Symbolic Play and Language Acquisition:

The Dynamics of Infant-Caregiver Communication during Symbolic Play

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Declaration

This thesis is the author’s original work. It contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of the author’s knowledge, it contains no material previously published or written by another person, except where due reference is made in the text.

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Acknowledgements

> "Les mots… Les chercher, les trouver, les entourer, les aimer ou au moins les accompagner, les penser, les poser, les reposer, les enlacer, les corriger, les améliorer, les photographier, les enjoliver, les présenter, les faire accepter, les valoriser, les assembler, les faire primer pour être appreciés. À l'image de leur auteure qui s'est donnée sans compter, posant toutes ses idées, dans un travail plein d'intensité, démesuré mais, à coup sûr prêt à être primé, même sûrement imprimé… Jean-Michel Chaniac.

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Abstract

Infant symbolic play and language acquisition have long been linked. While both activities are inherently social and their acquisition is typically scaffolded by a competent other (Vygotsky, 1978), most studies investigating the symbolic play-language link have considered it in the context of solitary play. This thesis examines the dynamic nature of the symbolic play-language relationship in a semi-naturalistic setting. Fifty-two infant-caretaker dyads engaged in a 20-minute play session that manipulated play type through the use of different toy sets (symbolic versus non-symbolic). Study 1 showed that play contexts influenced language: in symbolic play, infants spoke more, and their language and interactions were more complex. Infant-directed speech was more interactionally demanding (more questions and mimetics) in symbolic play, while in non-symbolic play it was more directive (more imperatives and naming). Study 2 established that conversational turn dynamics patterns differed: there were more conversational turns in symbolic play, turn gaps were longer, and infants were more likely to control entire turn sequences. Study 3 demonstrated that symbolic play allowed for greater and richer content alignment: there were more semantic repetitions and infants were more likely than their parents to choose the topic of conversation. Study 4 revealed more complex and demanding epistemic exchanges of information in symbolic play: infants were more likely to inform, assert, and build on previous information when they spoke. Parents were more likely to engage the infants actively in symbolic play by seeking or requesting information, but the ambiguity of symbolic play also meant that it was more difficult for participants to understand each other. When combined, the results of these four studies suggest that symbolic play is a challenging but communicatively rich environment for infants' language development, constituting a *zone of proximal development* deriving from the need to establish shared intentionality during interaction.

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Chapter 1

Language is acquired within a rich social environment (Nelson, 2009; Pruden, Hirsh-Pasek, & Golinkoff, 2006). While this has always been assumed to be the case, theoretical approaches to language acquisition often have ignored this richness in favor of explaining acquisition in terms of the deduction or induction of formal systems (see Ambridge & Lieven, 2011). As a result, we are only beginning to understand the many social influences on children's language development. In this thesis, I investigated how one common childhood activity – symbolic play – could provide a rich social context for language acquisition. I show that, when compared to a comparable but non-symbolic play context (i.e., functional play), symbolic play supports behaviors that past research has shown are beneficial for language acquisition. Following modern socio-cultural theoretical interpretations of symbolic play as necessitating and reflecting *collective intentionality* (Rakoczy, 2006, 2008), I argue that the context constitutes a *zone of proximal development* (Vygotsky, 1978), serving to both challenge and build children's socio-communicative competence.

1.1 Play and Language

Symbolic play is often defined as the nonliteral utilization of objects, attributes, or actions (e.g., object substitution or the introduction of absent object play or human/super-human features, see Smith, 2009). Symbolic play and language share many conceptual similarities. Notably, they are both communicative and symbolic (Volterra et al., 1979; Werner & Kaplan, 1963). Accordingly, developmental researchers have long identified similarities between the two. Notably, both Piaget (1962) and Vygotsky (1978) discussed symbolic play at length. Both suggested that the two domains are related in development, but their interpretation of this relationship significantly differed. Piaget (1962) argued that symbolic play was merely *indicative* of development; that is, children revealed their newly developed competencies within the realm of play. In contrast, Vygotsky (1962, 1978) argued that symbolic play was a driving force in child development; that within the *context* of play, children acquired new skills and competencies. In empirical terms, many studies have identified significant associations between symbolic play and language (for a review see Quinn, Donnelly, & Kidd, 2018). While the empirical results are consistent with either the Piagetian or Vygotskyan interpretation, the majority of work has been conducted (either explicitly or implicitly) within the conceptual framework of Piagetian theory.

One shortcoming of the Piagetian approach is that, in contrast to the Vygotskyan socio-cultural approach, it downplays the importance of social interaction in development. This is particularly conspicuous in studies of symbolic play and language because in childhood, both are highly interactive activities. For instance, infants typically spend most of their symbolic play time interacting with their primary caretaker (Haight & Miller, 1993), and must necessarily acquire language through social means. As such, it would appear that understanding the social dynamics of the symbolic play–language relationship is an important research priority. For this reason, this thesis reports on a semi-observational study designed to investigate the socio-communicative behaviors specific to symbolic play.

1.2 Thesis Overview

This thesis comprises nine chapters, including four empirical studies. Chapter 2 introduces and defines the concept of play, with a focus on symbolic play. It describes the multiple definitions of the concept of symbolic play that exist in the literature. Chapter 2 also reviews Piaget's (1962) constructivist and Vygotsky's (1962, 1978) socio-cultural approaches, including discussions of theoretical developments made subsequent to the original postulation of these theories. Together, they constitute the main theoretical framework for this thesis. Chapter 3 is a qualitative review of the existing literature that has examined the relationship between play and language.

Chapter 4 describes the methodology of the longitudinal study that informs the empirical studies presented in Chapters 5, 6, 7 and 8. The data were collected from 54 parent-infant dyads at three time points over a 6-month period. Testing began when children were approximately 18 months old. Parents and their infants were observed engaging in different types of play (symbolic, non-symbolic) in their own homes. The empirical chapters in this thesis report the analysis of data collected at the third time point of the longitudinal study, when children were approximatively 24 months old. Specific aspects of their interaction (e.g., language use, conversational turns, repetitions, epistemic stance) were analyzed to investigate how the context of symbolic play influences caregiver-child communication.

In dialogue, each turn and its content are not isolated but interactively linked to the content of other turns in an effort to align each speaker's linguistic representations along several dimensions (Pickering & Garrod, 2004). The four empirical chapters of this thesis compare symbolic and functional play across four different dimensions of interaction. Chapter 5 discusses whether the distribution of different speech acts differs across the two contexts. Chapter 6 then explores whether the two contexts lead to differences in interactional complexity by assessing conversational turns (number of turns, mean length of turns, turn-transition time, and turn sequences between speakers in each condition). Chapter 7 further examines the dynamics of conversation across the two contexts, using a computational discourse analysis tool to track topic introduction and repetition patterns. Finally, Chapter 8 describes the exchange of information across the play settings. Using concepts drawn from Conversation Analysis (Heritage, 2012; Sidnell, 2010), it compares who is the more knowledgeable speaker/recipient in the conversation. Chapter 9 provides a concise review of the findings of each empirical chapter and discusses how these findings may be interpreted within the framework of current developmental theories.

Overall, this thesis examines the dynamics of communicative interaction during symbolic play. It proposes that the ambiguous nature of symbolic play elicits specific patterns of interactions to create a unique socio-cognitive ecology that may serve to foster language and communication in development. Symbolic play is a challenging but communicatively rich activity that facilitates infants' language development. The argument made in this thesis is that because (joint) symbolic play necessitates the establishment of shared intentionality (Rakoczy, 2006; 2008), it constitutes a *zone of proximal development* for language and communication.

Chapter 2

Theoretical Framework

"The truly extraordinary power of language lies in the representational possibilities."

(Nelson, 2009 p.150)

"When the symbolic gateway opens, a whole new universe of cognitive and learning opportunities open up." (Rochat, 2001)

This chapter introduces and defines the concept of play, with a focus on symbolic play, and reviews the main theoretical frameworks that aim to explain the role of play in child development. Specifically, Piaget's (1962) constructivist approach and Vygotsky's (1962, 1978) socio-cultural approach are reviewed, including modern developments within these traditions. The last section of the chapter discusses the social contexts of symbolic play and language.

2.1. Definition of Play

Play encompasses many activities, from rough and tumble play to pretend, and although most of us have an instinctive understanding of what constitutes play, Fein (1981) called the concept fuzzy, and most before her and since have agreed that it remains a particularly difficult concept to define (Garvey, 1974; Lillard, Hopkins, et al., 2013; McCune-Nicolich, 1981; Rubin, Fein, & Vandenberg, 1983; Sutton-Smith, 1979; Weisler & McCall, 1976). Rather than provide explicit definitions, many researchers have preferred to describe the behavior as a cluster of features. For instance, Gray (2009) noted that play is behavior that is "self-chosen and self-directed, intrinsically motivated, structured by mental rules, imaginative, and produced in an active, alert, but nonstressed frame of mind" (p.480). Importantly, play is a particularly prominent feature of childhood, and far more common in children than in adults (Burghardt, 1988; Weisberg, Hirsh-Pasek, Golinkoff, Kittredge, & Klahr, 2016).

In a review of play literature, Smith (2009; also see Smith, Cowie, & Blades, 2003) pointed to Krasnor and Pepler's (1980) definition as a good starting point. Rather than providing a specific definition, they suggested that play behavior should be considered along a continuum that requires varying levels of five criteria: (i) intrinsic motivation, (ii) positive affect, (iii) non-literality, (iv) flexibility, and (v) means/end[1]. Figure 2.1 is an illustration of their model, which represents the five criteria, where activities are most playful at the intersection of the five criteria.

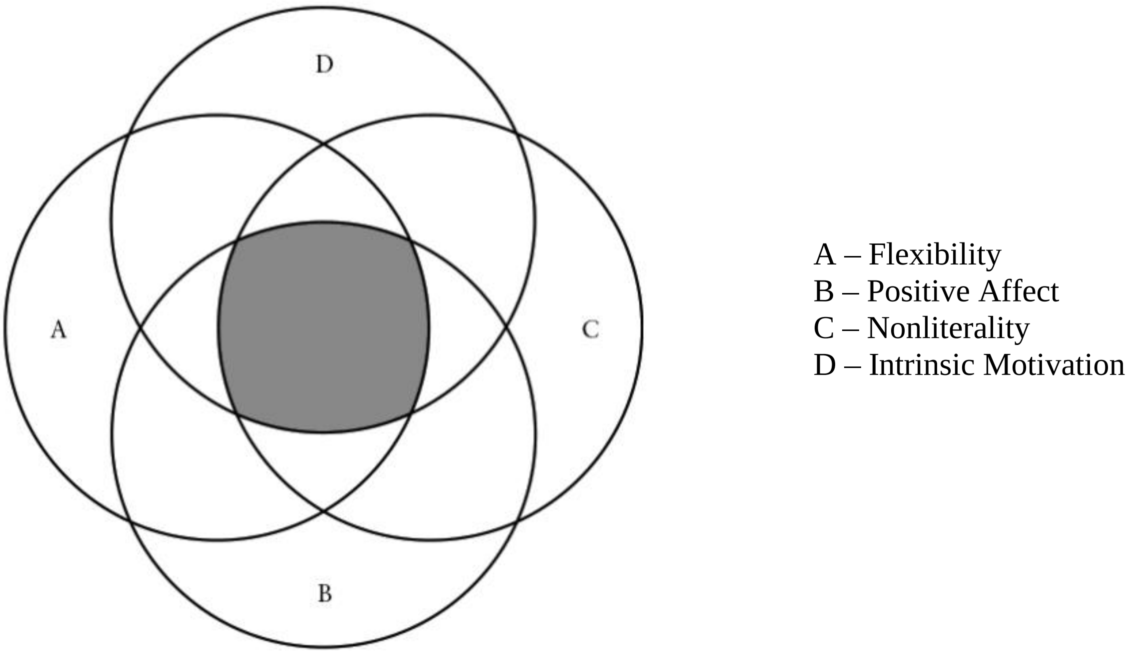


Figure 2.1 Krasnor and Pepler model – shaded area is most playful (Smith et al., p.218)

Empirical research suggests that not all of these features are equally important. Smith, Cowie, and Blades (2003) asked a number of adults to rate videos along the five criteria, and

[1] By which they mean the child is 'more interested in the performance of the behavior than its outcome' in Smith, 2009, p.7.

whether or not they represented play. From their analysis, Smith et al. (2003) concluded that flexibility, positive affect, and non-literality were necessary to the definition of play. Means/end correlated with play but play could still be described as such without means/end being present. Interestingly, they found that intrinsic motivation did not correlate with play at all.

