 50 months, pretend might also be a rich context in which parents and children regularly invoke HOT.

3.3. Frequency of Use of HOT in Narrative and Pretend

The above suggests that intendent narrative and HOT usage is related within individuals at the same session, while pretend usage was not generally related to HOT usage. Next, I will describe the frequency with which HOT is used in pretend, compare it to the usage of HOT in narrative. This will enable us to compare the relative rates of HOT use in different speech contexts, to determine whether pretend, like narrative, also encourages parents and children to use HOT. I will employ the same two analytical approaches described in Chapter 3: (1) percentage of each speech type containing HOT, as well as (2) expected versus observed occurrence of HOT in pretend and narrative.

(1) Percentage Containing HOT

The figure below (Figure 4.1) shows the average percentage of each speech type that contains HOT. This figure suggests that at 38 months, both parents and children incorporate HOT into roughly equal proportions in other speech and in pretend speech (around 5% for parents and around 3% for children). For both parents and children at 38 months, narrative contains a greater percentage of HOT (around 11% for parents; around 5% for children). However, at 50 months for both parents and children, pretend contains more HOT than other speech.

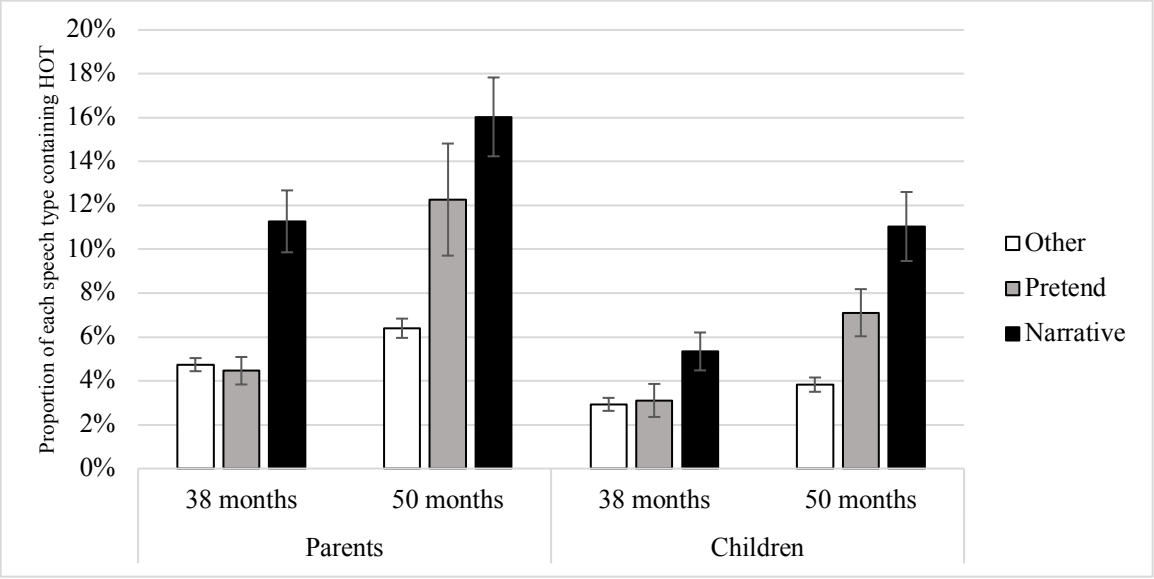

Figure 4.1. Proportion of parents' and children's other, pretend, and narrative speech that contains HOT.

An ANOVA was conducted, with speaker (parent vs. child) as a between-subjects variable, and session (38- vs. 50-months) and speech context (other vs. pretend vs. narrative) as within-subjects variables, resulting in a 2x2x3 mixed measures ANOVA. This ANOVA reports effects conditional on the participants using both narrative and pretend at both time points (which resulted in a sample of 44 parents and 52 children). There was a main effect of speech context, $F(2,188) = 21.90$, $p < .001$, such that other speech tended to contain the fewest instances of HOT. In addition, there was a main effect of session, $F(1,94) = 36.6$, $p < .001$, such that HOT use increased between 38- and 50-months. Finally, there was a main effect of speaker, $F(1,94) = 34.6$, $p < .001$, such that parents used more HOT than children. In addition, there was a marginally significant interaction between speech context and speaker, $F(2, 188) = 2.49$, $p < .10$, and a significant interaction between speech context and session, $F(2,188) = 5.78$, $p < .01$. No other interactions were significant.

Since speech context interacts with both speaker and session, and because it is unsurprising that parents differ from children, and that speakers differ between 38- and 50-

months, I conducted four one-way ANOVAs, with speech context (other vs. pretend vs. narrative) as a 3-level within-subjects variable for parents and children each at 38- and 50-months. These analyses were conducted on the participants at each session who used both narrative and pretend as reported in Table 4.2. For parents at 38 months (n = 52), there was a main effect of speech context, $F(2,102) = 17.81$, $p < .001$. Follow-up comparisons using t-tests with Bonferroni adjustment revealed significant differences between narrative and pretend ($p < .001$) and narrative and other speech ($p < .001$), while pretend and other speech did not differ from each other.

While patterns for children at 38 months (n = 55) looked qualitatively similar—in that narrative contains a greater percentage of HOT than either pretend or other speech—speech context was only marginally significant, $F(2,108) = 2.86$, $p < .10$. Follow-up comparisons revealed other and narrative speech differed marginally significantly ($p < .10$), while other speech did not differ from pretend, and pretend did not differ from narrative.

For parents at 50 months (n = 48), there was a main effect of speech context, $F(2,94) = 6.801$, $p < .01$. Follow-up pairwise comparisons suggested that other and narrative speech differed from each other ($p < .001$), similar to patterns at 38 months. Other and pretend are only marginally significantly different ($p < .08$), which suggests that as children grow, parents may be making pretend play richer, by using more HOT speech in pretend at 50 months than at 38 months. Finally, use of HOT by parents at 50 months in narrative and pretend was not statistically different, whereas it was at 38 months. This again lends support to the notion that as children get older, and their play becomes more sophisticated, parents recognize pretend, in addition to narrative, may serve as a place to invoke rich language such at higher-order thinking.

For children at 50 months (n = 56), there was main effect of speech context, $F(2,110) = 10.06$, $p < .001$. At 50 months, other speech and narrative differed significantly ($p < .001$), suggesting children are now looking much more like their parents in terms of incorporating HOT into narrative at greater rates compared to other speech. Interestingly, at 50 months for children, other speech and pretend did significantly differ from each other ($p < .01$), such that children were using more HOT in pretend compared to other speech. In addition, pretend and narrative did not differ from each other. This suggests that by at least 50 months, pretend could serve as another rich context in which children invoke higher-order thinking.

(2) Expected versus Observed Occurrence

The above suggests that there are differences in incorporation of HOT in different kinds of speech contexts, and that parents and children differ both from each other and across time. Narrative contains more HOT than other speech for parents and children at all time points, while by 50 months, both parents and children also seem to be using more HOT in pretend speech. To explore these results further, I compared the expected versus observed occurrence of HOT into pretend and narrative, using the same approach outlined in Chapter 3. As described earlier, this approach more fairly accounts for natural variation in individual's base rates of HOT, pretend, and narrative use. Figures 4.2 (percentage of utterances) and 4.3 (number of utterances) below summarize the findings.

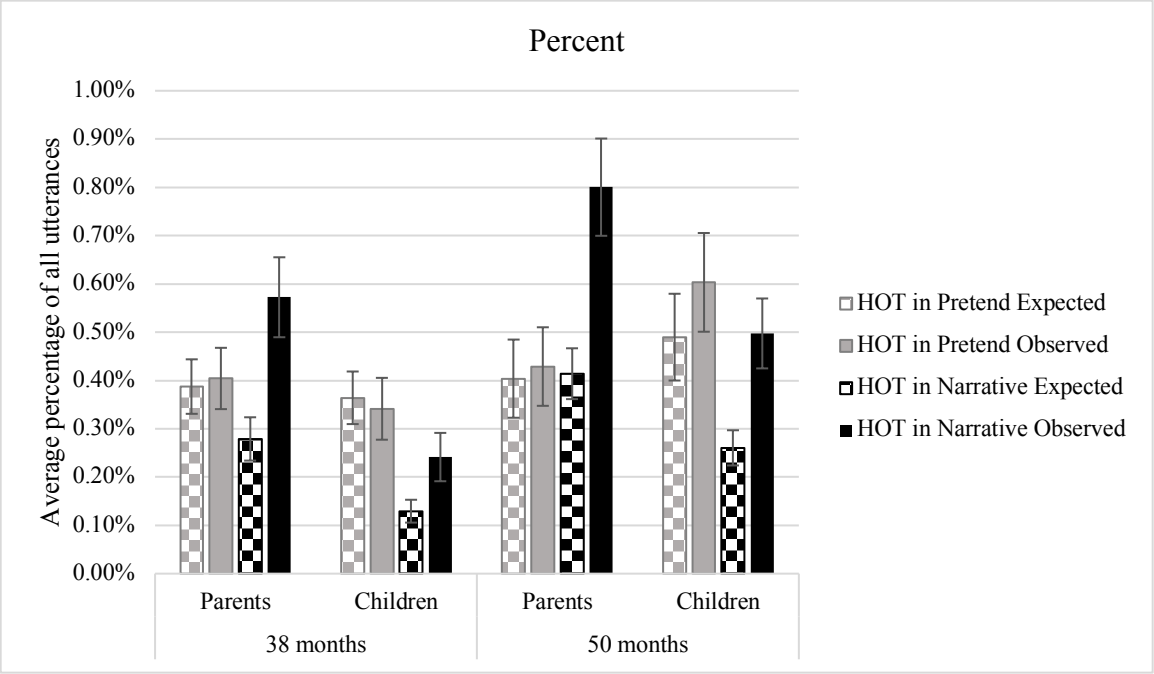

Figure 4.2. Expected and observed percentage of parents' and children's total utterances that are HOT in narrative or HOT in pretend.

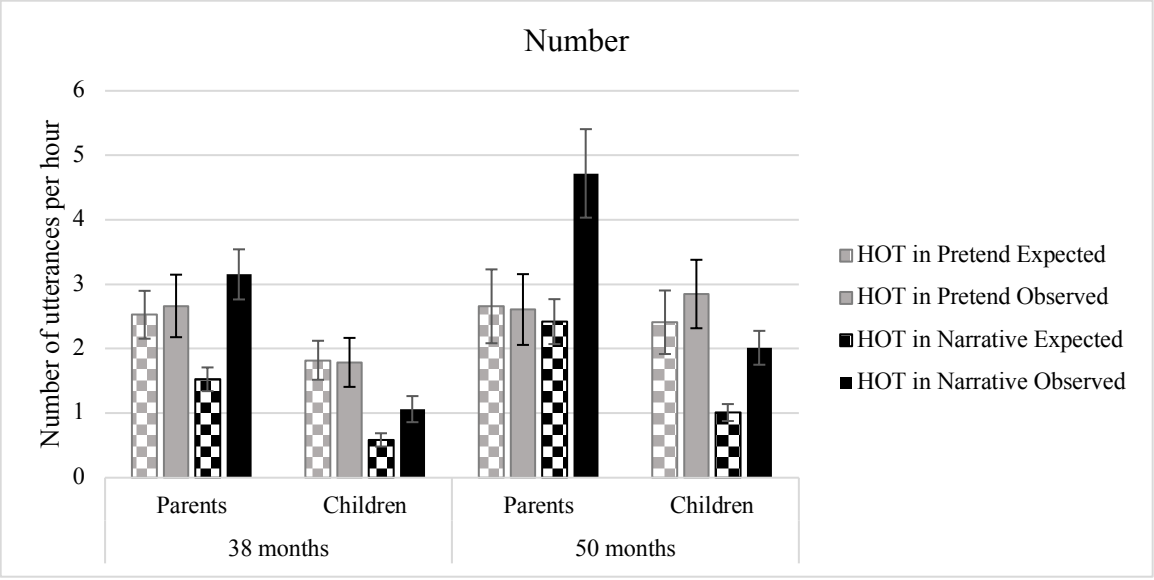

Figure 4.3. Expected and observed number of parents' and children's utterances per hour that are HOT in narrative or HOT in pretend.

These figures suggest that although at 50 months, pretend contains about equal proportions of HOT compared to narrative, parents and children are still incorporating HOT into their narrative speech at greater rates than expected by chance. However, because pretend makes

up a larger part of parent's and children's language than narrative (see Table 4.3), the number of HOT in pretend utterances is sometimes larger than the HOT in narrative utterances.

A 2x2x2x2 mixed measures ANOVA was conducted for percentage of speech containing HOT, with speaker (parent vs. child) as a between-subjects variable, session (38- versus 50-months) as a within-subjects variable, speech context (pretend vs. narrative) as a within-subjects variable, and speech status (expected vs. observed) as a within-subjects variable. As above, this ANOVA is conditional on subjects using both narrative and pretend at both sessions (44 parents, 52 children).

This ANOVA found main effects of session, $F(1,115) = 10.35$, $p < .01$, unsurprising given that we expect parents and children to differ in their language complexity as children grow. Somewhat surprisingly, the effect of speaker was only marginally significant, $F(1,115) = 3.42$, $p < .10$, likely due to the small occurrence of these types of speech. This ANOVA also did not find main effects of speech context, $F(1,115) = 0.45$, $p = 0.49$. There was, however, a speech context by speaker interaction, $F(1,115) = 8.04$, $p < .01$. There was also a main effect of speech status, $F(1,115) = 93.89$, $p < .001$, and a significant speech status by speaker interaction, $F(1,115) = 6.00$, $p < .05$. There was also an interaction between speech status and session, $F(1,115) = 6.43$, $p < .05$.

Most importantly, there was a significant speech context by speech status interaction, $F(1,1,115) = 42.03$, $p < .001$, suggesting narrative and pretend might differ with regard to their expected and observed values, as well as a 3-way interaction between speech context, speech status, and speaker, $F(1,115) = 4.40$, $p < .01$. No other interactions were significant.

Because speech context and speech status differed on so many levels, to explore these results further, and in line with the above approach, I conducted four two-way repeated-measures

ANOVAs for parents and children each at 38- and 50-months, with speech context (narrative vs. pretend) and speech status (expected vs. observed) as within-subjects variables. My goal is to determine whether there is an interaction between speech context and speech status, such that for narrative, what we observe is greater than what we expect, while for pretend, what we observe is equal to what we expect. I conduct this analysis for each speaker at each session, to see whether the pattern is the same for parents and children at 38- and 50-months. As above, the subjects of these ANOVAs are those who used both narrative and pretend in the same session.

For parents at 38 months, while speech context was not significantly different, $F(1,60) = 0.149$, $p = 0.70$, there was a significant effect of speech status, $F(1,60) = 20.77$, $p < .001$, as well as a speech context by speech status interaction, $F(1,60) = 13.54$, $p < .001$. Post-hoc pairwise comparisons revealed significant differences in speech status (between expected and observed) for narrative ($p < .001$), but not for pretend. This suggests that parents use more narrative-HOT co-occurrence utterances than expected by chance, based on people's 'natural' usage of narrative and HOT, but that pretend-HOT co-occurrence utterances only appear about as frequently as expected by chance. This means that narrative, and not pretend, particularly invites parents and children to use higher-order thinking, possibly because it is relatively more story-driven nature than pretend, because it relies less on the present context than pretend, or because it is more salient than pretend.

For children at 38 months, there was a main effect of speech context, $F(1,60) = 7.60$, $p < .01$, but not of speech status, $F(1,60) = 2.32$, $p = 0.13$. However, there was a speech context by speech status interaction, $F(1,60) = 4.88$, $p < .05$; like parents, post-hoc comparisons revealed that expected and observed values did not differ for pretend, but they did for narrative ($p < .01$),

suggesting even at this young age, narrative, but not pretend, particularly encourages children to use HOT at greater rates than expected.

For parents at 50 months, there were marginal effects of speech context, $F(1,57) = 3.89$, $p < .10$, but main effects of speech status, $F(1,57) = 30.38$, $p < .001$ as well as an interaction between speech status and speech context, $F(1,57) = 22.74$, $p < .001$. As at 38 months for parents and children, post-hoc pairwise comparisons revealed significant differences in speech status (between expected and observed) for narrative ($p < .001$), but not for pretend.

For children at 50 months, there was no longer a main effect of speech context, $F(1,58) = 2.27$, $p = 0.14$, but there were main effects of speech status, $F(1,58) = 42.53$, $p < .001$, and a marginal interaction between speech context and speech status, $F(1,58) = 2.92$, $p < .10$. Post-hoc comparisons revealed significant differences in expected and observed for narrative ($p < .001$) and no differences for pretend, similar to patterns for children at 38-months.

The findings from this section suggest that while narrative and pretend might contain similar percentages of HOT relative to each other in parents' and children's speech at 50 months, individuals are still more likely to incorporate HOT into their narrative speech at greater rates than expected by chance. For pretend, the expected occurrence of HOT into pretend is almost identical to the observed value, suggesting that while pretend may be a rich place where parents and children invoke HOT, they are not doing so at rates greater than expected by chance.

Although both narrative and pretend promote the use of metacognitive skills and thus might serve as rich places where parents and children invoke higher-order thinking, pretend does not differ from other speech in rates of HOT incorporation. Thus, parents and children might use more HOT in narrative due to its story-driven nature, its saliency, or its removal from the present context.

3.4. Different HOT Type Usage in Narrative and Pretend

Users of Inference and Comparison. Next, I explored whether different types of HOT—inference and comparison—were used more frequently in pretend, compared to narrative or other speech. As discussed earlier, while narrative may contain relatively the most inferences, pretend may also contain more inferences than other speech, due to its nature as extended discourse. Additionally, as shown in Chapter 3, use of comparisons does not differ between narrative and non-narrative speech for children, although it does for parents. Parents may also use more comparisons in their pretend speech compared to narrative speech; however, children may rely more on the present context to use comparisons, resulting in no differences by speech context in comparison usage.

To begin exploring whether usage of HOT was different by speech context, I first examined the proportion of parents and children at 38- and 50-months who used inferences or comparisons at all, as well as who could and did use each HOT type in narrative or pretend (for example, those that 'could use' inference in narrative are those who used both inferences and narrative in the same session, and thus had the capability to use an inference in a narrative context.) The following table (Table 4.5) summarizes the findings.

			Parents		Children	
			38 months *n* = 61	50 months *n* = 58	38 months *n* = 61	50 months *n* = 59
Inference	Used at All		61 (100%)	57 (98%)	55 (90%)	59 (100%)
	Used in Narrative	Could Use	60 (98%)	53 (91%)	54 (89%)	56 (95%)
		Did Use	49 (80%)	49 (84%)	28 (46%)	42 (71%)
	Used in Pretend	Could Used	52 (85%)	49 (84%)	51 (84%)	59 (100%)
		Did Use	31 (51%)	30 (52%)	30 (49%)	62 (63%)
Comparison	Used at All		60 (98%)	55 (94%)	52 (85%)	55 (93%)
	Used in Narrative	Could Use	59 (97%)	53 (91%)	52 (85%)	54 (92%)
		Did Use	33 (54%)	33 (57%)	8 (13%)	20 (34%)
	Used in Pretend	Could Use	51 (84%)	48 (83%)	48 (79%)	55 (93%)
		Did Use	23 (38%)	25 (43%)	20 (33%)	22 (37%)

Table 4.5. Proportion of parents and children at each session who used inferences and comparisons, and who could and did use each HOT type in pretend and narrative

This table suggests that more parents actually do use inferences (the most common HOT types) in narrative more than in pretend; for example, at 58 months, 84% of parents used inferences in a narrative context, compared to only 52% of parents who used inferences in pretend (these numbers are similar to the proportions at 38 months). For children, however, at 38 months, around 50% of children used inferences in pretend and in narrative; similar patterns were observed at 50 months, where about equal proportions of children used inferences in narrative (71%) and in pretend (63%). This suggests that for children pretend may serve as an equally important context to narrative where children invoke inferences, while fewer parents actually use inferences in a pretend context.

Comparisons were less likely to be used in decontextualized speech contexts, though were slightly more frequently used by parents in narrative than in pretend. Around 50-60% of parents at both visits used a comparison in a narrative context, compared to around 40% of parents who used comparisons in pretend. For children, usage of comparisons in any decontextualized speech context was fairly rare; at 38 months, for example, only 13% of children used a comparison in a narrative context, but at this age, 33% used a comparison in a pretend

context. This suggests, in line with Chapter 3, that comparisons in narrative speech may be particularly challenging for young children, but might be somewhat easier to incorporate into pretend speech. At 50 months, under 40% of children used a comparison in narrative or pretend.

Together, these findings suggest that not all individuals actually use the HOT types in decontextualized speech contexts, and that some types (especially inferences) may lend themselves more to usage in narrative and pretend.

Frequency of Usage. Next, I will explore the actual rates of usage, and whether they differ by speech context. I will only use the first analytical approach in this section (e.g. examining the percentage of each speech context that contains each type of HOT); examinations of the expected vs. observed figures, which can be viewed in Appendix C, yield comparable conclusions. At the end of this section, summary tables (Tables 4.6 and 4.7) presents the key statistical differences observed between rates of usage of overall HOT, inference, and comparison in narrative, pretend, and other speech.

(1) Inference. The figure below (Figure 4.4) shows the average proportion of parents' and children's pretend, narrative, and other speech that contains inferences, at 38- and 50-months. This figure suggests that for parents and children at both time points, narrative contains more instances of HOT than either pretend or other speech. While at 38 months, neither parents nor children use inferences in pretend more than in other speech, the pattern changes at 50 months, such that pretend contains more inferences than other speech (but narrative still contains relatively more inferences than either other or pretend speech).

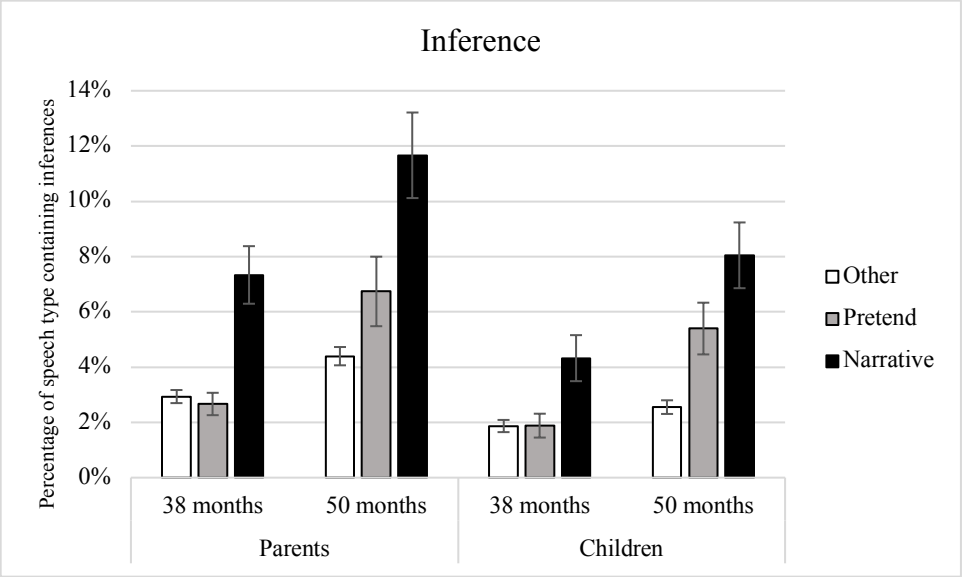

Figure 4.4. Proportion of other, pretend, and narrative speech containing inferences.

As when examining the proportion of each speech type that contained HOT overall, a 2x2x3 mixed measures ANOVA was conducted, with speaker (parent vs. child) as a 2-level between-subjects variable, session (38- vs. 50-months) as a 2-level within-subjects variable, and speech context (other vs. pretend vs. narrative) as a 3-level within-subjects variable. This ANOVA was conducted with the 44 parents and 52 children who used narrative and pretend at both sessions.

There was a main effect of speaker, $F(1,94) = 10.90$, $p < .001$, unsurprising given that parents used more inferences than children. There was also a main effect of session, again unsurprising, $F(1,94) = 35.42$, $p < .001$, again unsurprising, because parents and children used more inference at 50- than at 38-months. There was also a main effect of speech context, $F(2,188) = 32.23$, $p < .001$, suggesting rates of incorporation of inferences varied in other, narrative, and pretend speech. There was a significant session by speech context interaction, $F(2,188) = 5.03$, $p < .01$, suggesting the effect of speech context differed by session. No other interactions were significant.

To follow up on these results, and again, to explore whether there was an effect of speech context for parents and children at 38- or 50-months, four one-way repeated measures ANOVAs were conducted, with speech context (other vs. narrative vs. pretend) as a 3-level repeated-measures variable. These (and the additional one-way ANOVAs for each type described in this section) were conducted (with one exception, to be described below) with the 52 parents at 38-months who used both narrative and pretend, the 48 parents at 50 months who used both narrative and pretend, the 55 children at 38 months who used both narrative and pretend, and the 56 children at 50 months who used both narrative and pretend.

For parents at 38 months, speech context was significant, $F(2,102) = 18.37$, $p < .001$. Follow-up comparisons with Bonferroni adjustment suggested that while narrative differed from both other and pretend ($p < .001$), pretend and other were not different from each other. For children at 38 months, speech context was also significant, $F(2,108) = 5.81$, $p < .01$. Follow-up comparisons revealed narrative was significantly different than other speech, $p < .001$, and only marginally different than other speech, $p < .10$. Other and pretend speech were not statistically different. This suggests that for parents and children at 38 months, narrative is a special context in which parents and children invoke many inferences.

At 50 months, the effect of speech context was again significant for parents, $F(2,94) = 11.99$, $p < .001$, and for children, $F(2,110) = 9.81$, $p < .001$. Follow-up comparisons for parents revealed narrative differed significantly from other speech ($p < .001$), as well as from pretend ($p < .05$), and that pretend and other were close to marginally significantly different ($p = .11$). For children, there was also a main effect of speech context, $F(2,100) = 9.81$, $p < .001$. Post-hoc comparisons suggested both narrative ($p < .001$) and pretend ($p < .01$) differed from other speech, and narrative and pretend did not differ significantly from each other. This suggests that

for parents and especially children at 50 months, pretend in addition to narrative might serve as a rich context for inferences.

(2) Comparison. Next, I explored whether comparisons were used differentially by parents and children in pretend, narrative, or other speech. As noted in Chapter 2, children's usage of comparisons did not vary in narrative versus non-narrative speech, but it did for parents. Figure 4.5 below summarizes the findings. This figure suggests that for parents at 38-months, comparisons are used more frequently in narrative speech (around 3%) compared to other or pretend speech (around 1% of each type). At 50 months, parents have increased in their overall usage of comparisons, and in addition, are now using comparisons roughly equally in pretend and narrative (around 3-5% of each speech type), and use comparisons less frequently in other speech. For children, however, at 38-months, comparison usage did not vary by speech context (around 1% of each speech context). At 50 months, children are using more comparisons in pretend, and in fact has almost caught up to narrative. Both decontextualized speech contexts contain more comparisons than other speech.

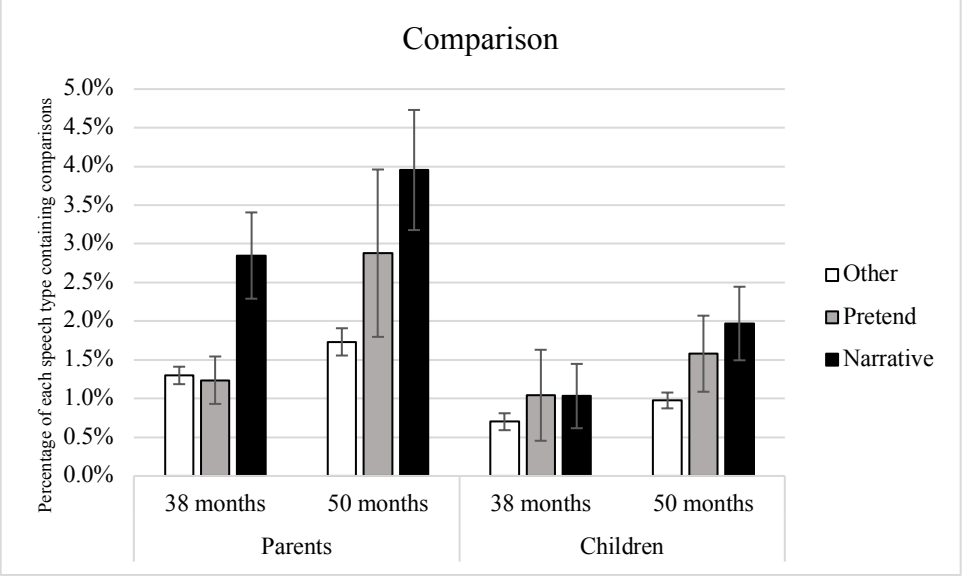

Figure 4.5. Proportion of other, pretend, and narrative speech containing comparisons.

As above, a 2x2x3 mixed ANOVA was conducted for percentage of each speech type that contained comparisons, with speaker as a between-subjects variable, visit as a within-subjects variable, and speech context as a within-subjects variable. This ANOVA found main effects of speaker, $F(1,94) = 85.39$, $p < .001$, unsurprising given that parents used more comparisons than children. Session was also significant, $F(1,94) = 10.69$, $p < .01$; parents tended to offer more comparisons than children. Speech context was only marginally significant, $F(2,188) = 2.57$, $p < .10$. No other interactions were significant.

To follow up these results, and in line with the above approach, four one-way repeated measures ANOVAs were conducted for parents and children each at 38- and 50-months. At 38 months for parents, there was a main effect of speech context, $F(2,102) = 6.04$, $p < .01$, while for children, there was no main effect, $F(2,108) = 0.19$, $p = 0.83$. Follow-up comparisons revealed that parents differed in their rate of comparison usage between narrative and both other and pretend speech (both p's $< .05$), while other and pretend were not different. While children at this age do not vary in their comparison usage by speech context, parents use more comparisons in narrative speech compared to other and pretend.

One parent at 50 months was excluded from analyses, whose pretend speech was 100% comparisons (because she only used one pretend utterance in the session and it happened to be a comparison); this subject greatly skewed the results. Thus, this ANOVA was conducted with the 47 parents who sued both narrative and pretend at 50 months. Parents at this visit marginally differed in their comparison usage by speech context, $F(2,92) = 2.25$, $p < .10$; post-hoc comparisons suggested this was due to the differences between other speech and narrative ($p < .05$) while narrative did not differ from pretend, nor did pretend differ from other speech.

Children at 50 months did not vary in their use of comparisons by speech context, $F(2,110) = 1.58$, $p = .21$.

Together, these finding suggest for parents at both child ages, narrative contains more comparisons than other speech; when children are younger, parents use more comparisons in pretend, possibly as a scaffolding strategy. Children do not use comparisons more frequently in different kinds of speech; one might almost expect non-narrative and non-pretend speech to contain more comparisons, because other speech is more contextualized and might rely more on the present context. It is intriguing that decontextualized speech contexts like narrative and pretend still contain a fair amount of comparison usage (and at 50 months, children seem to trending towards the patterns exhibited by their parents).

Summary. Tables 4.6 and 4.7 below summarizes the significant statistical differences observed in usage of these different types of HOT across speech contexts. Table 4.6 describes each of the main effects and interactions from the 2x2x3 ANOVAs, while Table 4.7 describes the main effects from the 3-way repeated measures ANOVAs conducted for parents and children at each session, as well as results from post-hoc analyses.