Krasnor and Pepler's (1980) five criteria are not the only features of play that are described in the literature. Table 2.1 lists the main characteristics of play found in a comprehensive review of the literature. The table lists the various characteristics ascribed to play in the literature, providing examples of authors who have described them. The table also indicates whether the characteristics are applicable to play in general and/or to symbolic play. As can be seen in the table, Krasnor and Pepler's criteria remain among the most cited and will therefore be applied as the working definition of play in this thesis. The table highlights Krasnor and Pepler's idea that play happens along a continuum, encompassing many activities. Features that differentiate symbolic play from the rest of play types are also noted and will be described in section 2.1.2.)

Table 2.1

Characteristics of Play

Characteristic	Authors (example of researchers who acknowledged the characteristic)	Play type
Self-chosen	Gray 2009; Manwell & Mengert, 1934	Play in general
Self-directed	Gray 2009; Manwell & Mengert, 1934	Play in general
Intrinsically motivated	Eberle, 2014; Gray 2009; Krasnor & Pepler, 1980; Lillard, 1993; Lillard, Lerner, et al., 2013; Sutton-Smith & Kelly-Byrne, 1984	Play in general
Imaginative	Eberle, 2014: Gray 2009; Manwell & Mengert, 1934	Play in general, Symbolic play in particular
Active and alert	Gray 2009	Play in general
Positive affect/non stressed*	Eberle, 2014: Gray 2009; Krasnor & Pepler 1980; Manwell & Mengert, 1934	Play in general
More common in children	Burghardt, 1988; Weisberg et al., 2016	Play in general
Flexibility*	Eberle, 2014; Krasnor & Pepler, 1980; Lillard, 1993; Lillard, Lerner, et al., 2013; Sutton-Smith & Kelly-Byrne, 1984)	Play in general
Non-literality/ mental representation that differs from reality*	Fein, 1981; Garvey, 1977; Gosso, Morais, & Otta, 2007; Krasnor & Pepler, 1980; Reynolds, 1976; Lillard, 1993; Lillard, Lerner, et al., 2013; Sutton-Smith & Kelly-Byrne, 1984	Symbolic play
Awareness of the difference between reality and fiction	Lillard, 1993	Symbolic play
Means/End (performance is more interesting than outcome)	Smith & Vollstedt, 1985	Play in general

Note. * designates what Smith et al., (2003) required for an event to be categorized as play in their experimental study.

2.1.1 Types of play. As argued in section 2.1, play behaviors encompass many activities along a multi-dimensional continuum. In an effort to organize these different play activities, many researchers have developed categories along functional and structural lines (for a review, see Smith, 2009). For instance, Smilansky (1968) theorized a developmental scheme dividing play into cognitive categories ranging from functional play (banging blocks), construction play (building a tower), symbolic play (what she called dramatic play, substituting imagination for reality) to games with rules (also see Lillard, Lerner, et al., 2013). Smith (2009) suggested that this division was problematic because, for instance, a child can play with blocks while pretending to build a castle, an activity which requires symbolic transformations. He also pointed out that both language play (e.g., rhyming) and rough and tumble play *(*e.g., climbing trees, play fighting) do not fit into this categorization. His more complete typology included social-contingency play, sensorimotor play, object play, language play, physical activity play, and symbolic play. I have synthesized his definition of each play type in Table 2.2.

This thesis focuses on two types of play: functional and symbolic play. In functional play, objects are used by children in a manner appropriate to their adult-given purpose, and to a specific end. For example, a magnetic drawing board is used to draw (Brown, Rickards, & Bortoli, 2001; Fein, 1981; McCune, 1995; Tamis-LeMonda, et al., 1992). In symbolic play, a child may pretend an object, action, or idea represents another object, action, or idea and they may inform their play partner of their new meanings (Bruner, 1983; Fein, 1981; Fekonja, Umek, & Kranjc, 2005; Leslie, 1987; Ungerer & Sigman, 1984; Werner and Kaplan, 1963). In the next section (2.1.2), I look more closely at the definition of symbolic play.

Table 2.2

Categories of Play

Play type	**Definition**
Social contingency play	Mimicry and simple games such as peek-a-boo
Sensorimotor play	Banging objects repeatedly, mouthing or dropping them (usual until age 2)
Language play	Play with noise, syllables, words, phrases such as babbling and rhyming
Object play	Construction play such as blocks pouring water between cups
Physical activity play	Gross body movements
- Exercise play	Running, climbing, jumping, etc.
- Rough and Tumble play	Social forms of physical play such as wrestling or chasing
Symbolic play	Non-literal use of objects such as pretending a plate is a steering wheel or a hat

Note. Table developed based on Smith, 2009.

2.1.2 Definition of symbolic play. In a recent review of 199 empirical research articles on the subject, Thompson and Goldstein (2019) assessed that past research has not defined and operationalized play in any consistent way. Fein (1981, p.1096) categorized symbolic play as “behavior in a simulative, nonliteral, or ‘as if’ mode” (see table 2.1). Symbolic play has been referred to as dramatic play, imaginative play, fantasy play, make-believe play, and pretend (Fein, 1981). The term symbolic play has become more commonly used in the past few decades, likely because it focuses attention on the fact that it requires the manipulation of symbols: one must understand and use symbols to engage in the behavior (Casby & Della Corte, 1987; Cook, 2000; Corrigan, 1982; Ervin-Tripp, 1991; Garvey, 1977; Hall, Rumney, Holler, & Kidd, 2013; Hopkins, Dore, & Lillard, 2015; Jurkovic, 1978; Lewis, Lupton, & Watson, 2000; Lyytinen, Poikkeus, & Larkos, 1997; McCune-Nicolich, 1981; Nicolopoulou & Ilgaz, 2013; Quinn, 2016; Reynolds, Stagnitti, & Kidd, 2011; Reynolds, 1976; Weisberg, Zosh, Hirsh-Pasek & Golinkoff, 2013). Recently, Campbell, Leezenbaum, Mahoney, Moore, and Brownell (2016) operationalized symbolic play as "reflecting the ability to imbue objects with imaginary characteristics and functions" (p. 2305). Symbolic play may occur whether an object is used for the purpose for which it is intended, like pretending to make a phone call on a toy phone, or replacing the object's real purpose, such as using a banana for a phone. Symbolic play allows the child to treat objects in a way that contravenes reality, and in doing so, children can project a symbolic mental representation onto the objects. However, symbolic play goes beyond object role substitution. Imaginary characteristics and functions can be inferred from gestures alone, such as talking into a hand that is empty but looks as if it is holding a phone.

Lillard (1993) developed a list of external requirements for symbolic play to occur. According to her, symbolic play requires a participant, a reality, a mental representation that is different from reality, and the participant's awareness of the difference between the two[2]. Additionally, one must be aware that the symbolic situation is different from reality for it to be pretend. Following Krasnor and Pepler's model (1980, see Figure 2.1), symbolic play must have flexibility, positive affect, non-literality, and intrinsic motivation to occur (also see Lillard, 1993; Lillard, Lerner, et al., 2013; Sutton-Smith & Kelly-Byrne, 1984). Symbolic play requires flexibility because it can change quickly (the block-cake becomes block-sugar later in play) and constant adjustment to make sure play partners understand the symbolic switch. Positive affect means people pretend when they enjoy themselves (and enjoy themselves when they pretend). Symbolic play is non-literal because it is different from reality and evolves in ways that are not constrained by it. It is intrinsically motivated since the child asserts independent agency by choosing to engage, requiring regular changes between

[2] "a pretender, a reality (omnipresent), a mental representation that is different from reality, a layering of the representation over the reality, such that they exist within the same space and time, and awareness on the part of the pretender of the above conditions" (Lillard, 1993, p.349).

signifier and signification (even playing with a piece of string requires mental adjustments to its representation).

2.1.3 Development of Symbolic Play. Infants typically begin to engage in rudimentary forms of symbolic play during their second year of life (for reviews see Fein, 1981; ; Nelson, 1985; 2009; Nicolich, 1977; Rubin & Howe, 1985), with the frequency of symbolic play behaviors following an inverted U-shaped curve across early childhood. It begins to emerge after a child's first birthday, increases quickly over the following three or four years, and then decreases (Fein, 1981; Garvey, 1990; McCune-Nicolich, 1981; Rubin et al., 1983). The initial increase is very sharp: Tamis-LeMonda and Bornstein (1994) noted a 250% increase in pretend play events in just seven months, between 13 to 20 months of age. In these early stages, symbolic play closely imitates activities in everyday life, such as common events like eating and drinking.

This development usually co-occurs with the child's ability to use objects effectively (Lillard, 2007; McCune-Nicolich, 1981), denoting a transition between sensorimotor practice and symbolic manipulation (see section 2.2.1). Object play (Leong & Bodrova, 2012) develops first, and because the abstraction necessary to develop symbolic play is more complex and requires more time to develop, the development of symbolic play is subsequent to that of functional play (Bruner, 1983; Leong & Bodrova, 2012; Rakoczy, 2008, Tomasello & Rakoczy, 2003). Object play behaviors progress to incorporate representational thinking and symbolic acts, including object substitution (e.g., pretending a stick is a person), gestures (e.g., holding their hand as if it is carrying a cup and drinking from it), sound effects and exaggerated motions (e.g., "*num num*" and dramatic chewing when pretending to eat from an empty fork), and the combination of representative acts into sequences and hierarchical orders (e.g., the child dresses Teddy with a cloth as a cape, has him ‘fly’ in the sky, and ‘save’ a doll) (Fein, 1981; McCune, 1995; 2008).

Initially, a competent other scaffolds the first instances of symbolic play for children and infants discover pretense by adapting to their play partner’s pretend scenario (Harris, Kavanaugh, Wellman, & Hickling, 1993). By 2 years old, symbolic play is well established (Bates, 1979; Bretherton, 1984; Fein, 1981; Nicolich, 1977; Tamis-LeMonda & Bornstein, 1994) and infants, at least in middle class families in the United States, spend between 5 and 20% of their play time pretending (Haight & Miller, 1993).

The comprehension of symbolic play develops more slowly. Early in development, children’s ability to pretend appears before their full ability to comprehend symbolic acts (Bigham & Bourchier-Sutton, 2007; Tomasello et al., 1999). Initially, it is easier for them to understand pretend objects or actions and their referents if they are at least somewhat alike (Bigham & Bourchier-Sutton, 2007): a block is easier to understand as a piece of cake than a hat is. The more dissimilar the pretend act and the object/action represented, the harder it is to understand. By 24 months, children are capable of interpreting and responding to most forms of pretense (Harris, Kavanaugh, Wellman, & Hickling, 1993).

While the developmental trajectory of symbolic play has been well described, at least in Western middle-class children, its theoretical significance in child development is less clear. The next section will give a brief historical perspective of the development of play and symbolic play theory, focusing on Piaget’s constructivist approach and Vygotsky’s social-cultural development approach, along with modern interpretations of the two.

2.2 Developmental Theories and Their Different Perspectives on Play

Play has been studied in psychology for well over a century. However, as Hirsh-Pasek and Golinkoff (2008) noted, as early as 380 BC, Plato had already identified the value of play in human development in *The Republic*: "Our children from their earliest years must take part in all the more lawful forms of play, for if they are not surrounded with such an atmosphere, they can never grow up to be well conducted and virtuous citizens." Subsequently, many scholars contemplated the role of play in development. In his treatise, *Émile ou De l'éducation* (1762/1961), Rousseau argued that education should involve play and be child-centered and enjoyable, in direct opposition to the era's puritanical views of child rearing. Many different animal species also play, and the behavior has been featured in the biological sciences, with play considered as one way to release surplus energy (Spencer, 1898), to practice skills necessary for survival (Groos, 1898), or to play out ancestral instincts (Hall, 1908). In the field of psychoanalysis, play was viewed as a safe situation to express destructive or sexual impulses that would be too dangerous to communicate directly (Peller, 1954). From Rousseau to Peller, play was considered to have some level of useful positive purpose, and from the 1920s to the 1980s, researchers increasingly considered play essential to human development (for a complete history of play theory, see Smith, 2009).