	Overall HOT	Inference	Comparison
Main effect of Speaker (Parent vs. Child)	***	***	***
Main effect of Session (38- vs. 50-months)	***	***	**
Main effect of Speech Context (Other vs. Narr. vs. Pret.)	***	***	^
Speaker x Session Interaction	ns	ns	ns
Speaker x Speech Context Interaction	^	ns	ns
Session x Speech Context Interaction	**	*	ns
Speaker x Session x Speech Context Interaction	ns	ns	ns

Table 4.6. Main effects and interactions from the 2x2x3 ANOVAs conducted for overall HOT, inference, and comparison use. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ^$p < 0.10$.

			Parents		Children	
			38 months	50 months	38 months	50 months
Overall HOT		*N*	52	48	55	56
		Main effect of Speech Context	***	**	^	***
	Post-Hoc Comparisons	Narrative vs. Other	***	***	^	***
		Narrative vs. Pretend	***	ns	ns	ns
		Pretend vs. Other	ns	^	ns	**
Inference		*N*	52	48	55	56
		Main effect of Speech Context	***	***	**	***
	Post-Hoc Comparisons	Narrative vs. Other	***	***	***	***
		Narrative vs. Pretend	***	*	^	ns
		Pretend vs. Other	ns	ns	ns	**
Comparison		*N*	52	47	55	56
		Main effect of Speech Context	*	^	ns	ns
	Post-Hoc Comparisons	Narrative vs. Other	*	*	--	--
		Narrative vs. Pretend	*	ns	--	--
		Pretend vs. Other	ns	ns	--	--

Table 4.7. Results from follow-up one-way ANOVAs for each speaker at each session. ***$p < 0.001$, **$p < 0.01$, *$p < 0.05$, ^$p < 0.10$.

As a whole, these findings suggest narrative contains more instances of HOT—and particularly inferences—than either pretend or other speech for both parents and children at both time points, while in most cases, pretend does not generally differ from other speech (the exception is for children at 50 months, who also use more inferences in pretend compared to other speech). While parents may use more comparisons in narrative than pretend or other speech, children do not vary in their usage of comparisons by speech context.

3.5. Predictors of Pretend and HOT in Pretend Usage

The previous chapters already discussed relations between demographic characteristics (child gender, child first-born status, and SES) and use of narrative or HOT in narrative. I found that SES was most important for explaining parents' and children's usage of narrative overall, while child first-born status and gender related to use of HOT in narrative.

In this section, I will explore whether different demographic characteristics relate to pretend or HOT in pretend use at 38- and 50-months for parents or children. In this section, I averaged across the 38- and 50-month visits, but patterns were qualitatively similar when examining each session on its own. Fifty-nine children and fifty-eight parents completed both sessions. For the three parents and two children who completed the 38-month visit but not the 50-month visit, their values from the 38-month visit are used. The final sample thus consists of 61 parents and 61 children.

Number of Pretend Utterances. I first explored whether demographics (gender, first-born, race/ethnicity, family income, primary caregiver education, and SES) were related to number of pretend utterances provided by parents and children in each session. Previous research suggests individuals with more time and material resources may use more pretend, though in the literature, frequency of pretend play has not generally been found to vary by first-born status, gender, or race.

(1) Parents. I found no effects of child gender or child first-born status on number of pretend utterances (all p's > .10). However, there was a significant effect of race, $F(3,57) = 4.51$, $p < .01$, such that parents of children of mixed/other race ($n = 6$) used more pretend utterances ($M = 94$, $SD = 73$) than parents of White ($n = 35$, $M = 51.3$, $SD = 42$), Black ($n = 13$, $M = 17$, $SD = 31$), or Hispanic ($n = 7$, $M = 16$, $SD = 19$) children. Follow-up comparisons with Bonferroni adjustment revealed that White children did not differ from any of the other groups, but that Black and Hispanic children both used significantly fewer pretend utterances than children from mixed/other races (both p's < .05)

In addition, access to resources (as measured by family income, parent education, and SES) is associated with the use of more pretend utterances by parents. There was a marginal

association between pretend utterances and parent education ($r = 0.25$, $p < .10$), such that parents with higher levels of education used more pretend utterances. Income was also significantly positively related ($r = 0.35$, $p < .01$), as was the composite SES variable ($r = 0.35$, $p < .01$). This provides some evidence in favor of the notion that individuals with more time, resources, space, and endorsement will use pretend play more frequently.

A multiple regression model was conducted, with number of parent pretend utterances as the outcome, and child gender, child first-born status, child race/ethnicity (with White as the reference category), and SES as predictors. In this model, I also controlled for total number of parent utterances. The model was significant at predicting usage of pretend, $F(7,53) = 4.27$, $p < .001$, $R^2 = 36.0\%$. Significant predictors were number of parent utterances ($\beta = 0.06$, $SE = 0.03$, $p < .005$), as well as the coefficient for mixed/other race ($\beta = 37.5$, $SE = 21.5$, $p < .10$). Controlling for number of parent utterances eliminates the effects of SES, parent education, and income, likely because these individuals use more utterances in general. However, this model suggests that when controlling for SES, gender, and first-born status, parents of children of mixed/other races used around 38 more pretend utterances than parents of White children (although given the small number of children in this racial group, it is difficult to draw firm conclusions).

(2) Children. The same predictors were used to establish whether there were any relationships between demographics and number of child pretend utterances. As with their parents, race was a significant predictor of child pretend utterances, $F(3,57) = 3.23$, $p < .05$; children from mixed/other backgrounds used more pretend utterances ($M = 109$, $SD = 66$) than children from other racial groups (White: $M = 58$, $SD = 47$; Black: $M = 40$, $SD = 43$, Hispanic: $M = 40$, $SD = 42$). As with their parents, follow-up comparisons with Bonferroni adjustment

revealed Black children ($p < .05$) and Hispanic children ($p < .10$) differed significant from children of mixed/other races, but no other group differences were detected.

Unlike their parents, parent education and income did not relate to child pretend utterances (all p's > 0.14). However, SES was marginally related to number of pretend utterances ($r = 0.22$, $p < 0.10$); this suggest that examining income and education alone does not explain child use of pretend, but their combination does. Gender and child first-born or only status did not predict number of child pretend utterances.

A multiple regression model to predict number of child pretend utterances was conducted, with child gender, child first-born status, child race/ethnicity (with White as the reference category), and SES as predictors. This model also controlled for total number of child utterances. This model significant explained number of child pretend utterances, $F(7,53) = 2.38$, $p < .05$, $R^2 = 23.9\%$. Only the dummy for mixed/other race was significant ($\beta = 48.6$, $SE = 22.5$, $p < .05$); surprisingly, child total number of utterances was not significantly related ($\beta = 0.09$, $SE = 0.05$, $p = .11$), suggesting usage of pretend may be more explained more by individual characteristics rather than overall quantity of speech.

Together, these findings suggest that while there are not consistent differences in pretend usage attributable to gender or child first-born status, access to resources (as measured by parent education, income, and SES) does predict pretend usage, particularly for parents. In addition, families from mixed/other racial backgrounds use more pretend utterances, even when controlling for overall talkativeness and SES, though the small number of subjects in this racial group make it difficult to draw generalizable conclusions.

Number of HOT Utterances in Pretend. Next, I explored whether number of HOT in pretend utterances varied by demographic characteristics. We might expect that girls and parents

of girls may use more HOT in pretend utterances, due to their reliance on language modes over material modes in their pretend play. We might also expect only- or first-born children to use richer pretend speech, resulting in more HOT use in pretend contexts, due to parents' ability to provide individuated attention to these children.

(1) Parents. While gender was not related to number of HOT in pretend utterances by parents, child first-born status was, such that parents of children who were the first or only born (n = 34) used average of 3.24 HOT in pretend utterances per hour across the two sessions, while parents of other children (n = 27) used only an average of 1.75 utterances per hour. This difference was marginally statistically significant, $t(59) = -1.89$, $p < .10$).

Racial differences were also observed, $F(3,57) = 3.99$, $p < .05$, with parents of children of mixed/other races using an average of 5.09 (SD = 4.06) HOT in pretend utterances per hour, parents of White children using an average of 3.08 (SD = 3.26) HOT in pretend utterances per hour, parents of Hispanic children using an average of 1.27 (SD = 1.34) HOT in pretend utterances per hour, and parents of Black children using fewer than 1 HOT in pretend utterance per hour (M = 0.76, SD = 1.55). These effects are not surprising, given the racial differences observed in total number of parent pretend utterances by race. However, follow-up comparisons with Bonferroni adjustment revealed only parents of mixed/other and Black children differed significantly from each other ($p < .05$).

As with total number of pretend utterances, HOT in pretend utterances was significantly correlated to income (r = 0.32, $p < .05$), parent education (r = 0.26, $p < .05$), and SES (r = 0.33, $p < 0.01$). This suggests usage of HOT in pretend may be another area where access to resources is important to consider.

A multiple regression model with number of parent HOT in pretend utterances as the outcome, and child gender, child first-born status, child race/ethnicity (with White as the reference category), and SES as predictors, while also controlling for number of pretend utterances, significantly predicted number of HOT in pretend utterances, $F(7,53) = 16.39$, $p < 0.001$, $R^2 = 64.2\%$. However, the only significant predictor was number of pretend utterances, $\beta = 0.04$, $SE = 0.005$, $p < 0.001$). This suggests that one way to get parents to use more HOT in pretend contexts is to increase the frequency of pretend utterances.

(2) Children. For children, similar to their parents, race was a significant predictor of HOT in pretend usage, $F(3,57) = 3.22$, $p < 0.05$. Children of mixed/other race ($M = 2.99$, $SD = 1.59$) and White children ($M = 2.95$, $SD = 2.90$) used more HOT in pretend utterances than Black ($M = 1.01$, $SD = 1.66$) or Hispanic ($M = 0.71$, $SD = 0.80$) children. However, follow-up comparisons did not reveal any significant between-group differences. Gender and child first-born status did not relate to usage of HOT in pretend utterances (both p's > 0.12).

As with their parents, income ($r = 0.24$, $p < 0.10$) and SES ($r = 0.25$, $p < 0.10$) both marginally related to use of HOT in pretend utterances (although parent education did not, $r = 0.18$, $p = 0.16$). Children's usage of HOT in pretend is slightly less influenced by access to resources than parent's usage. Child gender or first-born/only status did not predict child HOT in pretend utterances.

A multiple regression model to predict number of child HOT in pretend utterances was conducted, which was significant, $F(7,53) = 11.34$, $p < 0.001$. The full results from the model are presented in Table 4.8 below.

		β	SE_β	*t*-statistic	*p*-value
Child Pretend Utterances		0.04	0.005	7.25	<0.001
Gender		-0.11	0.48	-0.22	0.83
First-Born		0.52	0.47	1.11	0.27
SES		-0.16	0.26	-0.61	0.55
Race	Black	-1.46	0.63	-2.32	0.02
	Hispanic	-1.80	0.78	-2.32	0.02
	Mixed/Other	-1.88	0.85	-2.21	0.03
Constant		0.70	0.53	1.32	0.19

Table 4.8. Multiple regression model to predict child HOT in pretend utterances.

This model suggests that there are significant racial differences in usage of HOT in pretend utterances, even after controlling for gender, child first-born status, and SES. Black, Hispanic, and Mixed/Other children all use 1-2 fewer HOT in pretend utterances compared to White children (who are the reference group).

In sum, demographic characteristics significantly predict number of pretend and HOT in pretend utterances. Individuals with more resources (income, education, and SES) tend to use more pretend, and consequently more HOT in pretend. However, controlling for total number of utterances or total number of pretend utterances, the effects of socioeconomic status went away for parents. This suggests that interventions could try to increase the frequency of pretend play, which may also lead to more usage of HOT in pretend.

For children, there were racial differences in usage of HOT in pretend that were not explained by number of pretend utterances or SES alone. White children tended to use more HOT in pretend utterances than children in the other racial categories, which may be partially explained by the fact that White children many pretend utterances in general. However, children from mixed/other races still used fewer HOT in pretend utterances, despite using the most pretend utterances overall. Future research should work to address these deficits, and further explain why some children use HOT in pretend more frequently than other children.

4. Conclusions

The above chapter has explored whether pretend, another type of decontextualized speech frequently used by parents and children in their everyday interactions, also contains more instances of HOT compared to non-narrative and non-pretend speech. I also explored differences in usage of comparisons and inferences, as well as relations to individual demographic characteristics.

These findings suggest that slightly more children compared to their parents actually did use pretend speech, highlighting the important role portend play has for children in particular. In addition, while most parents actually did invoke HOT into narrative contexts fairly frequently at both sessions (more than 80%), fewer parents actually did use HOT in pretend contexts (around 50-60%), suggesting not all parents intuitively view pretend play as a place to invoke and use more complex language such as inferences, comparisons, abstractions, and hierarchies. Children did not generally differentiate between narrative and pretend with regard to whether they used HOT at all; at 50 months, around 70% of children used HOT in both speech contexts. This suggests that pretend may be an area of improvement for parents in terms of encouraging HOT usage, while children already recognize it as a space to invoke higher-order thinking.

In addition, a greater percentage of parents' and children's speech tended to be made of pretend, compared to either narrative or HOT. One individual used pretend in around 60% of his utterances, while the maximum frequency of narrative was only around 20% of utterances. This is largely explained by the fact that pretend episodes tend to be longer than narrative episodes.

Usage of HOT alone was generally related to usage of narrative alone, but not usage of pretend alone. When examining parent and child usage of HOT in narrative and pretend contexts, there were differences according to session. At 38 months, both parents and children used more

HOT in narrative, compared to pretend or other speech. However, at 50 months, narrative speech was made of a greater percentage of HOT compared to pretend speech, but pretend speech also contained more instances of HOT compared to other speech. This suggests that as children grow, both parents and children start to recognize pretend as a language context in which to invoke higher-order thinking such as inferences and comparisons. However, parents and children invoke HOT in narrative speech at greater rates than expected by chance, while pretend contains almost exactly the amount of HOT expected. Despite the fact that pretend later becomes more enriched, narrative still seems to be a special kind of speech which invites the use of higher-order thinking.

This suggests that while both narrative and pretend share many similarities that could explain why HOT may be frequently used—their story-driven nature, their saliency, their ability to encourage metacognition, and their degree of relation to the present context—narrative still contains more HOT than pretend. This could be due to the fact that narrative is more salient and relevant than pretend, because individuals are discussing events that have real and personal relevance to themselves. In addition, although both are story-driven, narratives tend to be more organized 'plotted' than pretend play, which could also lead to more HOT use. Finally, pretend relies more on the present context than narrative, as evidenced by the fact that we had to use the cues from the video, including paralinguistic cues and cues from the environment, to code pretend, while narrative could be coded using only the written transcript. In addition to the fact (described in Chapter 3) that future narratives also contain more instances of HOT than past/habitual narratives, it may be the case that when individuals refer to people, objects, actions, or things that are more removed from the *here-and-now*, they may also use more HOT.

There are also interesting differences in HOT use across parents and children in the two sessions by HOT type. At both sessions, more parents actually did invoke inferences in narrative

speech (around 80%) compared to pretend speech (around 50%). At 38 months for both narrative and pretend, around 50% of children used inferences. By 50 months, however, 71% of children used inferences in narrative and 62% of children used inferences in pretend. This suggests that using HOT in decontextualized speech contexts is challenging for young children, but as children age, they are increasingly able to invoke inferences in both narrative and pretend speech. Fewer parents (around 50% at both session) used comparisons in decontextualized speech at all, compared to only 13% of children at 38 months and 34% of children at 50 months; this suggests comparison usage may be tied more to the current context, and thus decontextualized speech might be a challenging speech context to invoke comparisons.

For inference usage at 38 months, both parents and children use more inferences in their narrative speech compared to either pretend speech or other speech. By 50 months, however, pretend speech contains more inferences than other speech, but still not as much relative to narrative speech. As children grow, parents and children make pretend play more complex and story-driven by invoking more inferences to explain cause-and-effect, character motivation, etc. Frequency of comparison usage did not vary by speech context for children at either visit, suggesting that children may need to rely more on the present context to scaffold their usage of comparisons. However, parents did use more comparisons in their narrative speech compared to their pretend or other speech, suggesting they are enriching their narrative speech, possibly through the use of similes or metaphors, or are drawing comparisons between objects in the present context and the decontextualized narrative context to scaffold their narrative interactions.

There were some interesting demographic differences with regard to overall pretend and HOT in pretend usage. SES (and its components, parental education and family income) were generally related to usage of pretend, as well as HOT in pretend. There were also racial

differences observed, such that children from mixed/other races and White children generally used the most pretend (and HOT in pretend). However, accounting for total amount of speech (or total amount of pretend utterances) largely explained these demographic differences. Nevertheless, these findings suggest that one strategy to get parents and children to use more HOT in pretend contexts is to support and encourage pretend play.

The findings from this chapter inspire many interesting avenues for future research. While pretend has been treated in these analyses as a singular type of speech, there are many different ways in which parents and children pretend: play while representing objects as another, play while using object replicas, and telling or re-telling stories about fictional characters. In there are also differences in children's play partners: collaborative vs. solo pretend play, play with parents vs. play with siblings, and play with objects vs. play that relies more on language. Each of these different ways or types of pretending may differentially afford the use of higher-order thinking. Pretend that is more story-driven (such as telling or retelling stories about fictional or made-up characters without pretend enactment), or that is particularly salient, or that relies less on the here-and-now, or that makes use of metacognition, may encourage the use of higher-order thinking, much in the same way that narrative does. Additionally, while this chapter only describes HOT use in pretend at 38- and 50-months, pretend could be examined in the remaining time points, to explore the onset of HOT in pretend speech, as well as whether these patterns differ across development.

In sum, this chapter—in line with the previous chapter—suggests that narrative serves as a unique speech context in which parents invoke inferences and comparisons, and where children invoke inferences. Parents and children also use more inferences in pretend at 50 months compared to other speech, although narrative still maintains a privileged position in terms of

incorporation of inferences. Children find it challenging to invoke comparisons into decontextualized narrative and pretend speech, while parents also use more comparisons in narrative speech compared to pretend speech.

CHAPTER FIVE: DISCUSSION

1. Overall Summary and Conclusions

Children vary greatly in the quality and quantity of the linguistic input they receive from their parents (e.g. Hart & Risley, 1995). Variations in children's early home language environments are one area that researchers believe partially explains how and why children from low-SES backgrounds come to school less prepared than their peers. Differences in early school readiness widen over time and relate to long-term academic outcomes (Saxe, 1999; Huttenlocher et al., 1991; Duncan et al., 2007). Therefore, it is important to understand the role that parent's and children's early language environments can play in helping all children to develop critical language and reasoning abilities, such as higher-order thinking.

Higher-order thinking occurs when individuals use language to link two representations ideas together (Richland & Simms, 2015; Resnick, 1987; Freeman, 2015). The four types of HOT described in this dissertation are inferences, comparisons, abstractions, and hierarchies. As well as examining HOT overall, I also focus in particular on inferences and comparisons, which are both most frequently occurring as well as particularly useful for educational application (Halford, Wilson, & Phillips, 2010; Speed, 2010). While HOT language and skills may require more cognitive processing, they also come with more generalized benefits, as these skills can be used to develop knowledge that crosses domains.

Although higher-order thinking is important, previous research has not examined whether particular kinds of speech contexts are conducive to supporting higher-order thinking, particularly for young children. The findings from this dissertation suggest that decontextualized speech such as personal narrative may be just such a speech context, where parents and children frequently and naturally invoke higher-order thinking at rates greater than expected by chance.

Personal narrative is speech where an individual tells others about events that have happened or will happen to oneself. It is decontextualized, or removed from the *here-and-now*, because individuals invite their conversation partners to discuss internal representations of events—memories of past events, plans for the future, or generalized routines—rather than the current or present context. Stories or narratives of personal experience are ubiquitous in many people's everyday conversations, including conversations with very young children. Children's abilities to relay their own stories of personal experience improve greatly over early childhood, such that even by around age 4, children are able to provide an understandable account a past event that occurred up to one year prior to a naïve listener (Fivush, Haden, & Adam, 1995; Peterson & McCabe, 1983).

Children's burgeoning narrative abilities are influenced a great deal by their parents, and are particularly influenced by parental elaboration styles (e.g. Haden, Haine, & Fivush, 1997). In addition, how frequently parents use personal narrative speech with their preschool-aged children has been linked to improved educational outcomes for children, such as vocabulary, narrative production, and other literacy skills (e.g. Dickinson & Tabors, 2001; Demir et al., 2015; Rowe, 2012).

Several reasons have been proposed to explain why decontextualized speech such as narrative matters for children's later academic abilities. One is that decontextualized speech serves as a precursor to *academic language*. Academic language is the language of instruction used in formal education settings, and is used when individuals formulate an argument, give a presentation, and discuss unknown concepts and vocabulary (Cummins, 1984; Snow & Uccelli, 2009; Snow, 2010). Understanding and producing the more formal register required by academic language can be challenging if children have little or no exposure with talking and thinking about

ideas removed from the present context. The second reason is that decontextualized speech might promote *emergent literacy*, the development of literacy-related skills before the commencement of formal reading instruction (e.g. Dickinson & Snow, 1987; Snow & Ninio, 1986). Talk about past and future events in narrative might expose children to the linguistic forms and macrostructures important for later literacy skills. These reasons are not mutually exclusive (as literacy promotes academic language and vice-versa), and merely represent different pathways through which early decontextualized speech impacts later outcomes.

One additional reason proposed in this dissertation is that its ability to promote higher-order thinking is another reason for why decontextualized narrative speech is particularly relevant to children's later skills and outcomes. I have found that the majority of parents use both narrative and higher-order thinking in their everyday interactions with their children when their child is between 14 and 58 months. Children begin using narrative around 26 months, and higher-order thinking around 28 months; over time, both parents and children increase the frequency with which HOT and narrative are used. Importantly, parents from 14-58 months and children after 38 months use more HOT in narrative compared to non-narrative speech. In addition, both parents and children incorporate HOTs into their narrative speech more often than expected by chance, based on their base rates of narrative and HOT speech. This suggests that personal narrative speech may serve as a rich place where parents and children frequently and naturally invoke HOT.

Four characteristics of narrative speech are described to explain why narrative speech encourages parents and children to use HOT: **(1) Story-Driven:** Narrative speech structured into story-like forms, and is an example of extended discourse (Tabors, Roach, & Snow, 2001). **(2) Saliency**: Narrative speech is relevant to the self, salient, and interesting; some research suggests

people may be more motivated to do more complex thinking when it is more relevant, salient, or interesting to them (Casey, et al., 2008A; 2008B, Gerofsky, 1996). **(3) Metacognition**. When individuals discuss events that happened in the past or may happen in the future, they are encouraged to reflect, predict, question, hypothesize, build awareness, identify goals, anticipate consequences and reactions—all of which involve higher-level thinking and problem-solving skills important to higher-order thinking (National Research Council, 2001). **(4) Removed from Present Context**. In narrative, speakers discuss actions, events, and objects not in the present context; this means relationships between representations are less explicit. To compensate for this, speakers might use more precise syntactic markings or more specific language to indicate the nature of events (Curenton & Justice, 2004), possibly resulting in more HOT use. The goal of proposing these characteristics or aspects of decontextualized narrative speech is not to rule them out in favor of one singular explanation, but rather to explore the different affordances of personal narrative speech.

Nevertheless, naturally-occurring variation along these dimensions in different types of speech (narrative versus non-narrative, past narrative versus future narrative, and narrative versus pretend) can be exploited to discuss why certain types of speech might be particularly conducive to supporting children's early higher-order thinking skills such as inference and comparison. In particular, I examined the different affordances of another kind of decontextualized speech, *pretend*, for using higher-order thinking. Pretend, like narrative, is decontextualized, meaning both use language to refer to people, actions, or things not in the immediate or current environment (Dickinson & Tabors, 2001). In pretend speech, one often treats the current environment in a non-literal way; pretend is considered decontextualized speech because it creates a new context around which speakers structure their discourse. In

contrast, narrative speech refers to displaced actions or events that either happened in the past or will happen at some point in the future. This suggests that pretend speech may rely more on the *here-and-now* than narrative. Pretend also differs from narrative in its story-driven nature; 'plotted' narratives take place more frequently in storytelling than play contexts, Benson, 1993. Pretend also differs from narrative in its relative relevance and saliency to the self; although pretend is also salient and interesting for children, it is generally not as self-relevant.

However, both narrative and pretend are similar in that they promote the use of metacognitive skills. In narrative, individuals reflect on their past experiences or anticipate future experiences. When individuals pretend, they often take on another role or persona, and must use perspective-taking skills to imagine another's thoughts and feelings, skills central to both metacognition, theory of mind, and higher-order thinking (Bergen, 2002; Leslie, 1987; Whitebread & O'Sullivan, 2012; Brown & Campione, 1978). These differences allow us to examine different affordances of speech for higher-order thinking, and whether certain characteristics are more important than others.

When I compared how frequently parents and children use HOT in their spontaneous narrative and pretend speech at 38- and 50-months, I found: (1) parents and children use more HOT in personal narrative compared to other (non-narrative and non-pretend) speech at both 38- and 50-months. (2) At 50-months but not at 38-months, both parents and children used slightly more HOT in pretend compared to other speech, suggesting pretend play is becoming more complex as children age. (3) While parents used significantly more inferences and comparisons in their narrative compared to other and pretend speech, children only used more inferences. In other words, frequency of comparison use was not related to the speech context in which it occurred. These general patterns also emerged when comparing only between narrative and non-

narrative speech using the entire developmental window from 14-58 months. This suggests that children's early use of comparisons may rely more on the present, while parents are able to use comparisons to enrich and contextualize their narratives.

Some qualities of language may make it easier for parents and children to use higher-order thinking, particularly when children are very young. These qualities include being story-driven, being salient or relevant to the self, and being decontextualized. Narrative is one kind of speech that has all these qualities. Theoretically, this fact enhances our understanding of the nature of higher-order thinking. Practically, this fact can be leveraged, possibly in interventions with parents and families that seek to enhance the quality of children's early language environments to boost their school-readiness skills. In the remainder of this chapter, I will discuss some of the limitations of this dissertation, expand upon the theoretical and practical implications, and discuss some ideas for future research.

2. Limitations

This dissertation has several limitations. First, we place our emphasis on the role of the early home environment, and particularly the early language interactions children have with their parents. As Bronfenbrenner points out (Bronfenbrenner, 1992; Bronfenbrenner & Morris, 2006), children's lives exist in a myriad of systems, which all overlap and influence each other. In particular, children's home lives are also impacted by their lives at school, which is particularly important to consider when examining educational outcomes. Nevertheless, this research presents an important first step in describing differences in children's early childhood experiences with their parents.

Second, it is unclear the extent to which these findings may generalize to other populations. All the subjects were typically-developing monolingual English speakers, meaning

these findings may not generalize to other populations of children, such as bilingual children or children with specific language impairments. Although the sample is diverse in terms of race/ethnicity and socioeconomic status, the sample is relatively small, limiting our ability to draw inferences from differences at these levels. However, this sample is larger and more diverse than other examinations of early parent-child narrative discourse, and also examines development over a wide developmental window, which adds to the value of these findings.

Additionally, this study only examined one small cohort of children, who were all born in the early 2000's. These findings may then not generalize to children born in other eras. Specifically, the advent of smart phones, smart speakers, and other technological advances in the past two decades means parenting and child-rearing may have changed significantly since this study was initiated. For example, in our corpus, parents and children sometimes looked at old family photos and talked about them; discussions of events in the photos counted as personal narrative talk. The fact that parents now constantly have access to the camera and photos on their phone might mean parents and children engage in more of this kind of talk now compared to the early 2000's. Alternately, parents and children might engage in this kind of talk *less* frequently, due to the fact that access to these photos are now ubiquitous and looking at photos is no longer a novel event. Nonetheless, this study still presents an intensive examination of children born during this particular era.

This project also observed only well-functioning families in mainstream American culture. It's possible that only parents who were more confident in their parenting and child-rearing practices originally volunteered for the study, meaning our sample is likely not representative of the population as a whole. However, these are also the families who are clearly invested in their children's future and experiences, and thus would be more likely to enroll their

child in an intervention. In other words, perhaps the sample accurately reflects the target population, should an intervention be developed from these results. Still, these results are less applicable to families living in deteriorating neighborhoods, to families of children whose language development is delayed, and to bilingual families.

In addition, another more general limitation to observational studies such as this is that parents could be changing their behavior because they knew they were being filmed. In other words, this study runs on the faith that children's cumulative experiences are being accurately captured on the videotapes. The presence of the video camera and experimenter might have put some parents on their "best behavior," and parents might have 'postured' to what they thought researchers 'wanted.' Even if this were the case, however, parents would likely be purposefully emphasizing aspects of their speech and behavior they felt were important for the child's development, giving us a clue as to what parenting practices they felt were most important. In addition, it is very difficult to maintain unnatural behavior for an extended period of time. From reading the transcripts, it appears that over the course of the 90-minute taping, and as the visits progressed, parents and children simply forgot the experimenter was there.

Related to the above point, the 90-minute taping sessions only gave relatively limited opportunities for parents and children to engage in particular kinds of talk. It's possible that we do not observe parents and children using the kinds of speech described here due to chance or other opportunities. This is an especially important consideration when interpreting the onset results, because obviously we are not capturing every kind of interaction children have or type of speech they use. Additionally, an unexpected byproduct of the experimenter's presence might have been to provide a new 'audience' for personal narrative. On occasion, it does seem as though parents and children occasionally engage in narrative talk for the benefit of the

experimenter (this is seen in example 5—when the girl discusses the birds that fell out of the tree—as well as in lines of exposition provided by the parent in example 7, lines 11-12). This in part explains the approach taken by Burger and Miller (1989), to have the experimenter, rather than to adopt a 'silent stance' or to act invisible, to instead act as a family friend who had stopped by for a visit. In this study, it is therefore unknown the extent to which the presence of the camera influenced people's behavior, or whether children's 'true' early experiences are being captured on the videotapes.

Finally, the early experiences of children in other cultures is likely to be different; some cultures differ in the appropriate amount of speech that should be directed at the child, while other cultures differentially emphasize the use of pretend and narrative. Cultures also vary in what is considered to be narrative (Michaels, 1981; Stein & Policastro, 1984), as well as whether it is appropriate to engage in pretend (Gaskins & Göncü, 1992; Lancy, 2007). Nevertheless, research has to start somewhere; by first determining how HOT and narrative work together in a mainstream context, we can later see how well the framework applies elsewhere.

3. Implications

The findings from this dissertation have both theoretical and practical implications. This dissertation increases our theoretical grasp of the relative impacts of early language environments on the development of HOT. Further, these findings offer another potential mechanism—in addition to exposure to academic language and the promotion of emergent literacy skills—for why narrative speech has been demonstrated to be beneficial for children's later academic outcomes. These results also enhance our understanding of the nature of higher-order thinking, by suggesting it is frequently employed in speech that is removed from the *here-and-now*.

Practically, this research strengthens our understanding of how best to support children's early higher-order thinking skills. The results of this dissertation can guide researchers in developing interventions for the home and classroom that support children's early HOT. Interventions with low-SES families in particular have been successful in increasing the quantity and quality of input parents offer their children (Engle et al., 2011; Marulis & Neuman, 2010; Roberts & Kaiser, 2011). In addition, laboratory studies have shown that manipulating the linguistic input children receive can have an impact on their ability to display higher-order reasoning (Lowenstein & Gentner, 2005; Pruden, Levine, and Huttenlocher, 2011; Son, Smith, & Goldstone, 2011). The findings from these studies suggests that linguistic input is malleable, and manipulation of this input could confer benefits to young children.

In addition, this research has important and far-reaching implications for classroom interactions and curriculum design. Prior research suggests in-classrooms interventions can be successful at encouraging HOT use in students with the use of different teaching strategies (Miri, David, & Uri, 2007). Concerns that U.S. students are not developing adequately sophisticated HOT skills have in part led to the reformulation of the Common Core to include practice standards and opportunities for HOT in curriculum (Common Core State Standards Initiative, 2010). Knowledge that narrative serves as a rich context where children invoke HOT could greatly inform teacher's ability to support HOT in classroom environments, and could also inform the development of a teacher intervention to encourage and implement HOT skills in classrooms.