The middle of the 20th century saw the emergence of modern developmental psychology, when two prominent theorists, Piaget (1951) and Vygotsky (1978), made play a point of theoretical focus, albeit in very distinct ways. Piaget (1973) considered play to be indicative of a child's development: that through play, they demonstrated newly acquired skills. Vygotsky (1978), on the other hand, argued that it is through play, and in particular through *joint play* with a competent other (e.g., caregiver), that children learn. According to Vygotsky, the social context influences the child's actions, and learning and development occurs within social interaction (Nelson, 2009); whereas to Piaget, it is the child who drives cognitive development, development thus being less dependent on social exchanges. The next section considers each of these approaches in more detail.

2.2.1 Constructivism. Piaget (1951; Piaget & Cook, 1952) argued that learning is a process by which an individual first experiences an event and internalizes it by reflecting upon it. Thus, children internally *construct* their mental representation of the environment in which they live. Piaget argued that development was stage-like, and that children's orientation to the world was qualitatively different in each stage. Thus, in the *sensorimotor stage* (0 to approx. 2 years), children's understanding of the world is limited to their immediate perceptual experience. Children in this stage typically fail to appreciate the symbolic nature of the world, such as a toy tiger being a representation of a real tiger. It is only once they develop *the semiotic function* towards the end of the sensorimotor stage that they begin to understand symbols, and thus begin to engage in rudimentary forms of symbolic play (e.g., object substitution). As children pass through subsequent stages, their play develops further, although Piaget argued that pretend play all but diminishes once children begin to engage in organized activities (e.g., 'games with rules'). Evidence now suggests that children continue to play well beyond that age (Belsky & Most, 1981). In fact, children report pretend activities until they are 12 years old (Lillard, Pinkham, & Smith, 2011; Smith & Lillard, 2012), and some adults continue to report pretend activities[3] (McCartney, 2016).

Symbolic play and language in constructionist theory. Piaget explained the apparent relationship between symbolic play and language as deriving from the development of the semiotic function. That is, both activities require the ability to use and understand symbols to represent actions, objects, or ideas. In fact, Piaget contended that language acquisition is only

[3] Consider the success of Pokémon Go in adults. This augmented reality mobile game developed and published by Niantic for iOS and Android devices uses the mobile device GPS to locate, capture, battle, and train virtual creatures, called Pokémon, which appear as if they are in the player's real-world location. 60% of Pokémon Go users are aged 18-34 according to one measure; another finds 38% aged 19-34, with a further 32% aged 18 or younger, (retrieved from https://www.pokemongo.com/en-us/ and https://www.businessofapps.com/data/pokemon-go-statistics/).

possible once our semiotic ability has developed (Piaget, 1951; Bornstein, Haynes, O'Reilly, & Painter, 1996). He argued that this is a time when infants consolidate their knowledge of reality and symbols through practice, which he called *representational rehearsal*. Representational rehearsal during play allows infants to project symbolic schemata (i.e., mental structures that represent the world) onto objects and people, actions and ideas.

Piaget's theory was *domain-general*, in that mental representations were proposed to develop according to a common set of mechanisms in a three-step process described by the concepts of *assimilation*, *accommodation,* and *equilibration* (Piaget, 1962). Assimilation is the process of knowledge consolidation, describing those instances where a child incorporates new experiences into their current understanding of the world. An infant may learn the word "car", for instance, and initially consider that all vehicles are termed "car" because they are being assimilated into a schema related to the infant's understanding of "car" (i.e., passenger vehicles). Accommodation occurs when children must change their knowledge schemata to incorporate new facts about the world. Pursuing the passenger vehicle example further, once the child perceives that a motorbike is distinguishable from a car, they must alter their understanding of the world by creating more complex differentiated conceptual and linguistic repertoires. Thus, according to Piaget, development is a process of achieving a balance between accommodation and assimilation, such that the child's mental representation of the world matches reality. Striking this balance is termed equilibration.

Piaget argued that the development of schemata is largely an autonomous and internal process rather than a social one, even though he recognized that assimilation and accommodation must occur during interactions with the environment, including but not limited to play. In fact, Piaget (1962) argued that symbolic play is primarily a way for children to assert and enjoy themselves by practicing, exaggerating, or correcting reality (pp.131-132). This egocentric assimilation that occurs during symbolic play, when children incorporate new information into their current understanding, is enjoyable, appealing, and reinforcing (Piaget & Inhelder, 1977, pp. 58-59). Symbolic play allows children the opportunity to master their environment according to constructivist theory. It allows them to control and manage the consolidation of their understanding of mental representation in a gratifying way, yet the rehearsal that occurs during play does not *modify* pre-verbal intelligence, according to Piagetian theory (Müller & Carpendale, 2000; Piaget, 1962, p. 68; Piaget & Inhelder, 1977, p. 84).

Constructivist theory's limited emphasis on the role of social processes in language development has been questioned by researchers who argue that signs are inherently social (Buhler, 1990). For instance, Piaget did not attempt to explain how children come to understand others' referential intent during object substitution, a level of social understanding that is required for both language and symbolic play. Yet researchers like Schlegoff (2006) contend that the triadic nature of signs: the sender, receiver, objects (and sometimes the state of affairs), is at the root of language development. I now turn to socio-cultural developmental theory, which identified a core role for interaction as the basis for socio-cognitive and linguistic development.

2.2.2 Socio-cultural development theory. While Piaget focused on autonomous personal cognitive growth without focusing on social and cultural contexts (see Müller & Carpendale, 2000; Nicolopoulou, 1993), Vygotsky focused on the active role of the interaction between the child, caretakers, and society at large in development (Vygotsky, 1962, 1978). Vygotsky and his followers (Leont'ev, 1978; Wertsch, 1981, 1985) argued that the phylogenetic, historical, and ontogenetic development of psychological processes were closely linked with the development of the actions through which the individuals relate to their society (Minick, 1987). Vygotsky (1978) argued that “human learning presupposes a specific social nature and a process by which children grow into the intellectual life of those around them” (p. 88). In other words, the socio-cultural approach (Vygotsky, 1962) explicitly views socialization as the driving force of development. Socially meaningful activities such as play can serve as a context in which important concepts and routines can be introduced, explored, and mastered.

In Vygotskian theory, play is a *zone of proximal development* (ZPD) for language and other cognitive processes (Vygotsky, 1978). A ZPD provides a context during which a competent other (e.g., an adult or older child) interacts with younger children to help them achieve the next step up in their development through guidance and assistance (e.g., guided play), a concept also known as *scaffolding* (Van der Veer & Valsiner, 1991; Vygotsky, 1978).

Recently, Weisberg et al. (2016) discussed four studies that show a more knowledgeable adult can *scaffold* a child's learning environment while not hindering play's positive impact on learning. For instance, a study by Sobel and Sommerville (2010) showed that at age four, children were more accurate at learning causal relationships in a toy (e.g., linking the push of a button to a light turning on) from their own actions in a guided play setting, a type of scaffolding, than from direct instruction. In the guided play setting, children were first able to explore the toy on their own and then observe an experimenter interact with it; whereas in the direct instruction setting, the child was shown what to do first and explored the toy second. In the guided play condition, the children were more likely to learn from their environment, or as Sobel and Sommerville (2010) put it: “children who discovered the causal efficacy of events (as opposed to confirming the efficacy of events that they observed another discover) were also more accurate than children who only observed the experimenter act on the environment” (p.1). In a similar study, Bonawitz et al. (2011) showed that guided play improved self-discovery of an object's hidden functions, whereas direct instruction inhibited such exploration. These results show that, in play with a parent, children can copy and perform more pretend actions and do so with greater complexity with a combination of self-exploration and social partner scaffolding (Bretherton, O'Connell, Shore, & Bates, 1984; Lyytinen, 1989, Ungerer, Zelazo, Kearsley, & O'Leary, 1981).

Symbolic play and language in socio-cultural development theory. Vygotsky argued that symbolic play is distinctively crucial to the development and understanding of symbols (including language) and symbolic thinking. It provides children with the opportunity to navigate symbolic relationships and eventually separate referents from objects (Bornstein et al., 1996; Weisberg et al., 2016). In symbolic play, children come to understand that objects like a small white plastic cube with black marks on it and its referent, a die, is substitutable for other referents that may be separated from reality during play. Indeed, during play, the die can become a sugar lump, a piece of cake, an ant, etc. Through learning that objects and their referents are substitutable, children learn to differentiate between meaning and appearance (Lillard et al., 2013). In socio-cultural development theory, the social structure serves as a primary source of learning for young children, and it is contended that the dynamic interactional nature of symbolic play provides a supportive context for the development of symbolic understanding (Bruner, 1983).

2.3 The Social Context of Symbolic Play and Language

In their anthropological review of pretense in Huli society in Papua New Guinea, Goldman and Smith (1998) noted that pretense is socially-moderated and linguistically constructed. In development, symbolic play has been noted to morph quickly from a solitary activity to a social one (Black, 1989; Hall et al., 2013; Lyytinen et al., 1997; Rakoczy, 2006, 2008). In an early study of social participation during free play, Parten (1932) noted that children start with solitary play (the child plays alone: 0 to 3-year-olds), which is followed by non-interactive, parallel play with peers (children play in the same way but side-by-side with limited interaction: around 3 to 4-years-old), and reciprocal and cooperative play types (children play together: 5-years-old and up; also see Lillard, Lerner, et al., 2013 for a review). Once play development is complete and children can practice every category of play, the majority of play time is social: 45%, compared with 15% parallel play, 25% solitary play, and 15% non-play (Lyytinen et al., 1997; Wang et al., 2016). In addition, with scaffolding from an adult play partner, play is social well before Parten described it. For instance, solitary play can be social because when children practice social interactions, their play can often attract the attention of others, particularly adults (Bruner, 1983). For example, when he was 15-months-old, my son Marius, like many other children his age, enjoyed pretending to make phone calls, a social behavior. Even though he was technically playing alone, I was more likely to ‘answer the call’ than I would have responded to one of his other non-social solitary play activities.

Like symbolic play, language development has a distinctly social component. Several researchers have investigated the social aspect of language and its development: for example, in his usage-based model, Tomasello (2009) explained that children acquire language by understanding how others use it. According to that model, language structure emerges from language use in society. The social input and cognitive processes at work in other developmental skills are used for language development, which requires intention-reading (the social-cognitive attempt to understand others and make ourselves understood) and pattern finding (abstraction). Indeed, language acquisition fits within an interactive communicative context requiring the use of intersubjective or perspective-taking skills (Tomasello, Kruger, & Ratner, 1993). The emergentist coalition model of word learning also takes into consideration the importance of the social context for language acquisition (Golinkoff, Can, Soderstrom, & Hirsh-Pasek, 2015; Hollich et al. 2000). This model shows that during word learning, children respond not only to linguistic cues but also to attentional and social cues. Children give a different weight to certain cues at different stages of language development (also see Rowe, 2012). A third model focusing on the social aspect of language development is that of Nelson (1985, 2009), who argued that children do not develop language as organisms of disembodied cognition, but as complex entities who acquire language in a socially infused environment with many contexts (for a thorough review, also see Roseberry, Göksun, & Hirsh-Pasek, 2009). A child’s worldview is not simply a primitive adult version. From a relatively internal world in infancy into their role as citizens in a community of people, children strive towards meaning-making and social connection, which leads them to more complex representations and cognitive skills.