To have an impact, interventions must be clearly understood by parents and teachers. While "higher-order thinking" is a phrase often used in academia, lay individuals may not have as many intuitions for how to best support these important skills. Narrative, unlike HOT, is a

category of speech understood more intuitively by adults and children alike; thus, an intervention targeting narrative speech could serve as an important leverage point through which HOT can be encouraged and stimulated in children. Indeed, prior work has established that it is possible to intervene on parent's use of decontextualized speech with their children. Leech, Wei, Harring, and Rowe (2018) conducted a randomized control trial with 36 children and their parents, with parents randomly assigned to either a training condition or a control condition, with the former educating parents about the importance of decontextualized speech. Trained parents increased in their provisioning of decontextualized speech compared to baseline, and maintained these gains throughout the duration of the study. Decontextualized input is thus malleable, and thus might serve as an important lever through which children's later academic skills and outcomes could be influenced.

By encouraging families and teachers to use decontextualized speech, and to talk about personal experiences in their past or future, caregivers could be better preparing children to perform the kind of inferential, relational reasoning they are expected to do in school; an intervention on narrative speech could result in parents and children using more HOTs as well. This could contribute to the elimination of the SES achievement gap, particularly in domains like math and science where HOT skills are vitally important.

4. Future Research

In addition to intervention described above, there are many areas where this research could be extended further, particularly through additional examinations of the narrative utterances in the corpus. The unit of analyses in these results (and elsewhere in research using this corpus; Freeman, 2015; Demir et al., 2015; Rowe, 2012) is the utterance. However, 'narratives' are construed over multiple, interlinking utterances; an important first step will be to

put related narrative utterances together into a narrative 'episode.' This will enable us to examine average length of episodes over development, the number that are co-constructed versus generated entirely by one speaker, how frequently parents and children initiate these episodes, and the proportion of these episodes that contain HOT.

Parental narrative speech in these spontaneous interactions may also be coded for different elaboration styles, to see whether parents in spontaneous speech with their children also fall into the 'high elaborative' and 'low elaborative' styles found in studies of elicited narratives. In addition, the narrative utterances may be coded for the presence of different evaluative devices, enabling researchers to examine when in development and how frequently parents and children use these devices in spontaneous speech.

The valence of the events described (as positive, negative, or neutral) could also be coded; previous research suggests that children tend to tell more complex and coherent stories when telling a story about a negative event, rather than a positive event (Fivush, Sales, & Bohanek, 2008). It is possible that talk about negative events (e.g. example 7, when the child was talking about her classmate that laughed at her chickenpox scars) may also contain more instances of HOT. Researchers could also categorize these episodes in a manner similar to Miller and colleagues, by coding them as referring to specific topics; for example, stories of material gain, emotional gain, physical harm, emotional harm, and property damage (Burger & Miller, 1989; Miller & Sperry, 1988).

In line with ecological theory, these narratives could also be coded for whether they describe shared or unshared experiences. Talking with a parent about a shared experience gives the parent more opportunities for scaffolding (as in example 5, when the parent and child are discussing the birds falling out of the tree). However, telling a narrative about an unshared

experience—particularly for children (as in example 7)—could encourage children to use more instances of HOT. In narratives like this, children are challenged to more clearly articulate their point, as well as the order and nature of events, which also provide more opportunities for children to practice metacognition.

In addition, I have focused on two particular kinds of decontextualized speech—narrative and pretend—because these play an important role in early language socialization. A third type of decontextualized speech, book reading, can also be examined for its ability to encourage parents and children to use higher-order thinking. Most research on relations between early parent-child book-reading and later outcomes focus on the frequency of book-reading interactions (for a meta-analysis, see Bus, Van IJzendoorn and Pellegrini, 1995), and frequency is often assessed through parent report. However, parents differ not only in the quantity of book-reading, but also their quality. Studies examining variability in the way parents read books with their children describe several different styles. Some parents tend to label and describe the pictures in the book, while other parents focus more on the story content, and ask their children to make plot inferences and predictions (e.g. Haden, Reese, & Fivush, 1996).

Demir and colleagues (2011) examined book reading interactions in the Language Development Project at 26- and 30-months, finding that talk that extends the topic of the book (including story predictions, evaluations, or inferences, as well as tying the content of the book to the child's own experiences) predicted children's reading comprehension skills at the end of 1st grade. This type of high-quality book-reading might facilitate a deeper connection to the story, particularly through the use of making predictions (or inferences) on the basis of the text. Parents may also compare between material in the book and the child's own life experiences ("Does that look like the giraffe we saw at Lincoln Park Zoo?"). In future research, book reading utterances

(which were included in this study as non-narrative/non-pretend "other" speech) can be explored as another rich context that naturally invites parents and children to use higher-order thinking.

There are also differences in HOT speech which are beyond the scope of this dissertation; for example, as described in Chapter 2, our coding differentiated between HOTs that provide a HOT relationship (Give) and ones that solicit another to provide a HOT relationship (Give). Are there differences between narrative, pretend, and other speech in the rate at which parents and children use ask HOTs versus give HOTs? Do parents who ask more HOT questions during narrative speech have children who are better at giving HOTs in narratives? Future research could examine differences in use of Ask/Give HOTs in narrative, pretend, and other speech.

In addition, we also coded the HOT utterances for relative complexity, as surface or structure. Surface HOTs reflects single level mapping where the relationship between the referents is not complex, and not dependent on deep understanding of the referents indexed. Conversely, structure HOTs involve mapping at a more systemic level, and requires deeper understanding of the ideas that are being linked. Structure HOTS are comparable to the skills described in the literature on HOTS for school aged children (Lewis & Smith, 1993). Freeman (2015) found that number of structure HOTs provided by children at 58 months was most strongly related to children's later educational outcomes. It's possible that parents and children are more likely to use more complex structure HOTs in certain kinds of speech contexts such as narrative, because individuals are more knowledgeable about these contexts and they are salient for the speaker.

This longitudinal study also collected measures of academic outcomes for children starting in kindergarten, including narrative, text decoding and comprehension, analogy, and inferencing. Another key next step for this project will be examine whether differences in

children's later academic outcomes can be linked to early differences in children's home environments, in terms of usage of narrative, HOT, or HOT in narrative or other contexts.

Finally, the project from which I draw this data, the Language Development Project, also has a parallel sample of 46 children with early brain injuries (BI), who were also observed in spontaneous interactions with their parents from 14- to 58-months. Other work (Demir et al., 2015) has examined differences between the BI and typically-developing (TD) children in terms of parents and children's use of decontextualized speech and relations to later outcomes. This research found that for both TD children and children with BI, parent use of decontextualized language at 30 months predicted later vocabulary, syntax, and narrative skill. Additionally, parent use of decontextualized speech played a more central role for children with BI than for TD children in contributing to later academic outcomes. Future work could examine whether parents of TD and BI children differ in their provisioning of HOT or narrative speech, or their incorporation of HOT into narrative speech, and whether the effects of this early input differs for TD and BI children.

In sum, this dissertation presents an examination of early parent and child use of spontaneous narrative speech, and argues that these stories of personal experience serve as a rich language context where parents and children invoke higher-order thinking. By heightening these skills early in childhood, teachers, educators, parents, and researchers can potentially make great strides at providing all children, regardless of background or available resources, with a stable foundation to foster the development of the higher-order thinking skills that are so crucial for later academic success. The welfare of all children can be served by enhancing the experiences they receive at home—by making the language they will need for later expression and interpretation in school available to them early, from those who care for and about them.

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APPENDIX A: PERSONAL NARRATIVE AND PRETEND CODING CRITERIA

Overall Coding Rules:

1. We only code utterances with speech, even if there is pretend enactment in the video (i.e. we are not coding gesture only lines).

2. Lines that are totally unintelligible (####) are not coded. If there is some content language that is relevant to one of the codes, e.g. below, both utterances would be coded.

P: Want to go to the park tomorrow?
C: #### swings
(in this case, these would both be coded as future narrative)

3. Lines that are incomplete but are clearly part of the pretend/narrative conversation or have enough content for us to determine that they are part of previous narrative/pretend talk, are also coded as being part of that same category.

P: We're going to Florida to go swimming, right?
P: Maybe if you're feeling better--

4. Parents/children's relevant responses to a question that falls into a particular category count as the same category, even if the response is minimal.

P: Do you want to have a tea party?
C: No!

5. However, off-topic responses are not coded as being in that same category

P: Do you want to have a tea party?
C: Puppies!

P: What did you do at school today?
C: I'm hungry!

6. Parents and children will frequently change topics suddenly, or have random interjections not related to the present conversation, so be careful to not default to coding ALL adjacent utterances as one category.

7. Ambiguous utterances will not be coded, unless you have a strong feeling/justification.

8. Attention getting should NOT be coded if it's on its own line. We're primarily interested in coding content utterances.

P: Hey Grace (would not count)
P: Want to bring your dinosaur tomorrow to the playground? (would count as future

narrative)

P: We'll do your workbook after Lucy goes home. (does count)
P: OK? (doesn't count)

P: What'd you do at school today? (does count)
P: Huh? (doesn't count)

P: Hey Grace, want to bring your dinosaur tomorrow to the playground? (would count as future narrative)

9. Clarifying questions about what was said should <u>not</u> be coded, but repeated utterances <u>should</u> be coded.

P: What'd you do at school today? (does count)
C: Huh? (doesn't count)
P: What'd you do at school today? (does count)

P: Want to play with shopping set? (does count)
C: What did you say? (doesn't count)
P: Want to play with the shopping set? (does count)

10. If C continues talking about P's narrative or pretend topic, then C's speech still counts, even if the linguistic structure is not in the past tense, does not make sense, etc.

P: She told you Josh was crying in his bed?
C: Stop crying! (would both count as narrative)

11. If P and C's body language/gestures indicates that they are still in the pretend frame, code all accompanying utterances as pretend even if the content is not pretend. The exception is using gesture to demonstrate/illustrate things.

Ex. P and C might be pretending to drive a car (using iconic hand gestures), but then talking about something unrelated to the pretend scenario. In this case, their utterances would still be coded as pretend. However, if C is telling P about how her father shot the aliens at Disneyland and demonstrates using an iconic shooting gesture, this would NOT be pretend, but would count as narrative.

Ex. P and C might be pretending to shop in a grocery store. They might then discuss foods that they like. Because a conversation about food preferences would be appropriate for a grocery store, these utterances are also considered part of the pretend.

12. Parents and children often invoke real-world experiences or knowledge in order to inform the narrative or elaborate on the pretend play. These should also be included in their respective categories. However, the real-world knowledge must contribute to narrative or pretend, and be surrounded by (i.e., before and after) related speech of the same type (i.e. narrative or pretend).

Sometimes parents invoke real-world knowledge as an attempt to "step away" from the narrative or (more likely) pretend--this distinction is subtle--but the real-world knowledge must be invoked in service of the narrative/pretend in order to be included.

Ex. P and C are playing with train table. P asks questions to support the pretend:
C: I'll build a -- a old scrapyard.
P: What kind of things are in an old scrapyard?
P: Maybe old cars?

PERSONAL NARRATIVE is language used to recount stories of personal experience about the past, future, or habitual/recurring events.

What Counts as a "Narrative"?
In order to count as a narrative, there must have an **event/some kind of action** as well as a **location/place (either temporal or spatial)**; these can be <u>construed across multiple utterances.</u>

Temporal location: "Christmas", "Last week,"
Spatial location: "Aunt Sue's house", "At the carnival"

"I'll have to get you a new one" - not sufficient
"I'll have to get you a new one when I go to the store" – sufficient

Sometimes speakers might ask their conversation partner to supply either the location or the event. Questions following up on/filling in the blanks for the event/location count as narrative, as long as there is <u>additional elaboration</u> (e.g. one or more utterances, spoken by either P or C, with new information)

- "Where did you hear about that?" (the event is 'hearing about that', the speaker is asking for the temporal/spatial location). Also, "Where did you learn that?" (event is 'learning that,' speaker is asking for temporal/spatial location) (similar to "Who taught you that?")
    - Code utterances like this as narrative even as long as at least one more utterance follows with more information (e.g. "From Teddy"; "At school")
- "What did you do at school today?" (the location is school, the speaker is asking for the event).
    - Code utterances like this as narrative even if C does not respond
- "Have you done this before?" - also needs more elaboration

If both a **spatial/temporal location** and an **event/action** are identified, code the entire conversation surrounding that topic as narrative. The elaboration/giving of the location/event can occur later; in that case, you would go back and recode earlier utterances. The exception is for *photograph talk*, where only the utterances with an event/action in them are coded; see below.

What counts as "Personal"?
In order to count as personal, the narrative must be about either the child, members of the child's family, other people in the child's life (e.g. neighbors/friends), or other people known to the teller of the story (e.g. a parent can talk about how her friend at work went to Disneyland last week, and this would count as Personal Narrative-Past)

How distant from the "present moment" must the event be?

- An event is considered to be in the future or in the past if it is a <u>few hours away</u> from the given time of the utterance
- <u>All</u> references to days other than the current day (e.g. tomorrow or yesterday, or anything more distant) count
- Talk about the same day counts as long as it's not something they are ***immediately*** planning on doing, and as long as the temporal or spatial location is **specific.**
- References to time that are NOT sufficient/specific enough: **later, next time, in a while, before**

Examples:

- "Want to make a card for daddy?" would not count if that is what they do right after the utterances
- Adding "later" to the end of this utterance is also not sufficient because the time is not specific enough.
- "Want to make a card for daddy before he gets home?" would count if that is not the family's next plans, and because the time is specific.
- "What did you have for breakfast today?" would not count if they had just finished eating. This would count if breakfast had occurred several hours earlier.

What types of Personal Narratives are there?

- **Past:** Events that happened in the past. ("Remember when you went to the zoo and saw a polar bear?")
- **Future:** Events that will happen in the future. ("Tomorrow you're going to the dentist.")
- **Habitual:** Events that recur; events that happen frequently in the past and are likely to happen again ("What do we do when the sun goes down?" "Who do we see when we go to the doctor?" "We need to mop the floor almost every day, because it gets so messy when we don't"). Habitual events require a <u>specific</u> time or place, something more than "always" or "usually", and the events must be specific and not just descriptions/characteristics of people (e.g. "You never want to wait" is not specific enough; "You never want to wait till your food cools down" is okay)

These three categories of narrative are **<u>mutually exclusive.</u>** All personal narrative utterances are identified as **<u>one</u>** of these three categories: past, future, or habitual. If you cannot identify it as one of these categories, the utterance might not be narrative.

Note on ambiguous time: Sometimes speakers might invoke past and future events in the same utterance ("Last time you got a haircut we forgot to get a sucker so next time we'll have to get one.") In cases like this, first look and see whether either the past or future event is elaborated more in the following utterances, then code the ambiguous utterance the same way, e.g. a parent might follow up this utterance with, "We'll go get your haircut tomorrow," indicating the ambiguous utterance should also be coded as **Future**. Alternatively, the parent might say, "You were real sad when we got home, huh?", indicating the ambiguous utterance should also be coded as **Past**. If the event is not elaborated, go with the *first* "time" that is mentioned. (In this case, the first "time" is "last time" so it would be **Past**. If the utterance were, "Next time you get a haircut we'll be sure to get you a sucker because we forgot last time," the first "time" is "next

time," so it should be coded as **Future**.

Examples of Commonly Occurring Personal Narrative Topics

- Parents talking about own childhood
- Plans for later in the day to go to the store, to pick up a sibling from school, to make a card for a parent, etc.
- Discussions about what the child did at school, or is going to do in school
- Discussions about family vacations, in the past or future
- Talk about past/future holidays, e.g. what they're doing/did for Christmas
- Parents talking about friends/neighbors and what they've been doing
- Looking at old family photos and talking about the events in them
- Unique or novel events
- illnesses/injuries

Note about photograph talk: Frequently parents might use contextualized clues (e.g. photographs, present objects) to scaffold children's use of narrative. **If they are merely <u>identifying</u> family members in photographs** ("There you are with Arnold") or **talking about how people look** ("You look silly in this one"), **this is not sufficient for past narrative, because there is not an event.** This type of talk only counts if they are talking about the <u>events</u> where the photographs were taken

P: There's Aunt Sue (doesn't count)
P: There's Aunt Sue on the rollercoaster (does count)

Note about invocation of objects gotten in the past: e.g. a child might say, "Where are those chips you got from Jewel?" While this utterance technically meets the criteria for narrative (event is getting chips, location is Jewel), if the following utterances are about the *object* and not the *event* (e.g. the parent might respond, "What kind?"), these utterances are not coded as narrative (though the first utterance is). If the following utterances are about the event (e.g. the parent says, "What, the ones we got last week?") these utterances would be narrative

Examples of Commonly Occurring Topics that are <u>Not</u> Sufficient for Personal Narrative

- **Planning meals** where the point is to decide what to eat ("Do you want mac and cheese or hotdogs for dinner?"), or talking about **what was eaten** at past meals
    - Meal talk is okay if they talk about what happened at dinner ("Did you eat lunch with daddy?") or other event-related talk
- **Saying C will play with E's toys** (this is the Toy Session which happens at the end of every home visit)
- Saying objects **look similar** to people we know ("That looks like Lars"), or things look similar to things they'd seen before ("That looks like Daddy's church")
- Saying something **looks like** something they'd read earlier ("Just like in your book huh?")
- Talking about **characteristics** of oneself or others, even if they're not present ("Mommy was never much of an artist" "Is that a tie like Dad wears?" "Who's afraid of spiders?" "You usually chatter" "Daddy knows how to juggle")
- General use of the **past tense** (e.g. "Did you have some bacon?")

- Talking about **generally** what people do ("What do you say when someone sneezes?") or rules ("We can blow bubbles at the playground but not here")
- Talking about people's **favorites/preferences** when they're not present ("That's Grandma's favorite color")
- Just talking about things to "**remember**" is not sufficient ("Remember your backpack is blue"; "The green ones broke, remember?")
    - Likewise, talking about things that had happened "already" is not sufficient ("You already ate your snack")
- Talking about **events in TV shows/movies/video games/books they'd seen or read together, or whether they had seen them** ("Remember it has that song with Gaston?" "What happened in that book with Pooh?")
    - BUT, talking about the fact that they'd done such things is sufficient ("Last night I watched a bad movie with Daddy"; "Did you read that book last night?")
- Talking about **whether one had seen/read** a particular TV show or book ("Did you ever see Bob the Builder?" "Have we read this one yet?")
- Locating **lost objects** ("Where's my knife?")
- Talking about **people that are not present** ("Dad's at work." "Sissy's at school")
- Talking about **things people had given them** ("Want to play with the dollhouse Grandma got you?" "You got that for your birthday")
    - These would count if there was further elaboration about the giving event (at least one more utterance on that topic that actually talks about the EVENT)
- Talk about **dates**, including when Christmas is, when birthdays are, etc. (e.g. "What day is your birthday?") as well as how old someone is ("How old are you going to be?")
    - However, talk about plans for holidays/birthdays/etc. is sufficient
- **Behavior management** by recalling what parent had previously said ("What did I tell you about playing with the balls in the house?" "Did Dad say it was okay to hit the balloon?")
    - Would be sufficient if they then discussed a specific time when child had broken something, etc.
- Talking about **historical events/people in history** ("Why did Marc Chagall come to the United States?")
- Talking about **locations** around the world/locations apart from the present ("I don't think there's a pyramid at Notre Dame"; "There's a big tower called the Sears Tower downtown")
- Talking about **seasons/time passing** ("It's going to be summer here in three months")

PRETEND is speech where one:

- **Represents/substitutes one object as another** (i.e. pretend banana is a phone; pretend a Lego is Diesel Ten)
- **Takes on the role/persona of another** (i.e. "I'm going to save you from the wicked step sister!")
- **Attributes actions to an inanimate object**, whether it's a stuffed animal, regular toy, toy car, etc. Such as "Buzz Lightyear went under the fridge!" In other words, treating the object like it's acting on its own behalf.

    - **However, just narrating actions of inanimate objects is not sufficient** (e.g. "He's going through the loop!"), **unless**
        - There is additional information in the speaker's language or actions that makes it clear that they are pretending the inanimate object moved on its own (i.e. attributing actions to inanimate objects).
            - C: "He's going through the loop! No, Thomas, don't do that!"
- **Attributes thoughts to an inanimate object.**
    - P: "The mouse doesn't want grapes." (referring to a toy mouse)
- **Attributes feelings to an inanimate object.**
    - P: "Your foot is sick."
    - Non-toy items count if they are inanimate, i.e. "The window is sad because it stays shut all winter."
- **Talks to or about an inanimate object as though it's real**, e.g. saying "Hi" to a stuffed animal, or "bye-bye" to inanimate objects which some parents do when cleaning up or putting away toys (e.g. "Say bye-bye to the cars"). This includes describing appropriate behavior towards an inanimate object as if it were real, e.g. "Don't hurt your baby". (referring to C's actions toward a baby doll)
- **Voices for a toy or any inanimate object** (i.e. "I'm going to get you!" while moving around Thomas the train)
    - This includes making "sound effects" for an inanimate object (i.e. holding a stuffed cat and saying, "Meow," or saying, "Choo choo!" while moving a train).
    - However, **utterances for animal noises may be ambiguous.** Children and parents may use words like "moo" to refer to animals, and children may confuse these words with labels for the animals.
        - P: "What is this?" C: "Moo!" (This is **not sufficient for pretend unless** the child or parent uses speech or vocalization to indicate that they are pretending to be a cow.)
- **Communicates about play**, including assigning roles (e.g., "Are you going to be the bride?") and about prospective play plans (e.g., "Pretend you hate fish").
    - Any speech negotiating, discussing, evaluating and planning for the pretend play in the present is coded for pretend.
    - However, talking about pretend play in the past or future would be coded as narrative <u>only</u> ("When Davie comes over are you guys going to play pirates?")
- **Tells stories about fictional characters**, whether or not they are part of a pretend play scenario.
    - Enactments of the fictional story may occur but are not required for pretend play. For example, if the child is dressed as Cinderella, and the parent and child describe what happens to Cinderella, then the interaction is considered pretend play (e.g. "What happened to Cinderella when she went to the ball?" "It is twelve o'clock!").
    - Describing the actions of imaginary characters may also occur without enactment, but these interactions must include speech that describes the displaced action of the imaginary event to be sufficient for pretend play.

        Ex. C describing a story from Sesame Street.

        C: In the first part, Bert turns into a -- fairy with a wand and then --

        C: Um, fairy with a wand and then Bert says Big Bird, I'll turn him into a

-- I'll turn him.
C: And then Bert said to Big Bird, I'll turn ### Elmo.

- References to fictional characters is not sufficient for pretend, unless there is both a fictional character and an action explicitly described.

- **Responds to pretend play** such as "Yes" and "Okay" are coded as pretend play. Even negative responses, such as "no," or responses that deny the pretend suggestion are considered responses that negotiate the pretend frame and are coded as pretend.
  P: "That's Big Boulder. We could pretend."
  C: "That's not Big Boulder."
- **Describes fantastical things/events** that do not exist in the real world and never will.
  - Parents often say ridiculous things ("Do you want a kitty cat sandwich?" "Maybe we can grow a tree in here so we can get your balloon down"), which do count
  - Parents might be doing this in order to make things more interesting; these types of interactions count as pretend, because they're taking the kid out of reality and treating the world in a non-literal way

Note: Pretend can occur in many utterances in a large cluster, particularly in older children, although abbreviated pretend play episodes can also occur, consisting of single actions or simple routines.

Examples of commonly occurring activity which are ambiguous, and generally require further elaboration to be considered pretend play:

- **Play with objects:** Often families will play with replica object sets (e.g. fishing rod and magnetic fish, McDonald's cooking and play set, etc.). Because play with these objects does not require pretending, we look for additional detail in speech and action when evaluating whether the interaction contains pretend play:
  - **Talking about manipulating the objects is not sufficient** for pretend play. If the parent or child extend the pretend interaction (e.g. "That fish is really struggling!" "You be the customer and I'll be the cook") this is sufficient to make the interaction pretend.
    - However, if the manipulation of the objects is in service of pretend play (e.g. "Move the pterodactyl to the window so he can be the lookout") then this utterance is included in the pretend.

    Ex. P and C are playing with toy cars. They narrate what they are doing, but these utterances alone are not sufficient for pretend.
    C: Now got all the cars I put in. Now I put the truck in.
    P: You're really winding it up!

    Ex. P and C are talking to a kid-sized Barbie doll. P tells C to turn Barbie's head while they talk, so Barbie can "look." This is a manipulation of an object in order to support the pretend play, and ascribing actions to an inanimate object (Barbie "looks") so it is included.
    P: Mm, turn her head to look at you?
  - **Describing or labeling a replica object is not sufficient** for pretend play. For example, if a child picks up a stuffed animal cat and starts talking about its tail, that is not sufficient for pretend play. However, if the child makes noises for the

cat, or personifies it, this would be considered pretend play. If a child calls a plastic apple an apple, this is not sufficient for pretend play, however if he or she pretends to eat or cook with it, this would be pretend play.

Ex. P and C are playing with McDonald's playset. P is looking for objects that belong to the set, but these utterances are not in the pretend frame (P would not be saying them as the "customer" in the pretend scenario) and so these utterances are not included.

P: I was looking for the pancakes.

P: Where is the pancake box?

Ex. P and C are playing with McDonald's playset. When P and C refer to objects in the pretend frame, as "customer" and "McDonald's guy," these utterances are included.

P: McDonald's guy.

P: You got my hamburger with ketchup and pickle?

P: Do you have any soda pop?

- **Constructing objects with other materials** (e.g. "building a tower") is not considered pretend play unless there are accompanying dramatizations, e.g. talking about what the "people in the tower" are doing). If the objects could reasonably be called what the P or C is calling them, pretend is not required and these utterances should not count as pretend.

  Ex. C arranges blocks with a slanted side for trains to slide down. C: "I made a ramp." (not sufficient)

  Ex. C uses baseball bats to make letter shapes. C: "I made an H!" (not sufficient)

  Ex. C stacks blocks. C: "I'm making a tower." (not sufficient)

  Ex. C stacks blocks. Below, they elaborate on the pretend by giving more details about what the blocks are standing in for and providing the imaginary characters and actions in the pretend story.

  C: We're building, mom.

  P: All right, what are we going to build?

  C: Water tower.

  P: What do they keep in the water tower?

- **Complimenting someone's manipulation of an object** ("You're good at this") does not count, unless the voicing indicates that they are in the pretend frame in some way
- **Requests for help/fixing/talking about broken objects** ("The hook isn't working!" "Help me with this toy") are not sufficient, unless they carry further elaboration of pretend scene/frame
- **Arranging furniture/objects to facilitate the pretend play** ("Move that step stool over there" "Can you go get your tea set?") are not sufficient for pretend play without additional utterances that add pretend content. ("Can you go get your frying pan so we can make soufflés?")

  Ex. P and C are playing with train toys. P asks C to move one of the toys next to another, and then voices a dialog between the two characters. In this case, the purpose of moving the toys was to be able to enact a pretend scene, so all the utterances below are counted.

P: Can you put Duck the Great Western Engine by Diesel?
C: Why?
P: Because I like Duck and Diesel.
P: *(voicing)* Hey! Hello Duck! How are you?
P: *(voicing)* I'm okay, Diesel.

- **Ritual hiding games / conventional games and songs are excluded** from pretend play. The parent pretending to not know where the kid is ("Where's Elise?") and other variations like peek-a-boo (and similar conventional games, like "I'm going to get you!"; "this little piggy"; "patty cake" etc.) are not sufficient for pretend play. Similarly, a child playing with sports equipment who describes the sport ("I'm playing baseball") is not coded as pretend play unless there are accompanying enactments or statements to suggest pretend (e.g. catching an imaginary ball, voicing a cheering crowd.)
    - All hiding games are excluded unless there is additional role-shift ("We're the mice hiding from the cat") or an explicit pretend environment ("We're hiding in a cave") or another marker as described above that adds explicit pretend content the game.
- **Describing the actions, thoughts or feelings of *animate* creatures, such as live pets and infants, are excluded** unless there is additional elaboration of pretend play.
    - For example, asking the dog, "You want to go outside?" is not considered pretend play, nor is saying, "You made the cat angry."
    - Humans often interpret the feelings and thoughts of pets. We often imbue inanimate objects with fantastical attributes as a heuristic for life. Context matters; if normative in context, not necessarily pretend.
    - This also counts for fictional characters—"Diesel Ten is a mean train" is describing his characteristics, not his actions
- **Saying what someone or something "looks like" on its own** is not sufficient for pretend play (e.g. "You look like an artist" while C is drawing).

    Ex. P and C are playing with colored blocks.
    C: With all those blocks together, they are sunrise.
    P: It looks like a sunrise.

  Though C does not say "looks like" explicitly, without further elaboration it remains ambiguous whether the child was pretending or just identifying a similarity, so these utterances should not be included.
- **Describing the family's unique name for something** (e.g. "Dragon corn" for goldfish crackers)
    - It is likely that there is some kind of pretend that went on behind-the-scenes that led to something like this, but unless there is some kind of pretend action/manipulation using this (e.g. "Let's pretend to be dragons and eat dragon corn"), just using the word does not count
- **Talking to inanimate objects as a form of releasing frustration** (e.g. "You stupid toothbrush!")
- **Literacy activities** such as drawing, reading books, sticker books, and "making pictures talk" (captioning) are **not sufficient for pretend play without further elaboration**. Telling a story about the fictional characters in a drawing or from a book is considered pretend only if there are **actions enacted or described**.
    - Talking about what the characters are doing in a book while the parent and child

are reading the book is not considered pretend play. However, if the parent or child **perform enactment** and use speech to **treat the pictures in the book as if they are real**, this is considered pretend.

Ex. P and C are reading a book about an animal that gets bitten on it's tail. C leans forward and acts out biting toward the book, saying:

C: I bite his nose.

- If the parent or child **talk about what fictional characters did** in a story, as long as they are not reading or referring to the media in the immediate context, telling stories about fictional characters is considered pretend **if it contains at least one action.**

  C: Yeah, there is a Transformer called Optimus Pride.
  P: What does he turn into?
  C: He turns into a car.

- Likewise, **telling stories about what is happening in drawings** qualifies for pretend **if there is at least one character performing action.** Otherwise, simply labeling the items in the drawing is not sufficient for pretend, even if the items bear no resemblance to what the child might be calling them.

- **Behavior management** outside of the pretend frame is not included, even if the surrounding utterances are pretend ("Don't throw your toys"; "We can play but you have to be gentle.") Sometimes pretend play is used to manage others, such as ascribing feelings to items to encourage a child to treat the item differently (e.g. "That will hurt your baby.") Because these utterances treat an inanimate object as if it is real, such utterances would be included as part of the pretend.