Nelson (2009) outlined a model with four principal developmental phases as children progress from intrapersonal experience to interpersonal culture. In each of these phases, they gradually adjust their cognition and behavior to the social adults around them. First, they develop affective communication: an infant’s first social communication, such as crying or smiling. Joint attention and imitation are the markers of this milestone. With these new tools, infants can then form communicative relationships and connections with other people, while imitation is a sign that infants have made connections between another person’s body and their own. As they grow, they move away from this egocentric perspective and adopt a more social attitude. The second phase is mimetic cognition. Mimetic cognition consists of exchanging social knowledge, such as when language begins, thanks to the use of repetition. This phase sees an increase in productive vocabulary. Next, infants are able to communicate intentionally and have voluntary control over the transmission of their experiences.

Accordingly, mimetic cognition allows children to express their private thoughts. Then, Nelson postulates that children are able to use grammar and complex sentence structures. They learn language as a symbolic system and can communicate successfully in a group. Nelson gives special importance to pretend play in her work, because it is a time when children must substitute symbols for the actual referent (Bruner, 1983; Bornstein et al., 1996; Weisberg et al., 2015). The last phase occurs when children understand shared meaning and therefore can participate fully in their culture, usually when they are around the age of five. These children have developed an advanced capacity for perspective-taking (i.e., a theory of mind), which permits them to assess the world both subjectively and objectively, including from someone else's perspective.

2.3.1 Scaffolding. Like other play types, symbolic play begins with a lot of adult scaffolding (see above and Bruner, 1983; Lillard et al., 2007). Groups of children or parent-infant dyads and triads partake in symbolic play together, sharing the fluctuating symbolic representations with each other so that play is successful (e.g., one must agree that the block is a piece of cake and not a car for symbolic play to be sustained; Lillard, Hopkins et al., 2013). Sociodramatic play, such as 'playing families' or 'playing superheroes', emerges when children are about four years old, particularly with a proficient play partner (Haight & Miller, 1993; Howes & Matheson, 1992; Bretherton et al., 1984).

Language development is also scaffolded by competent others during social interaction, which often involves play (Bernstein, 2004; Damast, Bornstein, & Tamis-LeMonda, 1996, Nelson, 1985). According to Tomasello et al. (1993), children first learn language through imitative learning, instructed learning, and collaborative learning. Through these processes, infants are exposed to a range of verbal behaviors (e.g., child-directed speech) and socio-cognitive behaviors with objects (e.g., gestures, facial expressions, functional and symbolic play behaviors). The interactive communicative context necessary for language acquisition requires the use of intersubjective or perspective-taking skills. In turn, these skills help scaffold language through the triangular interaction between adult, infant and object: the adult intermittently matches and then extends an activity to promote infant learning in a multidirectional and transactional fashion (Razfar & Gutiérrez, 2003). That is, parents react to what their infants say and do, and vice-versa. These interactions provide infants with exposure to the role of social partners and allow them to understand communicative intent and the ensuing production of intersubjective linguistic constructions (Tomasello & Rakoczy, 2003; Kirkham, Stewart, & Kidd, 2013). The consideration of someone else's perspective within this triangular interaction facilitates abstract mental representation (Tomasello, 1999).

In this thesis, I follow Tomasello and Carpenter (2007) in referring to the process of understanding someone else's mental representation in interaction as *collective* or *shared intentionality*: the collaborative psychological process by which members share psychological states with one another in order for a communicative exchange to occur successfully (Gilbert, 1989; Searle, 1995; Tomasello & Carpenter, 2007; Tuomela, 1995). Following Vygotsky's socio-cultural learning theory, Tomasello and colleagues argued that what makes human cognition different from animal cognition is not only greater individual intellectual capacity, but also the ability to learn through other people, and to collaborate with them (Tomasello, 1999; Tomasello, Carpenter, Call, Behne, & Moll, 2005; Tomasello et al., 1993). The concept of collective intentionality is an important motivational element for children to share social experiences with others. I consider it in more detail, with special reference to symbolic play, in the next section.

2.3.2 Collective Intentionality. Rakoczy (2006) suggested that symbolic play was the first unambiguous instance of collective intentionality in development. To be successful, symbolic play requires the collective conception of a series of ideas or behaviors, which are transient but act to establish and organize the symbolic play situation. Take, for example, a mother holding a toy teacup on her head and saying, "I love my new hat". The child then picks up the other teacup and puts it on her head saying, "Nice hat". The symbolic play episode comes to an end when the child says, "My hat is too small", and puts down the teacup. Herein lies an instance of symbolic play that demonstrates how collective intentionality is crucial to the activity. In this instance, there is a representational relationship (Bühler, 1990) between the cup and its new referent – a hat. Thus, in this context, object A (cup), which conventionally refers to concept X (drinking vessel), now refers to concept Y (an item of clothing). Only if the two participants have this representational relationship in mind and know that their play partner is applying this same relationship, can the play episode be successful. Thus, collective intentionality describes the reciprocal representational pact that humans make in conversation – a collective meeting of the minds that allows the kind of dynamic meaning making that occurs during symbolic play.

Rakoczy (2006, 2007) argued that these types of social interaction that require collective intentionality provide a child with opportunities to rehearse specific skills. These include: shared action (child and mother pretend to wear hats), joint attention (child shares her mother's attention to the toy teacup in order to understand that she is wearing a hat), and imitative cultural learning (child infers an appropriate symbolic act, namely that the hat could be "too small"). Within these playful interactions, children begin to grasp the symbolic nature of the world. Children's knowledge of the form (color, size, shape, material, complexity) and function of an object (e.g., a teacup goes on a saucer) influences the type of play the child performs with it (Nielsen, 2012; Pellegrini, 2009; Rubin & Howe, 1985). That is, using the vocabulary of Searle (1995), an object's *causal function* can guide play. However, within the realm of symbolic play, objects can also be assigned a *status function* (e.g., this teacup is a hat) because the object (teacup) cannot conventionally fulfill the function (being worn) due to its intrinsic properties. Thus, through the assignment of status functions in play, children gain entry into the distinctly symbolic nature of human society.

2.4 Conclusion

After defining the concepts of play in general and symbolic play in particular, this chapter presented an overview of the theoretical explanations of the role of play in development. Specifically, Piaget's (1962) constructivist approach and Vygotsky's (1962, 1978) socio-cultural approach were considered, along with more modern interpretations of some of these original ideas. The chapter then discussed the social context of symbolic play, highlighting how symbolic play provides optimal conditions for the establishment of collective intentionality. Chapter 3 reviews the past empirical literature that has investigated the symbolic play-language relationship.

Chapter 3

The Play and Language Relationship: Review of the Literature

As discussed in Chapter 2, psychologists generally assume that symbolic play is an important feature of early child development. While a Piagetian view of the play-language relationship has dominated the empirical literature, the work of socio-cultural theory provides an alternative perspective from which we can understand associations between play and language in early childhood (Vygotzky, 1978; Nelson, 2009; Tomasello, 2009). This chapter will first review the existing empirical literature on the relationship between symbolic play and language development, including the (i) correlational, (ii) longitudinal, and (iii) training studies that have investigated symbolic play and language. To date, most but not all research has identified links between the two domains. I will then explore what limitations may have led to these mixed results before describing the qualitative and quantitative reviews of the literature which have evaluated the entire body of research available. Finally, I will introduce the scope of this thesis and its attempt to expend the field's current knowledge of the relationship between the two domains.

3.1 Correlational Studies

Concurrent correlational studies have shown evidence of a relationship between symbolic play and language acquisition (Bates, 1979; Bates, Bretherton, Snyder, Shore, & Volterra, 1980; Casby & Corte, 1987; Corrigan, 1982; Doswell, Lewis, Sylva, & Boucher, 1994; Elias & Berk, 2002; Jurkovic, 1978; Lewis, Lupton, & Watson, 2000; Lyytinen et al., 1997; McCune, 1995; Shore, 1986). This is particularly true in infancy (Doswell et al., 1994). For example, Bates et al. (1979) found an association between the two domains in the first year of life. In 3- to 4-year-olds, Kirkham et al. (2013) reported that symbolic play and language were significantly associated even when controlling for the influence of age and non-verbal IQ. Up to the age of six, researchers have found associations between symbolic play and language: in a cross-sectional study of 40 children between 1 and 6 years-old, Lewis et al., (2000) found that solitary symbolic play was significantly correlated with both expressive and receptive language.

The parallel development of symbolic play and language has often been noted in the correlational literature. For example, Cole and la Voie (1985), in a cross-sectional study of symbolic play and cognitive development, tested children between 2 and 6 years old and determined that receptive vocabulary scores were correlated with object symbolic play (also see Katz et al., 1996). Similarly, Shore (1986) found that the complexity of symbolic play predicted similar levels of complexity in language in infants aged 18- to 24-months. She interpreted her findings to suggest that the capacity to analyze, separate, and recombine elements of an object or event appears during this timeframe and allows for the transition to multiword speech, symbolic play, block-building, and non-semantic action. That is, following Piaget, both language and symbolic play depend on the child’s ability for symbolic representation, whether it is mapping words with meaning in language or modifying reality in symbolic play (Lewis, et al. 2000).

The correlational literature also has pointed to a difference in the relationship between language and dyadic versus solitary symbolic play. For example, Garvey and Kramer (1989), in a cross-sectional observational study of 35 dyads of children between 2 and 6 years old, found different patterns and complexity of language in symbolic play compared to other social but non-symbolic play activity. Namely, they found more complex sentences in symbolic play in younger dyads and more non-present tenses, modals, and temporal expressions in symbolic play for all dyads. This is one of the first studies to compare play types in a dyadic context, therefore controlling for such influences as imitation or social/partner effects between types of play. In a naturalistic observational study of both solitary and dyadic play in 141 twenty-month-olds, Bornstein et al., (1996) found that collaborative (i.e., dyadic) play was positively associated with children's language and mothers' symbolic play, but solitary play was not. Gibson, Fink, Torres, Browne, and Mareva (2019) conducted an observational study of dyadic peer interactions during dyadic play with 134 children aged 5 years. They found that negotiation in play was positively associated with expressive language skills. They interpreted this to mean that social symbolic play may provide an enhanced context for the rehearsal of core social skills and other competencies, especially in relation to adaptation and flexibility in social encounters.

In an observational study of 110 18-month-old infants, Lyytinen et al. (1997) found that complexity in symbolic play was significantly associated with both language production and comprehension. Interestingly, they noted that the relationship was strongest for other-directed symbolic play (doll-play with a play partner) in comparison to other types of play (also see Sigman & Sena, 1993). They deduced that other-directed symbolic play required social exploratory and representational skills which, in turn, assist language. Marbach and Yawkey (1980) also thought that the relationship between symbolic play and language stemmed from the facilitation of acquisition through social explorational and representational skills. They tested the effect of symbolic play (imaginary play action) on sixty 5-year-olds in a semi-experimental study with three conditions (self, puppet, and control). They found that answering a question about a book by enacting the response (self-action) improved semantic recall but they found no difference between conditions in terms of syntactic recall.

Hall et al., (2013) examined how play, language and gestures were related in a cross-sectional group of children aged 18 to 30 months. They found that when accounting for the age difference, representational play was significantly associated with language development and gesture use. The authors proposed that the symbolic aspect of representational play provided a context that may facilitate communicative development. They interpreted these findings to mean that the social context was beneficial to the exchange of meaning, which influences language acquisition. Quinn and Kidd (2019) came to a similar conclusion: when compared within-subjects at 18 months, symbolic play contained greater gesture use and longer joint attention episodes than functional play did. The authors suggested that symbolic play provides a rich context for the overall exchange and negotiation of meaning, and thus may contribute to the development of important skills underlying communicative development.

3.2 Longitudinal Studies

In one of the first longitudinal studies on the relationship between play and language, Bates et al. (1979) studied 25 children between the ages of 9 and 13 months. They specifically examined associations between language development, play, and deictic gestures. Both play and gestures predicted language development. These associations were interpreted as evidence for a common underlying mechanism supporting the development of these three domains. In particular, following Piaget, Bates et al. interpreted the results to reflect the existence of local homologies or sets of interrelated developmental schemata between symbolic play, gesture, and early spoken language.

Most longitudinal studies since then (Bornstein et al., 1992; Lyytinen et al., 1997; McCune 1995; Ogura 1991; Shore, O'Connell, & Bates, 1984; Stagnitti & Lewis, 2015; Tamis-LeMonda & Bornstein, 1994; Ungerer & Sigman, 1984) have aimed to determine if symbolic play predicts language development and/or vice versa. For instance, McCune (1995) and Ogura (1991) reported that, between the ages of 8 and 24 months, the development of symbolic play predicted longitudinal spoken language development. McCune (1995) found that pretend play evolved to the next level of complexity about two months before similar improvement could be noted in language. She tested 10 children between the ages of 8 and 24 months every month, alongside a cross-sectional study of 102 children. Ogura (1991) reported similar findings. His smaller longitudinal semi-naturalistic observational study (4 children in the first two years of life) determined that play and language developed in parallel during the first year but became interrelated thereafter. Laakso, Poikkeus, Eklund, & Lyytinen (1999) noted an association between language comprehension during solitary symbolic play at 14 months and their symbolic play competence at 18 months. McCune (2008), Orr and Geva (2015), and Smith and Jones (2011) also noted that the development of language and symbolic play were parallel and interrelated. In older children, Stagnitti and Lewis (2015) found that the complexity of a child's symbolic play at 4 to 5 years predicted language proficiency three to five years later. In particular, symbolic play was associated with children’s explicit knowledge of vocabulary (‘semantic organization’).

In another longitudinal study, Casby and Della Corte (1987) noted parallels between the complexity of language and play. They observed the frequency and nature of object substitutions used during play episodes in 15 children, assessing how these changes influenced language development over a 12-month period when the children were aged between 19 and 32 months. They found that children who produced multi-word utterances were more proficient at decontextualizing objects and more likely to decontextualize dissimilar objects (e.g., using a cup as a hat) than children who produced only single word utterances, over and above the influence of age. The authors interpreted these findings to mean that symbolic play complexity was significantly associated with language complexity (especially syntax) because of the child’s level of symbolic understanding.

Some longitudinal studies note that the social aspect of symbolic play and language may be part of the relationship between the two domains. For instance, Ungerer and Sigman (1984; also see Sigman & Ungerer, 1984) reported that infants who engaged in more other-directed play (including dolls) at 13.5 months old had higher current language skills, an effect that persevered longitudinally. In particular, at 22 months of age, language proficiency was associated with symbolic play events but not relational play (i.e., stacking objects). Ungerer and Sigman (1984) described the benefits of the social and communicative functions of play in the development of play and language associations (also see Roseberry, Hirsh-Pasek, & Golinkoff, 2014 for recent research on how social contingency facilitates language development).

Lyytinen et al., (1997) analyzed associations between language and functional play (goal-oriented, like a puzzle) and compared it to language and symbolic play associations (object substitution) in a large longitudinal sample of 171 infants aged 14, 18, and 24 months. They reported significant concurrent correlations between symbolic play and language comprehension and production at 14 and 18 months, and significant longitudinal correlations between symbolic play measured at 14 and 18 months and vocabulary production at 24 months. Symbolic play measured at 14 months was predictive of infant vocabulary production at 24 months. By contrast, they found no significant associations between functional play and any measure of infant language. They concluded that symbolic play, in particular other-directed (social) pretense (also see work on doll-oriented play by Sigman & Sena, 1993) correlated most strongly with language comprehension and production, likely because symbolic play and language rely on similar underlying mental capacities, such as exploratory skills and representational skills.

Finally, Quinn (2016) compared symbolic play to functional (non-symbolic) play in a longitudinal study of 54 infants at 18, 21, and 24 months. Infant-caregiver dyads participated in both symbolic and functional play at 18 months and their language in each context was analyzed. The results showed that parents used different patterns of language across the two play settings. Specifically, although more imperatives and declaratives were used in functional play, more questions, mimetics, and conversational turns were used in symbolic play. Importantly, these different speech acts and behaviors had different effects on children's language development. Whereas imperatives were negatively associated with vocabulary development, mimetics and conversational turns predicted concurrent language skill, and conversational turns predicted language growth longitudinally at 24 months. Thus, the patterns of language that were used more frequently in symbolic play were positively associated with language development, whereas those used more often in functional play sometimes had a negative effect.

3.3 Training Studies

Results from training studies also have suggested that play-based activity supports language development (Baumer, Ferholt, & Lecusay, 2005; Bellin and Singer, 2006; Ferrara, Hirsh-Pasek, Newcombe, Golinkoff, & Lam, 2011; Levy, Schaefer, & Phelps, 1986; Lovinger 1974; Marbach & Yawkey 1980; Pellegrini & Galda, 1982; Smilansky, 1968; Smith, Dalgleish & Herzmark, 1981). Smith et al., (1981) conducted a training study of fantasy play in 33 four-year-olds, which they compared to skill training (tutoring) of 32 four-year-olds. They found that fantasy play training but not skill training improved children's language, as measured by change in the number of utterances produced, and improved vocabulary and sentence structure. Other training studies have been found in populations who have atypical development. Notably, Shore, Hester, and Strain (1976) and Rogow (1981) found that children with behavioral and speech delays benefited from symbolic play interventions to facilitate language acquisition.

In a quasi-experimental study, Stagnitti, Bailey, Hudspeth Sevenson, Reynolds, and Kidd (2016) investigated the influence of a play-based versus a traditional school curriculum on the development of pretend play skills and oral language in children attending their first year of formal schooling. Each group was tested on standardized measures of pretend play and language skills at the beginning of the school year and then again six months later. The results showed that the children in the play-based curriculum group significantly improved on all measures (i.e., both play and language), whereas the children in the traditional-curriculum group did not. Like Martlew, Stephen, & Ellis (2011) or Fekonja et al. (2005), the authors interpreted their results to suggest that play-based activity may stimulate social and therefore linguistic interaction among pupils: children speak more during play-based activities, and this increase seems to be associated with greater gains in language.

In a school-based study, Fisher, Hirsh-Pasek, Newcombe, & Golinkoff (2013) tested the impact of play on learning, focusing in particular on children's understanding of the names and properties of a number of geometric shapes. Seventy children aged between 4 and 5 years were trained under three different conditions: (i) guided play, (ii) free play, and (iii) didactic teaching. The results showed that children's understanding and retention of the concepts increased in the guided play condition above and beyond the children in the other two groups. The children in the guided play condition were also more flexible and able to generalize the properties to rare or unusual shapes. The researchers interpreted their results to show the importance of scaffolding during guided play.

In another training study, Pellegrini and Galda (1982) found that symbolic play was more effective in helping children understand a story when compared to (i) a discussion with an adult and (ii) drawing training (also see Rubin, 1980; Sachs, 1980). The authors suggested that symbolic play assists with the acquisition of the narrative function of language because it facilitates the practice of symbolic representations (e.g. changing roles and objects; also see Baumer et al., 2005). Lovinger (1974) came to a similar conclusion. She performed a 25-week training study with an intervention and a control group. In the training condition, the experimenter encouraged (rather than trained) 47 children (average age 56 months) to perform socio-dramatic play. She noted the increased use of language (number of words, score on the verbal expression scale of the Illinois Test of Psycholinguistic Abilities) in the training condition and interpreted this improvement to stem from symbolic play's requirement for flexibility or negotiation of meaning that allows ideas and labels to be rapidly changed. Levy et al. (1986) also found in a preschool-based training study that sociodramatic play improves children's language competence between 3 and 4 years of age.

In contrast with the previous studies cited, one training study contended that it was parental scaffolding and not play itself that facilitated language acquisition. In a study of 17 4- and 5-year-olds, Christie (1983) provided half the cohort with nine 20-minute symbolic play sessions with an adult while the other half received the same number of academic tutoring sessions. Each training session included one adult (the trainer) and 5 children. Christie tested the children on a variety of measures before, immediately after, and 3 months later. The measures included quality of play, verbal intelligence and creativity. The authors found that verbal intelligence and creativity improved similarly in both training groups. Play quality did not change their results. They deduced that it might be the adult interaction rather than the specific context that explained the improvement.

3.4 Limitations to the Relationship between Symbolic Play and Language

Although the studies described above reported a positive association between the two domains, others have not. For example, Shore et al. (1984) reported no longitudinal association of symbolic play and language between 20 to 28 months, yet at 20 months, they found a significant concurrent association between object substitution in play and mean length of utterance (MLU), and language complexity. Bornstein, Vibert, Tal, and O'Donnell (1992) reported a concurrent symbolic play and language link at 13 months, yet no longitudinal associations from 13 to 20 months. In another example, Lyytinen and colleagues (1997) reported a longitudinal language-symbolic play association from 14 to 24 months, but in the same sample, found that symbolic play at 18 months did not predict language at 24 months.

These contradictions could be due to a number of limitations. The effect may be sensitive to concept operationalization issues. In Chapter 2, it was noted that operationalizing and defining symbolic play is particularly difficult, and past research has found no consistent way to define and operationalize play (Thompson & Goldstein, 2019). For instance, Sigman and Ungerer's (1984) definition of functional play included two behaviors that would now be considered symbolic play, namely, holding a phone to someone's ear (self or other) and feeding a doll with a spoon (for details about what constitutes symbolic play behaviors, see Table 4.3 in Chapter 4 and Unhjem, Eklund, & Nergård-Nilssen, 2014). In addition, it could be that the strength of the relationship changes across development. For instance, Tamis-LeMonda and Bornstein (1994) found that language comprehension but not production was related to symbolic play in 13-month-olds. However, at 20 months, only a child's ability to express meaning (i.e., semantic diversity such as agency, location, and possession) was related to symbolic play, showing that the outcome differs based on both definition and type of measurement. Finally, identifying and quantifying the symbolic play and language relationship may have been hampered by an implicit adoption of the Piagetian argument that both systems develop from a core capacity for symbolic representation, which has tended to result in symbolic play and language being measured in the absence of a social context.

3.5 Previous Literature Reviews

In an effort to clarify the mixed results that exist in the literature and to re-visit the theoretical underpinnings of the symbolic play link with language, several research groups have produced overviews of the literature in the past decade. Hirsh-Pasek, Berk, and Singer (2009) reviewed the evidence with a specific focus on the role of play in learning in preschool and concluded that play in general was an important context for language development (when children are 3 to 4 years old). Following up on this work, Weisberg et al. (2013) reinforced this conclusion, arguing that "children who engage in play with attentive and responsive adults will improve their language skills" (p. 49).

A second review by Lillard, Lerner et al. (2013) was less positive. They reviewed the role of symbolic play in the development of a number of cognitive domains, including language. On the basis of the correlational research, they argued that the evidence for a relationship between symbolic play and language was compelling, but that the degree to which the relationship was causal was unclear because experimental and training studies contained some methodological limitations. Instead, the data could be explained by a relationship that was dependent on a third variable (i.e., as an *epiphenomenon* of other developmental processes), or because symbolic play was one of many variables that influence language development [which, following Smith (2009), they term *equifinality*].

Narrative reviews have an important place in synthesizing research; however, quantitative reviews are valuable because they can aggregate past research statistically to estimate the magnitude of an empirical effect in the population. Quinn, Donnelly and Kidd (2018) took this approach, reporting the first meta-analysis of correlational studies that have investigated the relationship between symbolic play and language. They reviewed 35 correlational studies on the topic with a total combined sample of 6,848 children aged between 1 and 6 years. They included three moderating variables in their analysis: the study design (longitudinal/concurrent), the type of language measure (production/comprehension) and the age of the participant. Overall, they reported a significant small-to-medium association between symbolic play and language (r = .35), which was not strongly affected by any of the moderating variables Thus, the results suggested that the relationship of symbolic play and language is observable early in development and does not appear to appreciably change in magnitude throughout early childhood. The stability and magnitude of the correlation is most consistent with the argument that symbolic play is one significant variable that contributes to language acquisition, but that the relationship is not causal.

3.6 The Current Study

The evidence is compelling that symbolic play and language are meaningfully related in development. While the existence of the relationship is beyond doubt, the underlying explanation of the effect is unclear. While much research has explained the relationship within a Piagetian constructivist framework, hints in the literature suggest that, following socio-cultural approaches to development, the social context of play is important. This is an under-researched part of the literature. Indeed, if language is acquired in a contextually-rich and socially-infused environment (e.g. Nelson, 1985), as socio-cultural theory suggests (see Chapter 2), a core focus should be placed on the socio-communicative dynamics of symbolic play. The research reported in this thesis aimed to focus on exactly that.