APPENDIX B: SUPPLEMENTAL FIGURES AND TABLES FOR CHAPTER 3

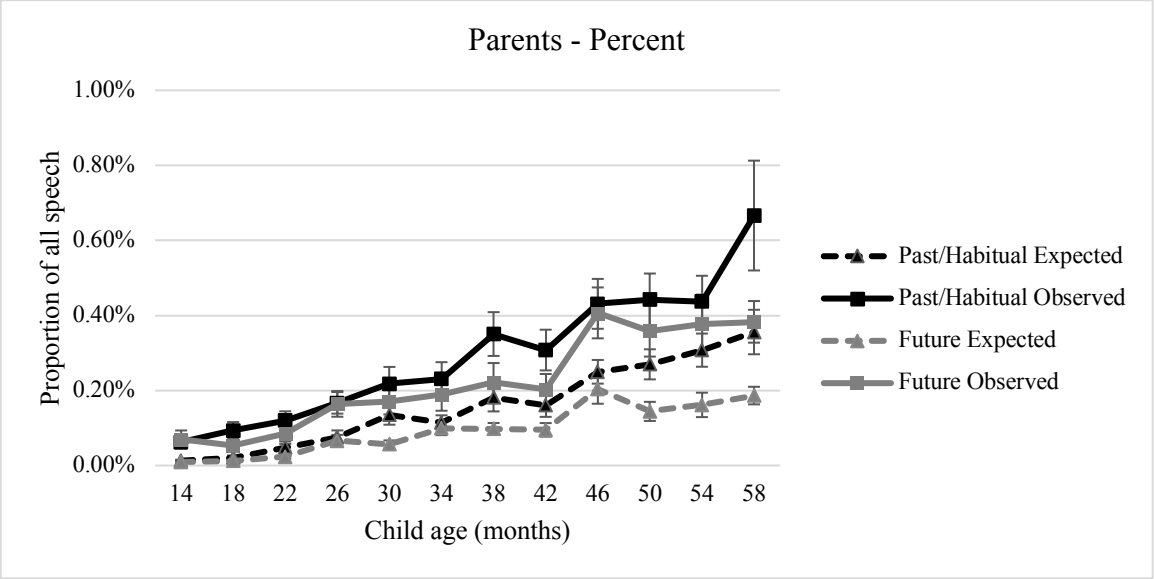

Figure B.1. Expected (dashed lines) and observed (solid lines) proportion of all utterances that are HOT appearing in past (black) and future (gray) narrative utterances for parents.

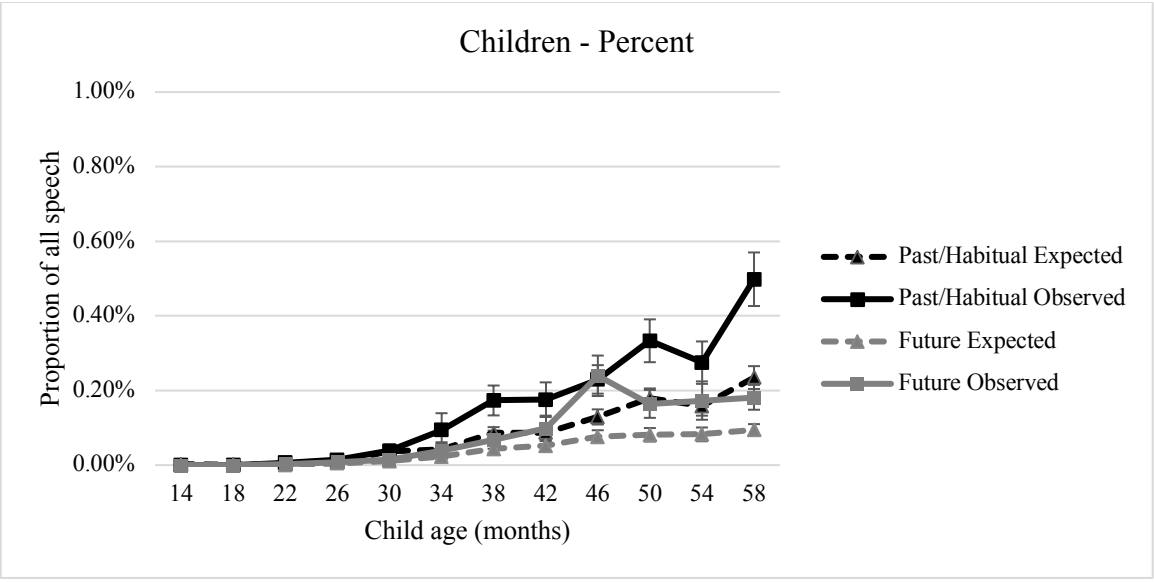

Figure B.2. Expected (dashed lines) and observed (solid lines) proportion of all utterances that are HOT appearing in past (black) and future (gray) narrative utterances for children.

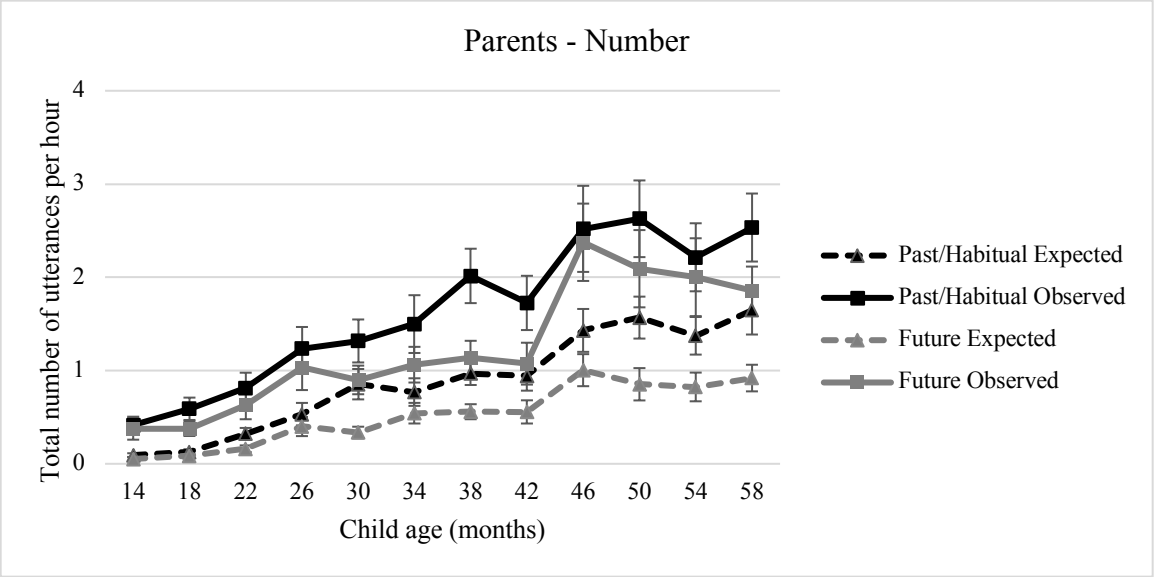

Figure B.3. Expected (dashed lines) and observed (solid lines) number of HOT utterances appearing in past (black) and future (gray) narrative speech for parents.

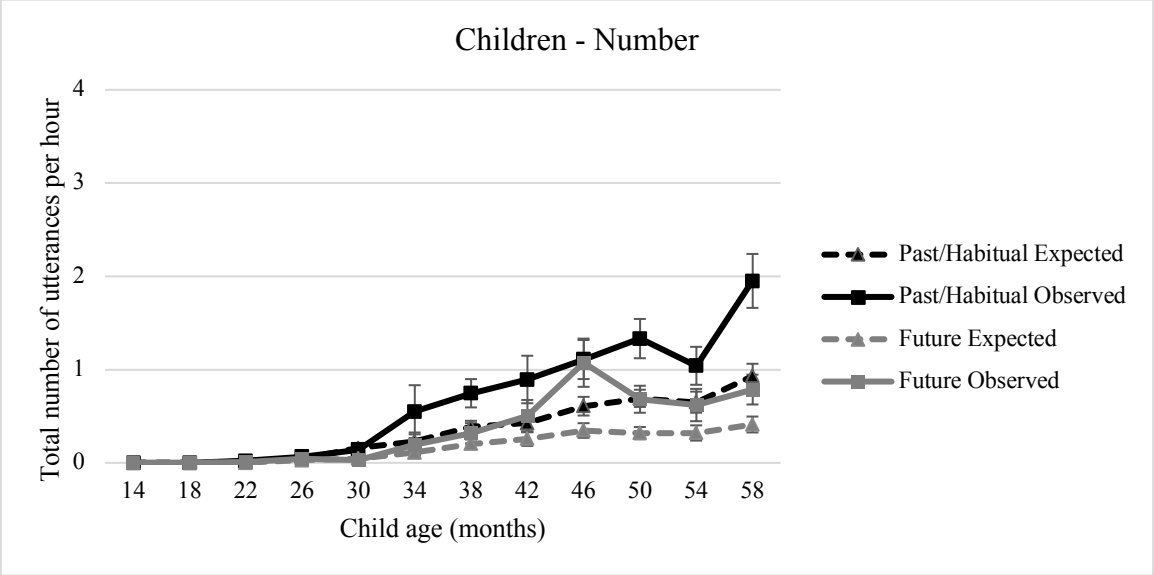

Figure B.4. Expected (dashed lines) and observed (solid lines) number of HOT utterances appearing in past (black) and future (gray) narrative speech for children.

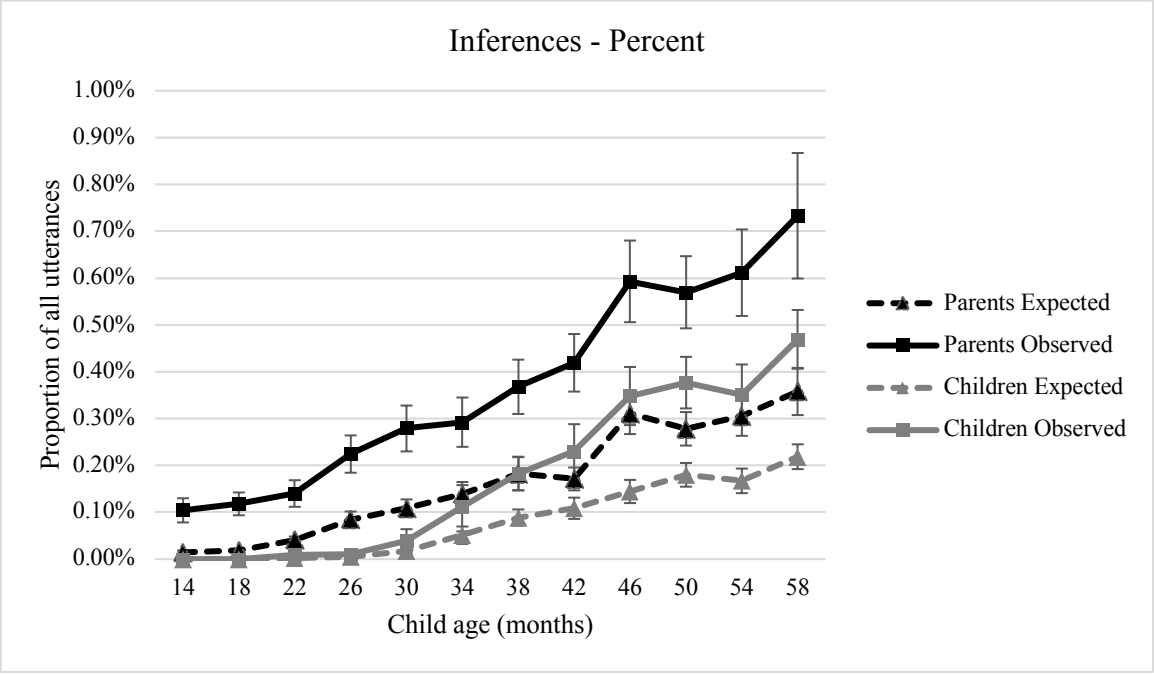

Figure B.5. Expected (dashed lines) and observed (solid lines) proportion of all utterances that are inferences appearing in narrative for parents (black) and children (gray).

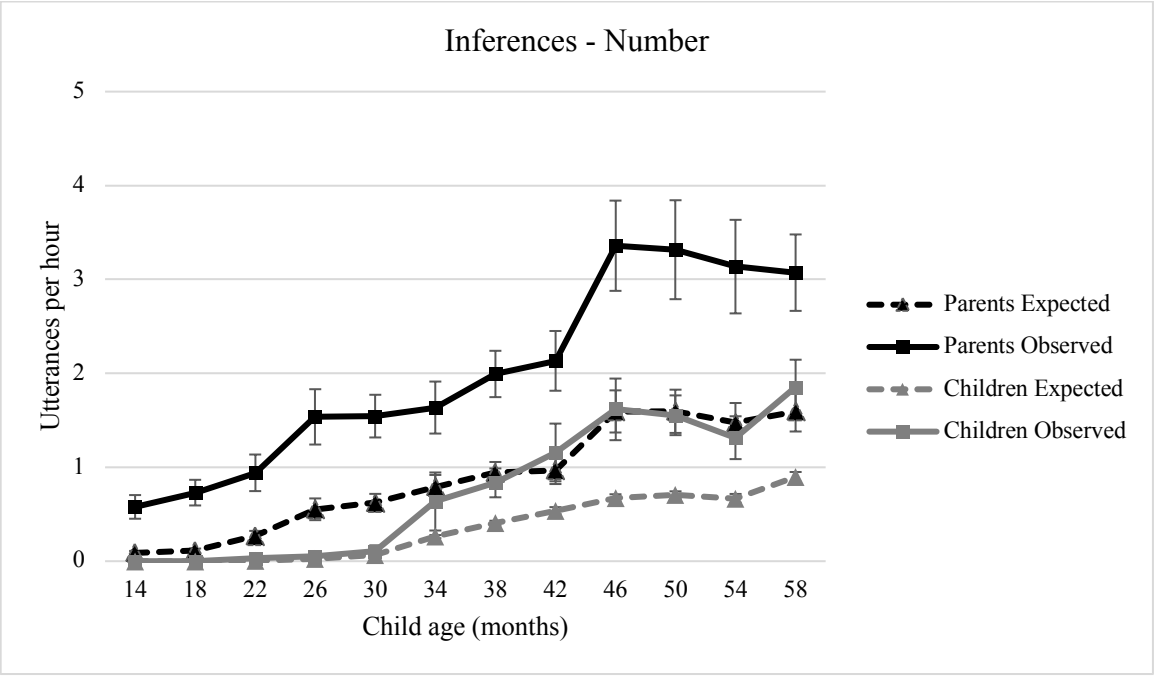

Figure B.6. Expected (dashed lines) and observed (solid lines) number of inferences appearing in past (black) and future (gray) narrative speech for parents.

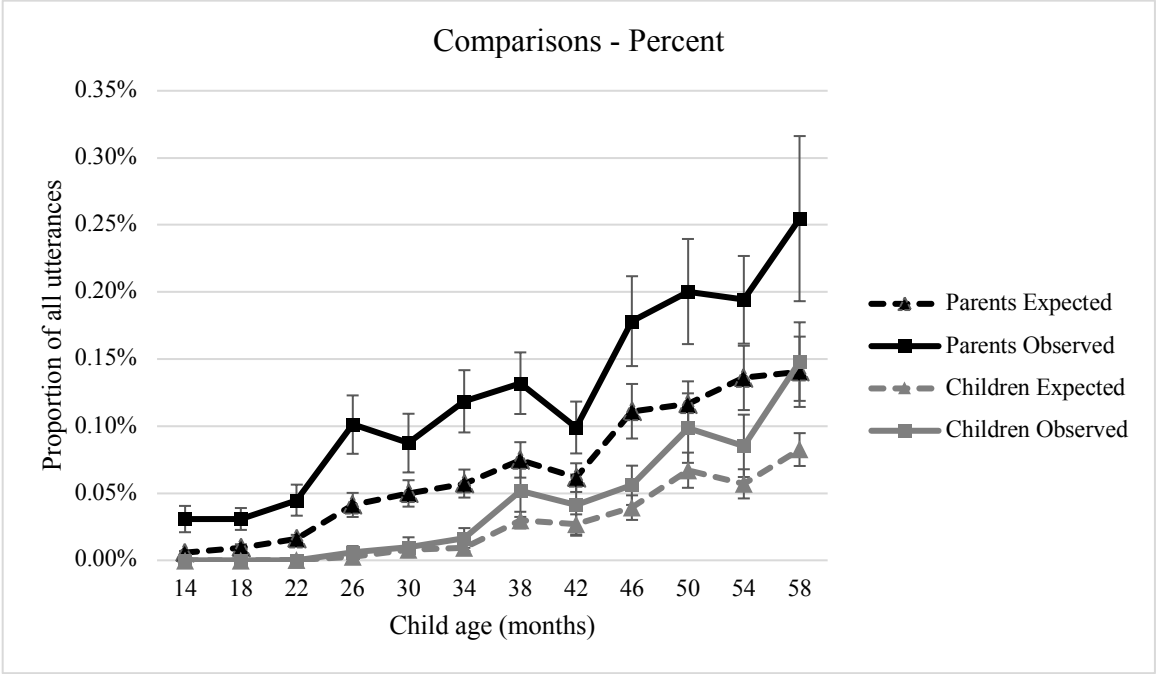

Figure B.7. Expected (dashed lines) and observed (solid lines) proportion of all utterances that are comparisons appearing in narrative for parents (black) and children (gray).