The following chapters report on research that aimed to answer a number of research questions concerning the socio-communicative properties of symbolic play compared to a comparable but non-symbolic context. After reviewing the methodology of the study (Chapter 4), the next chapters (Chapters 5, 6, 7, and 8) examine how parent-infant interactions differ between functional and symbolic play contexts, with a focus on whether the context of symbolic play provides a particularly fertile context for language development (Bruner, 1983; Vygotsky, 1978).

Chapter 4

Research Outline and Methodology

This chapter describes the current study's methodological approach. The study was semi-observational and longitudinal in design. Parents and their infants were observed playing in their homes across two play conditions (symbolic, functional) when the infants were 18 and 24 months old. The data was originally collected as part of a previous PhD in the ANU Language Lab (Quinn, 2016; see also Quinn & Kidd, 2019). Quinn reported analyses of the 18-month time collection point and how language and communicative behaviors at that age predicted subsequent language development. The current thesis concentrates on analyzing the play interactions at the 24-month data collection point.

4.1 Participants

Fifty-four primary caretakers (50 mothers, 4 fathers) and their biological infants (31 girls and 23 boys) participated across three data collection timepoints. Fifty-two dyads (30 girls and 22 boys) completed the study and participated in the third timepoint. They were recruited from the Canberra metropolitan area in Australia. Participants were recruited through a variety of means: advertisements at childcare and early learning centers and family services, local libraries, a local children's magazine, online parenting groups, and word of mouth.

At the first testing time point, infants were 16.58 to 20.26 months old (M = 18.32, SD = 0.98). Three months later at the second time point, infants' ages ranged between 19.68 and 23.32 months old (M = 21.29, SD = 0.97). At the third and final testing session, infants were 22.73 to 26.45 months old (M = 24.29, SD = 1.01). This thesis examined the data of the 52 dyads that completed the last timepoint. Participants were recruited within this age range because it marks the point at which children begin to (i) regularly engage in symbolic play

(Fein, 1981; Fein & Apfel, 1979; McCune, 1995, 2008; Nielsen & Dissanayake, 2004; Rubin & Howe, 1985) and (ii) rapidly acquire language after a preceding period of slow developmental gains (Benedict, 1979; Lyytinen et al., 1997: Rowe, Özçalışkan, & Goldin-Meadow., 2008). All infants were monolingual and typically developing, with no known or suspected developmental delay or difficulty, determined via a semi-structured interview conducted during the first testing session (see Appendix A). Fifty-three infants were born at full term and one participant was born 10 weeks early but was identified by parents as typically-developing according to their doctor, having met all age-appropriate developmental milestones by the first testing session. As shown in Table 4.1, 70% of the infants were first born (n = 38), 67% had no siblings (n = 36), and 65% attended childcare (n = 35; $M_{days/week}$ =1.73, $SD_{days/week}$ = 1.51). Fifty-one infants lived in the same home as both their father and mother; three lived solely with their mother.

Parental average age did not differ between genders: mothers were aged approximately 34 years old (M = 33.80, SD = 4.11) and fathers approximately 35 years old (M = 34.81, SD = 4.77). Eighty-three percent of mothers (n = 45) and 82% of fathers were born in Australia. Similarly, socio-economic status, as estimated from parental education, was high yet reflected the broader population. Seventy-eight percent of mothers (n = 42) and 69% fathers (n = 37) had bachelor's degrees or higher. This is consistent with the average level of education for Canberra (Australian Bureau of Statistics, 2011). While some parents reported speaking a different language in addition to English, all parents were raising their infants monolingually. Details of infant demographics are presented in Table 4.1.

At the first timepoint of data collection (see Table 4.1), a semi-structured interview of the primary caretaker was conducted by researchers to collect demographic data about the parents (e.g., age, place of birth, education, and occupation), the infant's living arrangements (e.g., with parents, siblings), childcare attendance (e.g., age of commencement, frequency) and to screen for typical development (e.g., checklist of basic milestones that may suggest developmental or cognitive delay, see Appendix A). Parents completed an additional language questionnaire at 21 and 24 months.

Table 4.1

Infant Demographics

	Birth order				*Childcare (days/week)*			*Age of childcare onset*			*Primary caregiver*	
	1	2	3	4	0	1-2	3-5	N/A	< 12mts	≥ 12 mts	Mother	Father
n	38	12	3	1	19	18	17	20	17	17	50	4
%	70.4	22.2	5.6	1.9	35.2	33.3	31.5	37.0	31.5	31.5	92.6	7.4
N = 54												

Note. Reprinted with permission from Quinn, 2016

4.2 Materials

4.2.1 Play conditions. Two different sets of toys were selected to elicit play across two conditions: functional and symbolic play. Object play (Leong & Bodrova, 2012) is one of the first types of play to develop, and infants between 18 and 24 months and their primary caretaker play with objects both functionally and symbolically (Leong & Bodrova, 2012). Functional play with objects was thus selected as the non-symbolic play condition because it is a developmentally valid context comparable to symbolic play with one fundamental component removed, symbolic transformations. Functional play is a play activity that can have both a dyadic and a social component, while not requiring the symbolic transformation of objects, entities, and actions that symbolic play demands. For this thesis, it was defined as object play where the toys were used for their intended purpose in an *adult-defined* fashion (Quinn & Kidd, 2019; Fenson, Kaga, Kearsley, & Zelazo, 1976; Laplante, Zelazo, Brunet, & King, 2007).

4.2.2 Sets of toys. Play is influenced by the number and type of toys and materials available to children, the form of the toy (e.g. shape, size, material, complexity), and the child's knowledge of its function (Morrissey, 2014; Rubin & Howe, 1985). In order to elicit functional and symbolic play separately, two different sets of toys were selected (see Figure 4.1), drawing upon toys that have been used in standardized measures (e.g. Test of Pretend Play; Lewis & Boucher, 1997) and in past research that has investigated symbolic (e.g., Bigham & Bourchier-Sutton; Brown et al., 2001; Fekonja et al., 2005; Largo & Howard, 1979: O'Brien & Nagle, 1987; Taylor, Cartwright & Carlson, 1993) and functional play (e.g., Fenson et al., 1976; Laplante et al., 2007). As gender-stereotyped toys influence the nature of the parent-child interaction irrespective of the gender of the parent or child (Caldera, Huston, & O'Brien, 1989), toys were selected to be relatively gender-neutral.

The symbolic play condition set of toys included both representational toys: a saucepan with its lid, a wooden spoon, a teapot, two teacups, a teaspoon, a teddy bear and a plastic toy cellphone, and nonrepresentational toys: a piece of red cloth, a small yellow cylinder, and a small white cube. The representational toys were selected because toy household items (e.g. tea set, saucepan, spoons) tend to elicit symbolic play (e.g. pretending to bake a cake or drink tea), toy cellphones tend to elicit pretend conversations (see Taylor et al., 1993), and the teddy bear is an item upon which the child may project these behaviors and conversations (e.g., feeding) (Brown et al., 2001; Lewis & Boucher, 1997). These toys are representational because they offer iconic representations of real objects in the world. The nonrepresentational objects were selected because they do not immediately represent real world artifacts and encourage object substitution because they are abstract (e.g., the red cloth is a *'cape'* or a *'blanket'* for teddy). These objects have been shown to support emergent pretend play behaviors and higher levels of symbolic play (Tamis-LeMonda & Bornstein, 1994).

The functional condition set of toys consisted of a magnetic drawing board with magnetic stamps, a wooden peg and hammer set, a wooden animal block puzzle and its wooden tray, and a wooden maraca and castanets. These toys were chosen because they have a specific purpose, according to adult definitions (Quinn & Kidd, 2019; Fenson, et al., 1976; Laplante, et al, 2007). They are goal-oriented or “rule-based” (e.g., the hammer bangs the pegs, the magnetic drawing board is for drawing), and do not immediately lend themselves to symbolic play.

Figure 4.1. Functional (left) and symbolic (right) condition toys.

In order to delimit the space where dyads could play, a blue blanket (157cm x 130cm) was used to prevent the participants from going off-camera. Parent-infant dyads were asked to remain seated on the blanket while they were playing.

4.2.3 Semi-structured interview. Researchers interviewed the primary caretaker (see Appendix A) to obtain demographic information about the parents (e.g., age, place of birth, education, and occupation), the infant’s living arrangements (e.g., with parents, siblings), childcare attendance (e.g., age of commencement, frequency). The interview also screened for typical development (e.g., checklist of basic milestones that may suggest developmental or cognitive delay).

4.2.4 Recordings. Both video and audio were recorded separately during the play sessions. An Olympus WS-811 digital voice recorder (stereo recorder and integrated USB stick; serial number 200141311) and SONY microphone (ECM-T140) were used to record the audio of play sessions. A Zoom Q2HD Hand Video Recorder was used to record the sessions. It was set up on a tripod during play sessions.

4.3 Procedure

The Australian National University Human Research Ethics Committee (protocol: 2013/578) approved the study. Dyads were observed in their own homes. The parents were instructed to play with their infants as they normally would for 20 minutes. They were encouraged to sit on the play mat and face the direction of the camera. If an infant wandered off, they were encouraged to gently invite the infant back to the play mat. Play sessions allowed for breaks as required. During filming, the researcher typically was hidden from view, controlling the videotaping equipment. Unlike previous studies (e.g., Lillard & Witherington, 2004), caretakers were never asked to engage in pretense, thus ensuring that play was spontaneous and ecological validity substantial.

Both the functional and the symbolic play sessions were presented consecutively to the dyads as a continuous play session (within-subjects). The dyad was randomly assigned their first set of toys, they played with it for about 10 minutes, at which point, the experimenter introduced the second set of toys (and removed the first). Each play session lasted approximately 20 minutes. Play conditions (functional or symbolic) averaged just under 11 mins (M = 648s, SD = 52.62s) and ranged in duration between 9 mins and 12 mins, 45s. Although they are referred to in this thesis as separate play sessions, parents were not aware that play sessions were distinct. The order of conditions was randomized across participants to avoid order effects. Play sessions were recorded by video and an additional microphone to provide visual and audio recordings for later transcription and coding. The semi-structured interview was completed following the first play session only (18 months old). Sessions at time one were approximately 60 to 90 minutes long and at time three (24 months) were about 60 minutes long. Following the final testing session at 24 months, parents were debriefed in person regarding the overall aims of the study.

4.3 Coding

Each 20-minute video collected at Time 3 (i.e., when participants were, on average, 24 months) was coded a minimum of six times, according to the coding pipeline described in Figure 4.2. Detailed and specific coding schemes for each variable are described in individual chapters.

1st stage: Assess level of symbolic play

2nd stage: Transcribe parent and infant language

3rd stage: Code parent and infant language

4th stage: Code turn initiation

5th stage: Code epistemic stance

6th stage: Code concept recurrence in Discursis

Figure 4.2. Coding stages.

4.3.1 Transcription. Video and audio recordings were aligned and transcribed verbatim in ELAN Linguistic Annotator software (Tacchetti, 2017) by the primary researcher using the Child Language Data Exchange System (CHILDES) in the Codes for the Analysis of Human Language program (CHAT: MacWhinney, 2013) conventions. Only verbal exchanges between the parent and infant were used in the analyses. Thus, verbal exchanges that included interactions with the researcher or someone else in the household were excluded. An utterance was defined as a unit of speech marked by a transition in speaker, grammatical closure, and/or greater than a two second pause (Golinkoff & Ames, 1979; Miller & Chapman,1981).

Ten percent of play sessions were randomly selected to calculate inter-transcriber reliability. Reliability was obtained by manually comparing each transcribed utterance. Utterances were scored 1 for a match and 0 for a non-match. Matches were scored a 1 only if they were identical for both transcribers or if segments of speech were transcribed verbatim but identified as separate utterances. Matches were also scored as 1 if mimetics, contractions, discourse participles and infant's babbles were phonemically similar (e.g., *shlurp* vs *schlurp*, *gotta* vs *godda*, *mmm* vs *mmhm*, *ba* vs *bap*), as these differences were not pertinent to the study. Non-matches were scored 0 if an intelligible utterance was not identically transcribed, or only one transcriber had identified an utterance as audible. Due to the dichotomous nature of inter-rater scoring, the most accurate and informative assessment of inter-rater reliability was raw agreement. To compute the proportion of correct matches between transcribers, the number of matches was summed and divided by the number of total utterances. The average probability of matches between the researcher and transcriber was 96.23%. Non-matches were distributed equally between parent (49%) and infant (51%) utterances and were primarily associated with one transcriber missing utterances or words, or writing that the utterances were intelligible when the other transcriber had heard and written an utterance or word. Some ambiguity also was evident when transcribing infant's speech and babbles. Overall, agreement was high, and the distribution of errors was similar between the parent and the infant across interactions. Therefore, these errors were not problematic for subsequent analysis.

4.3.2. Levels of symbolic play. Infant-parent interactions were coded for the level of symbolic play, to determine whether the toy manipulation did in fact result in different types of play across the two conditions. Play was coded from videotaped footage of the play sessions. Both conditions were coded to determine if the symbolic condition elicited (i) more complex forms of symbolic play and (ii) a greater number of symbolic actions overall. Symbolic acts in both play conditions were coded according to the Pretend Play Observation Scale (Brown et al., 2001), a coding scheme that describes the typical developmental sequence of pretend play, based on ten stages. For a description of these stages and their examples see Table 4.2.

Table 4.2

Symbolic Play Stages

Stage	Age (months)	Description and example
1	12 >	Pre-symbolic (closes eyes and pretends to sleep)
2	14-18	Autosymbolic (drinks tea out of empty cup)
3	13-18	Decentered (feeds partner/doll with empty spoon)
4	16-19	Linear sequence (feeds self and partner in any order)
5	18-24	Combinatorial sequence with single recipient (feeds and bathes doll in any order)
6	18-26	Planned action (searches for, requests, offers materials incorporated into play)
7	20 >	Simple object transformation (uses saucepan as hat, aerosol lid as cup)
7.5	20 >	Complex object transformation (more than one object at a time, within a combinatorial sequence, and/or involving greater dissimilarity to the represented object)
8	21-30	Agency attribution (adopts vocal or physical attributes of another e.g., cat, driver)
9	30 >	Ordered sequences (mixes cake, bakes it, eats it, retaining logical order)
10	30 >	Imaginary transformation (places imaginary cake on plate, interacts with imaginary character)

Note. Adapted from Brown, Rickards, and Bertoli (2001) and Quinn (2016).

Following Morrissey (2014), the coding scheme was modified slightly: Stage 7 (object transformations) of Brown’s scale was separated into two stages: simple (7.0) to represent early forms of object transformations (e.g., using a saucepan as a hat, cylinder as a cup) and complex (7.5) forms of object transformations (e.g., transforming more than one object at a time, transforming within a combinatorial sequence, and transformations involving greater dissimilarity to the represented object).

The reliability of symbolic play coding was tested by calculating the nominal agreement between two independent coders for 10 of 52 (19%) of play sessions. The percentage of matches between the two coders was 93.37%. Overall, percentage error was 6.63% and was evident only for assessments of infant play levels. Paired-sample *t*-tests were used to compare (i) the number of symbolic play events in parents and infants across play conditions and (ii) the highest level of symbolic play in each condition. The symbolic play condition was confirmed to have significantly more pretend play events than the functional condition for both infants ($M_{symbolic}$ = 24.98, $SD_{symbolic}$ = 8.93 and $M_{functional}$ = 1.18, $SD_{functional}$ = 1.46), $t(52) = 18.59$, $p < .001$, $d = 3.68$, CI_{95} [21.24, 26.37], and parents ($M_{symbolic}$ = 30.57, $SD_{symbolic}$ = 12.14 and $M_{functional}$ = 0.82, $SD_{functional}$ = 0.76), $t(52) = 17.80$, $p < .001$, $d = 3.42$, CI_{95} [26.29, 33.2]. In addition, symbolic play was also shown to have higher levels of symbolic play (Parent: $M_{symbolic}$ = 8.76, $SD_{symbolic}$ = 1.31, $M_{functional}$ = 1.78, $SD_{functional}$ = 1.07, $t(50) = 28.32$, $p < .001$, $d = 5.78$, CI_{95} [6.49, 7.48]; Child: $M_{symbolic}$ = 8.01, $SD_{symbolic}$ = 1.18, $M_{functional}$ 1.02, $SD_{functional}$ = 0.99, $t(50) = 41.82$, $p <.001$, $d = 6.32$, CI_{95} [6.65, 7.33];). The results confirmed the efficacy of the toy manipulation. Notably, not only were these results significant, but we rarely observed symbolic actions occur in the functional condition.

4.4 Overall Design

The study had a within-subjects longitudinal design. The timeline for data collection is outlined in table 4.3. As previously stated, this thesis focuses on Timepoint three data.

Table 4.3

Data Collection Timeline Across Testing Sessions

Variable	T1 (18mts)	T2 (21mts)	T3 (24mts)
Play Sessions	X		X
Infant language: MB-CDI	X	X	X
Semi-structured interview	X		
Debrief of study aims			X

Note. Adapted from Quinn, 2016

The main independent variable was the play condition (functional, symbolic). Conditions were randomized and counterbalanced between dyads to minimize practice and fatigue effects. This design allowed for a comparison of differences in play across contexts while controlling for individual differences in parental and infant spoken language and play style. Dependent variables included measures of parental and infant verbal communicative behaviors and dynamics of speech. These are described in more detail in each individual chapter.

Chapter 5

The Language of Parent-Child Interactions during Symbolic Play

In Chapters 2 and 3 I explored the possibility that one reason why symbolic play and language are related is because symbolic play provides a rich context for honing skills important for language. Chapters 5 through 8 elaborate this proposal. The current chapter discusses language use during symbolic play as compared to functional play. The literature on the role of infant-directed speech (IDS) in language acquisition has shown that the quantity of IDS alone is not sufficient to explain differences in language development trajectories, with recent research showing that the input *quality* of the type of interactions contributes significantly to language growth (Hirsh-Pasek et al., 2015; Rowe, Leech, & Cabrera, 2016; Soderstrom, 2007). The current study replicates one of Quinn's (2016, Chapter 5) study six months later at 24 months old and explains the differences in the quality of language across the two play contexts.

5.1 Parent-Child Interactions in Language Development

Parent-child interactions, in particular their specific pragmatic functions, have been studied at length in studies of infant directed speech (IDS) (e.g. Aslin, 1993; Cameron-Faulkner, Lieven, & Tomasello, 2003; Rowe et al., 2004; Tomasello, Conti-Ramsden, & Ewert, 1990; Wu & Gros-Louis, 2014). IDS is defined as a specific pattern of language addressed to young children. Adults and older children (siblings, for instance) have been shown to practice IDS, and although men, women, and children have slightly different ways of modifying their language for IDS, they all partake in it (Fernald et al., 1989; Jacobson, Boerma, Fields, & Olson, 1983; McRoberts & Best, 1997; Papoušek & Papoušek, 1987; Shute & Wheldall, 1999). Overall, IDS is defined by more variable pitch, limited vocabulary, repetitions, shorter utterances, vowel alterations (Fernald et al., 1989; for a review of IDS see Golinkoff et al., 2015) and exaggerated facial expressions (Singh, Morgan, & Best, 2002; Soderstrom, 2007; Tamis-LeMonda, Kuchirko, & Song, 2014). Golinkoff et al. (2015) have also noted that IDS "promotes infant attention to language, fosters social interaction between infants and caregivers, and informs infants about various aspects of their native language by heightening distinctions relative to the speech addressed to adults (p. 339)". Overall, therefore, research has shown that infants prefer to listen to IDS over other types of speeches (Cooper & Aslin; Fernald et al., 1989; Pegg, Werker, & McLeod, 1992; Soderstrom, 2007).

Among researchers who studied IDS, Quinn (2016) explored the nature of IDS during symbolic play and compared it to that of functional play in children at 18 months old. She also analyzed whether infant language varied between the play contexts. She aimed to examine whether the 'linguistic ecology' of play differed when the play context had a symbolic component and found that language was significantly different in the symbolic versus non-symbolic play context. Although she did not find differences in the quantity and complexity of the language of either infants or parents, she found differences in the pragmatics of Infant Directed Speech. Notably, a greater frequency of both *yes-no* questions and *wh-* questions occurred in symbolic play. At the same time, she found more imperatives and directives in functional play. Her findings support the suggestion that the different play contexts appear to foster different opportunities for children to hear and respond to different forms of language (Camaioni, Longobardi, Venuti, & Bornstein, 1998), which either promote or hamper conversational interaction (Heubner & Meltzoff, 2005). Indeed, the symbolic play context may foster conversational interactions because questions are more interactionally demanding than imperatives and declaratives are. They require and often necessitate a response (Rowe et al., 2016), whereas imperatives and declaratives, which are used to inform, do not require a high level of information processing or verbal response (Barnes, Gutfreund, Satterly, & Wells, 1983; Blount, 1972). She interpreted the overall results to mean that the symbolic play is a linguistically more complex context. It prompts the use of IDS, which acts to promote negotiation and cooperative action because the parent-infant dyads are required to clarify symbolic transformations in symbolic play (also see Brown, Donelan-McCall, Dunn, 1988; Fekonja et al., 2005; McCune-Nicolich, 1981; Pellegrini, 2009; Rakoczy, 2008).

5.2 The Current Study

The current chapter replicated Quinn's analysis (2016). The linguistic differences in parent-child interactions between the symbolic play and functional play contexts she found at 18 months were examined to see if they replicated in the same sample when the children were 24 months. There were two hypotheses. First, was the hypothesis that greater language and interactional complexity would be observed during symbolic play versus functional play. Parents and children were expected to not only speak more but to also have more complex interactions (greater MLU) in symbolic play. In her results, Quinn (2016) found that language complexity did not vary between play context; however, these findings were inconsistent with previous research in older children (Farver, 1992; Fekonja et al., 2005; Göncü, 1993) and she suggested that it might have been due to the age of the children in her sample (Quinn, 2016). Replicating her analysis should clarify whether this is the case. The second hypothesis was that the pragmatics of IDS (speech acts) would differ between play contexts, consistent with Quinn (2016), who found more questions in symbolic play and more imperatives and directives in functional play.

5.3 Method

For detailed information about the study design, please refer to Chapter 4 – Research Outline and Methodology.

5.3.1 Participants. The participants were the same as in Chapter 4.

5.3.2 Coding. Video and audio recordings were aligned and transcribed in ELAN Linguistic Annotator software (Tacchetti, 2017). ELAN allows the synchronization of audio and video within one annotation file, improving transcription reliability. Play transcripts were then coded manually for pragmatic function, as described in Table 5.1. The transcripts were then analysed in the Child Language Analysis (CLAN) software (MacWhinney, 2013).

Table 5.1

Coding Scheme for Types of Utterances Used in Infant-Directed Speech

Classification	Description	Example
Declaratives	Statements that convey information; requires a verb or implied verb	*Let's stir the soup* *You made me a cup of tea*
Interrogatives		
Wh- questions	Questions beginning with what/where/when/who/why/how etc.	*Who are you calling?* *What are you doing?* *Where did the picture go?* *How does this work?*
Yes/no questions	Questions eliciting a yes or no answer	*Is this a chicken?* *Should we hide teddy?* *Will you make me a picture?*
Tag questions	Declarative, imperative or naming statement ending with an interrogative tag	*It's noisy, isn't it?* *You want the phone, don't you?* *We haven't seen teddy, have we?*
Imperatives	Directives: attempts to direct infant's attention or to perform an action	*Look at this* *Come over here* *Careful*
Exclamatives	Statements that emphasize an idea typically with emotive meaning	*Daddy's on the phone!* *Wow!* *Boo!*

Naming	Identifying an object or feature of an object	*That's a teacup.* *It is pink.*
Mimetics	Words forms that mimic and/or symbolizes the sound associated with the referent (e.g. animal, iconic, or pretense sound)	*Slurp* *Bang* *Crash* *Woof woof*
Other	Incomplete/inaudible sentences Social routines Discourse particles	*Unintelligible* *Thank you, hi, yum* *Oh, hey, oi, eh, hey*

Note. Adapted from Quinn, 2016; Cameron-Faulkner et al., 2003; Rowe, Coker, & Pan, 2004; Tomasello et al, 1990; Wu & Gros-Louis, 2014.