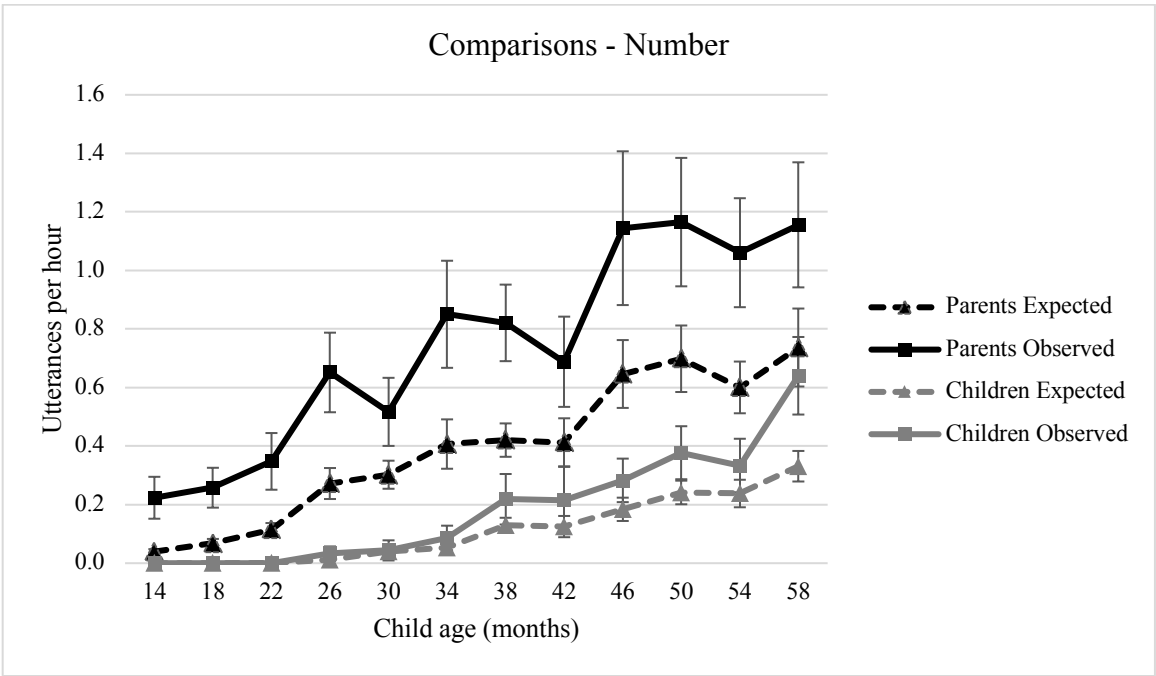

Figure B.8. Expected (dashed lines) and observed (solid lines) number of comparisons appearing in past (black) and future (gray) narrative speech for parents.

		Parents				Children			
child age	statistics	Inf	Comp	Abs	Hier	Inf	Comp	Abs	Hier
	average	12.31%	2.77%	0.09%	0.00%	0.00%	0.00%	0.00%	0.00%
14 mos	sd	19.15%	6.44%	0.65%	0.00%	0.00%	0.00%	0.00%	0.00%
	N	53	53	53	53	7	7	7	7
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	100.00%	29.41%	4.76%	0.00%	0.00%	0.00%	0.00%	0.00%
	average	12.00%	3.95%	0.00%	0.13%	0.00%	0.00%	0.00%	0.00%
18 mos	sd	18.93%	10.71%	0.00%	0.81%	0.00%	0.00%	0.00%	0.00%
	N	58	58	58	58	19	19	19	19
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	100.00%	66.67%	0.00%	5.88%	0.00%	0.00%	0.00%	0.00%
	average	4.51%	2.06%	0.36%	0.13%	0.51%	0.00%	0.00%	0.00%
22 mos	sd	5.98%	4.98%	1.45%	0.72%	1.89%	0.00%	0.00%	0.00%
	N	58	58	58	58	28	28	28	28
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	22.73%	26.32%	8.11%	5.17%	8.33%	0.00%	0.00%	0.00%
	average	8.83%	5.03%	0.33%	0.05%	1.01%	0.11%	0.02%	0.00%
26 mos	sd	15.63%	14.31%	1.26%	0.28%	5.27%	0.72%	0.10%	0.00%
	N	57	57	57	57	41	40	41	41
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	100.00%	100.00%	7.69%	1.92%	33.33%	4.55%	0.65%	0.00%
	average	7.61%	1.86%	0.52%	0.11%	2.18%	0.14%	0.02%	0.05%
30 mos	sd	8.88%	3.43%	1.91%	0.50%	9.88%	0.75%	0.13%	0.34%
	N	57	57	57	57	50	50	50	50
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	33.33%	14.81%	11.11%	3.06%	50.00%	4.84%	0.93%	2.44%
	average	7.24%	3.17%	0.43%	0.06%	2.14%	0.58%	0.01%	0.04%
34 mos	sd	8.54%	5.26%	1.95%	0.34%	5.65%	2.80%	0.11%	0.31%
	N	59	59	58	59	55	55	55	55
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	33.33%	28.57%	14.29%	2.44%	25.00%	20.00%	0.81%	2.27%
	average	7.33%	2.85%	1.76%	0.15%	4.32%	1.03%	0.29%	0.06%
38 mos	sd	8.07%	4.32%	4.78%	0.64%	6.40%	3.19%	1.28%	0.42%
	N	60	60	60	60	59	59	59	59
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	41.67%	21.43%	20.34%	3.39%	27.27%	16.67%	8.33%	3.26%

Table B.1. Descriptive statistics for percentage of narrative speech that contains each type of HOT, for parents and children at each session. *N*'s represent the number of parents and children who used narrative at each session. Table continues on next page.

42 mos	average	11.45%	2.67%	0.28%	0.11%	5.73%	0.83%	0.00%	0.07%
	sd	15.59%	4.66%	1.27%	0.49%	9.31%	2.43%	0.00%	0.36%
	N	55	55	55	55	52	52	52	52
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	100.00%	22.22%	9.09%	3.39%	50.00%	14.29%	0.00%	2.06%
46 mos	average	9.56%	3.32%	0.68%	0.84%	7.76%	1.16%	0.62%	0.60%
	sd	7.75%	7.00%	2.10%	2.12%	9.09%	2.46%	2.93%	2.84%
	N	54	54	54	54	54	54	54	54
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	34.29%	50.00%	12.42%	11.11%	33.33%	10.53%	20.22%	20.00%
50 mos	average	11.66%	3.95%	0.76%	0.70%	8.05%	1.97%	1.03%	0.53%
	sd	11.38%	5.70%	2.15%	1.67%	8.90%	3.56%	4.88%	1.81%
	N	54	54	54	54	56	56	56	56
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	50.00%	33.33%	12.50%	8.33%	40.00%	13.33%	33.33%	8.00%
54 mos	average	10.68%	3.07%	0.47%	0.25%	8.04%	1.34%	0.33%	0.17%
	sd	9.21%	4.13%	1.11%	0.90%	9.16%	2.45%	1.41%	0.88%
	N	50	50	50	50	53	53	53	53
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	50.00%	21.43%	5.06%	5.26%	33.33%	13.04%	9.09%	5.88%
58 mos	average	9.66%	2.99%	0.78%	0.24%	9.04%	2.07%	0.67%	0.25%
	sd	9.43%	3.51%	1.75%	0.80%	11.32%	2.95%	1.98%	0.71%
	N	53	53	53	53	55	55	55	54
	min	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	max	50.00%	16.67%	7.41%	4.35%	55.56%	11.11%	11.11%	2.94%

Table B.1 Continued. Descriptive statistics for percentage of narrative speech that contains each type of HOT, for parents and children at each session. *N*'s represent the number of parents and children who used narrative at each session.

APPENDIX C: SUPPLEMENTAL FIGURES FOR CHAPTER 4

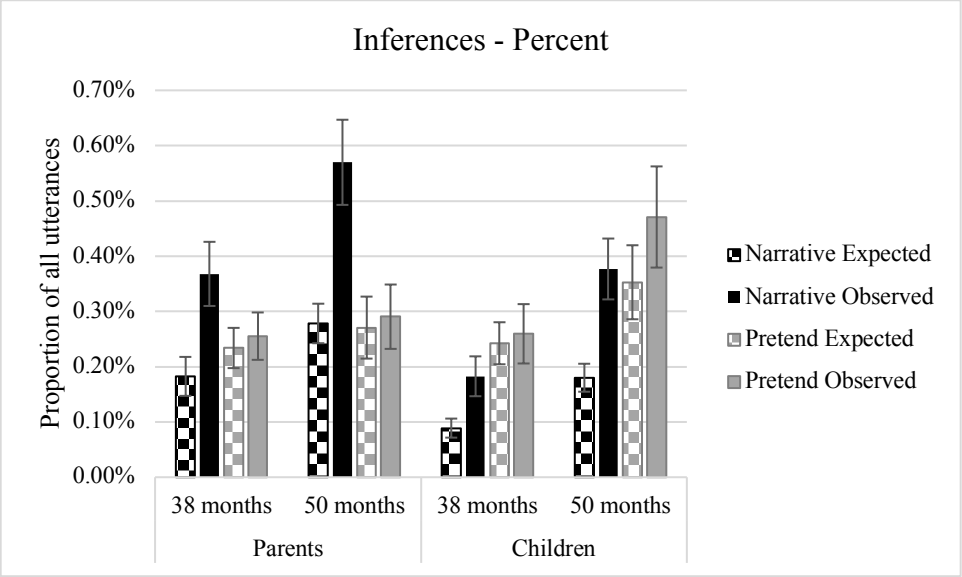

Figure C.1. Expected and observed proportion of all utterances that are inferences appearing in narrative or pretend for parents and children.

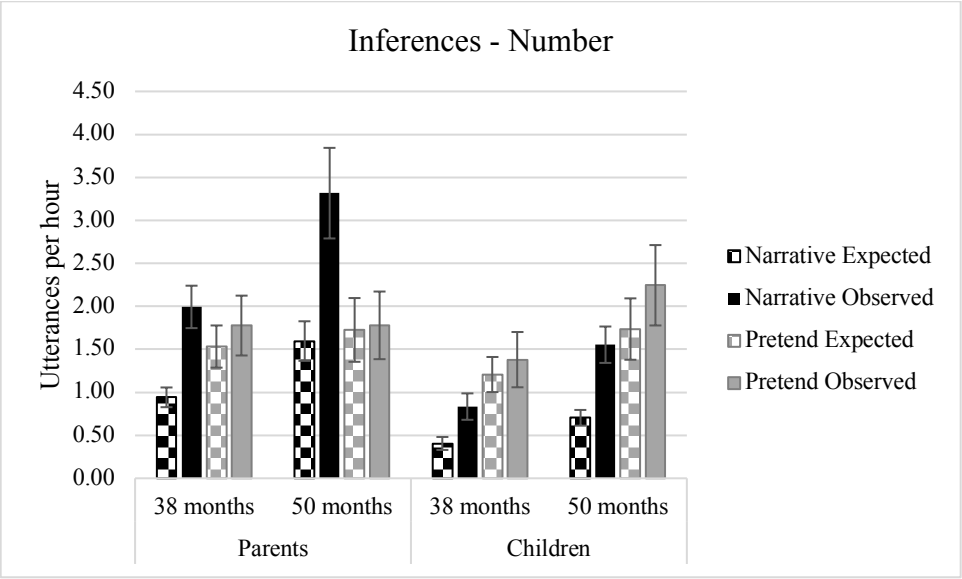

Figure C.2. Expected and observed number of all utterances that are inferences appearing in narrative or pretend for parents and children.

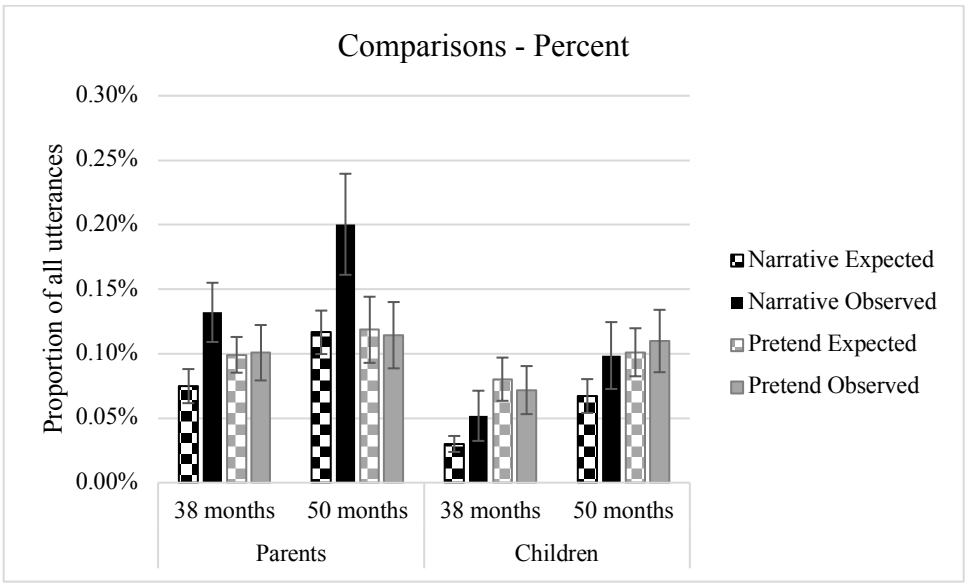

Figure C.3. Expected and observed proportion of all utterances that are comparisons appearing in narrative or pretend for parents and children.

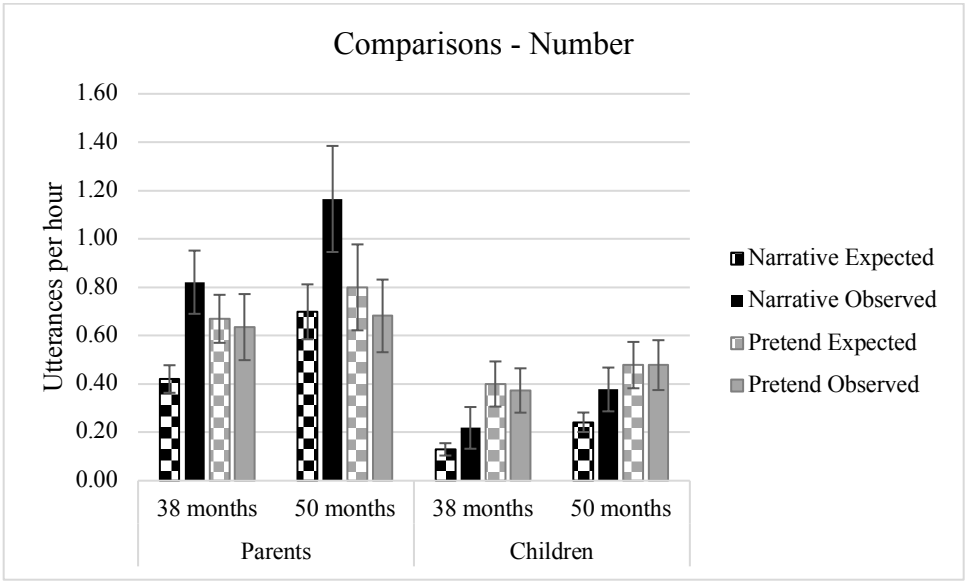

Figure C.4. Expected and observed number of all utterances that are comparisons appearing in narrative or pretend for parents and children.