The ensuing variables were coded:

Mean length of utterance (MLU). MLU served as a measure of grammatical complexity. It was calculated by dividing the total number of morphemes by the total number of utterances produced during an observational interaction (Brown, 1973). Morphemes were counted when an utterance was both complete and intelligible (Brown, 1973). To calculate the morphemes, the standard rules described in Table 5.2 were used: Irregular plurals and past tense and past participle verbs (e.g., children, were, sang) and diminutives (e.g., blankie) were counted as one morpheme, because they were assumed to be stored as a whole word in the mental lexicon (Kirkham et al., 2013). MLU is typically a measure of grammatical development in early language acquisition, but parental MLU was also calculated in this analysis to measure parental language complexity and to compare it across different contexts, as Golinkoff and Ames (1979) and Miller and Chapman (1981) had done before.

Table 5.2

Computing MLU

Morpheme Type	Number of Morphemes	Example
Compound morphemes		
- Compound adjectives	2	*Tasty, lovely, noisy*
- Compound adverbs	2	*Really*
- Compound nouns	2	*Teacup, sweetheart, somewhere, myself, nothing*
Adjectives and Adverbs (not compounded)	1	*Pretty*
Subject-verb agreement	4	*She eats soup.*
	2	*Does (irrespective of position in sentence)*
Simple past and past participle		
- Compounded (regular)	2	*Baked, frustrated, wooden*
- Not compounded (irregular)	1	*Were, ate, begun*
Comparatives and Superlatives		
- Compounded	2	*Greater, noisiest*
- Not compounded	1	*Best, worst*
Contractions	1	*Gonna [: going to], wanna [: want to], gotta [: got to], outta [: out of], whattaya [: what do you], whattawe [: want do we], whaddave [: want have], hiya [: hello], whatcha [: what are you], hafta [: have to], tryna [:trying to], cuppa [: cup of tea]*
	2	*C'you [: can you], d'ya [: do you] , svery [: it's very], lotsa [: lots of], lookeda [: looked at], onea [: one of], looka [: look at], anen [: and then], sright [: that's right], whatis [: what does], d'th [: did the], kinda* [: kind of], *dit* [: did it], *sthere* [: is there], *swe* [: so we]
Discourse particles	0	*Ooh, mmm, eh, hey*
Repetitions	3	*No, no, no*
	4	*I need a, need a cup*
Diminutives	1	*Teddy, Mummy*
Frequently used compound words assumed to be stored as whole morphemes	1	*Christmas, Weetbix*
	1	*Together, Belong, Wonder*

Note. Adapted from Brown (1974) and Kirkham et al. (2013).

Type-token ratio (TTR). Type-token ratio was calculated by dividing the total number of unique words by the total number of words used by each speaker. TTR is a measure of flexibility and variability in lexicon usage. The ratio is reported as a number between 0 and 1 (for a review of the measure, see Wachal & Spreen, 1973).

Infant-directed speech (IDS). Following Quinn (2016), who based her coding scheme on past research (Cameron-Faulkner, Lieven, & Tomasello, 2003; Graf Estes, Gluck, & Grimm, 2016; Ninio & Snow, 1999), IDS was analyzed at the level of the speech act; that is, the pragmatic function of the utterance. First, the four types of utterance were distinguished that differ in their pragmatic function: declarative, interrogative, exclamative, and imperative (Hoff-Ginsberg, 1985; Ninio & Snow, 1999; Quinn, 2016; Wu & Gros-Louis, 2015; see Table 5.1). A declarative is a statement (e.g., *I would like to draw*). An imperative is used to express an order, and within IDS, it is often an attention-getter or a command for a specific behavior (e.g., *Draw a picture*!). An exclamative gives emphasis to a specific statement, and tends to convey emotion (e.g., *Beautiful drawing!*). An interrogative is a question requiring a response from the conversation partner; it aims at eliciting additional information from them (e.g., *Did you draw a car?*) (Huddleston & Pullum, 2002). From this original grouping, further subdivisions were made for interrogatives based on the answers they elicit. A *wh-* question is an open-ended question requiring a constructive complex response, and in English begins with one of nine interrogative words: *who, whom, which, whose, what, where, when, why, how* (Ninio & Snow, 1999). *Yes/no* questions, sometimes called close-ended questions, require a single word response, usually yes or no. *Yes/no* questions can be subdivided further into canonical *yes/no* questions or *tag questions,* in which a declarative or an imperative statement is directly followed by an interrogative fragment that turns the original statement into a question (e.g., *It's a phone, isn't it?*). It is important to mark the difference between tags and canonical yes/no questions because they have different functions. In this study, tag questions are treated as separate from yes/no questions because their status as true questions is unclear; they are not typically used to elicit information unknown to the speaker, but are instead used to negotiate common ground between speakers, often due to some level of uncertainty (e.g., *This is a cup of tea, isn't it? You like tea, don't you?* vs. *Is this a cup of tea? Do you like tea?*) (see Huddleston & Pullum, 2005). Therefore, tag and *yes/no* questions were treated separately in the analyses.

In addition to the four initial pragmatic functions, an additional category, *naming*, was included. An utterance was coded as naming when it referred solely to the label of an object or its parts (e.g., "*It's a block"*) (Ninio, 1980; Ninio & Bruner, 1978; Wu & Gros-Louis, 2014). *Mimetics* (sound symbolic utterances) were also coded; these are utterances mimicking the sounds associated with the referent object (e.g., iconic sounds like "*bang*", "*crash*" and symbolic sounds like "*numnum*" to mimic eating, and animal sounds: "*bak bak*", "*woof woof*"). Utterances that did not fit in any of the categories described above were coded as *Other*. This category included incomplete, inaudible, or unintelligible utterances as well as conventional social routines (e.g., *yes, no, thank you, hi*), singing, and routines or games involving language (e.g., *peek-a-boo*). The frequency of each classification was coded manually and converted into a proportion of the total utterances spoken by the parent per condition, thus giving the probability of the specific utterance type being used. To ensure reliability, 11.5 percent (6 out of 52) of the coding was performed again by a second coder and compared. The overall agreement was substantial (95.11%).

5.4 Results

Language use in both conditions was analyzed using multiple two-tailed paired-sample *t*-tests conducted with a significance level of α = .05. This method was chosen because many of the dependent variables were interdependent, most notably those indexing IDS. Thus, since each parent produced a finite number of utterances, the use of one utterance type (*e.g.,* a *wh*- question) had a direct bearing on the possible number of utterances that could be produced in another category (e.g., declaratives). For this reason, the *t*-tests were reported with their effect sizes and confidence intervals, providing an unbiased and standardized measure of the magnitude of the observed effects. This approach is consistent with recommendations made by researchers who criticize null hypothesis significance testing (Nickerson, 2000; Schmidt & Hunter, 2002), and is commonly used in fields such as behavioral ecology, where multiple comparisons regularly are made on interdependent measures (Garamszegi, 2006; Nakagawa, 2004). This approach allows our results to be compared to other studies despite differences in measures and sample sizes. The difference between two means in terms of the size of the standard deviation is reported using Cohen's *d*. Following Cohen (1988, 1992), an effect size of less than or equal to 0.2 was considered small, an effect size of greater than 0.2 and less than or equal to 0.5 was considered medium, and an effect size greater than 0.5 was considered large. Confidence intervals (lower- and upper-bound) around the effect size for *t*-tests were also reported.

5.4.1 Language across play contexts. Table 5.3 shows the results of the paired sample *t*-tests for language complexity across play contexts (Number of utterances, MLU, TTR).

Table 5.3

Paired-Sample t-tests for Language Complexity Between Conditions

	Mean Difference	Df	*T*	*p*	Cohen's *d*	CI_{95} of *d* Lower bound	Upper bound
Parent Utterances	-5.28	51	-0.64	.53	.1	-.51	.26
Infant Utterances	13.48	51	2.79	.01*	.39	.15	.94
Parent MLU	.09	51	1.12	.27	.144	-.17	.6
Infant MLU	.10	51	2.10	.04*	.179	.02	.8
Parental TTR	.003	51	.544	.59	.073	-.28	.49
Child TTR	-.01	51	-.525	.60	.079	-.49	0.28

Note. *p <.05, two-tailed.

Table 5.3 shows that the number of parental utterances did not differ significantly between play settings ($M_{functional}$ = 195.01, $SD_{functional}$ = 59.18 and $M_{symbolic}$ = 189.73, $SD_{symbolic}$ = 45.76). In contrast, infants produced significantly more utterances in the symbolic play condition than in the functional play condition ($M_{functional}$ = 89.69, $SD_{functional}$ = 38.56 and $M_{symbolic}$ = 103.8, $SD_{symbolic}$ = 28.92). It is worth noting that although the difference was not significant, parents do seem to speak more (negative difference of means) in the functional play condition.

Parental MLU did not significantly differ between symbolic (*M* = 4.54, *SD* = 0.55) and functional play conditions (*M* = 4.45, *SD* = 0.73). This suggests that language complexity and linguistic productivity for parents was similar when dyads were engaged in functional and symbolic play. For infants, however, MLU was significantly different between symbolic (*M* =

1.97, *SD* = 0.61) and functional play (*M* = 1.87, *SD* = 0.47), although the effect size was small. No other effects were significant.

5.4.2 Pragmatics of IDS across conditions. To determine whether the pragmatic function of utterance types in IDS differed across play conditions, the incidence of each utterance type was calculated for each play condition. Raw scores of the means and standard deviations for the frequency of parental utterances during functional and symbolic play contexts are presented in Table 5.4. To control for individual differences in parental speech production, the incidence of parental pragmatics was tallied and divided by total parental utterances produced during each condition. This provided a measure of the proportion of each utterance type used during each interaction, thereby controlling for the quantity of language produced by each parent.

Table 5.4

Means and Standard Deviations of Different Utterance Types in Infant-Directed Speech

	Functional		Symbolic	
	M	*SD*	*M*	*SD*
Declaratives	54.77	20.11	54.44	17.87
Exclamatives	15.92	11.38	14.38	13.37
Imperatives	14.92	8.75	7.79	6.85
Mimetics	5.82	6.24	11.1	6.68
Naming	10.79	5.84	4.5	3.37
Tag Questions	4.15	3.6	4.1	3.81
Wh-Questions	20.31	10.49	23.48	10.47
Yes/no Questions	38.48	15.56	49.48	18.35
Other	21.40	12.11	28.83	14.29

N = 52

Paired-sample *t*-tests results revealed (see Table 5.5) that caregivers used imperatives and naming significantly more often in the functional play condition than in the symbolic play condition. The reverse was true for *yes-no* questions, which were used significantly more often in the symbolic play condition than the functional play condition. Mimetics were also used significantly more often in the symbolic play condition than the functional play condition. These findings and their large effect sizes suggest that play context had a significant influence on the distribution of different speech acts.

Table 5.5

Paired-Sample t-Tests for Infant-Directed Speech between Conditions

						CI$_{95}$ of *d*	
	Mean Difference	Df	*t*	*p*	Cohen's *d*	Lower bound	Upper bound
Declaratives	-.02	51	-.15	.14	.2	-.41	.36
Exclamatives	-.02	51	-1.13	.06	.22	-.61	.16
Imperatives	-.04	51	-8.8	<.001*	1.02	-2.17	-1.27
Mimetics	.03	51	3.83	<.001*	.77	.35	1.15
Naming	-.04	51	-9.29	<.001*	1.51	-2.28	-1.36
Tag Questions	-.001	51	-.44	.66	.06	-.47	.3
Wh- Questions	.01	51	1.35	.18	.18	-.12	.65
Yes/no Questions	.04	51	3.6	<.001*	.57	.02	.06
N = 52							

Note. Data are proportions of total parental utterances. **p* <.05, two-tailed.

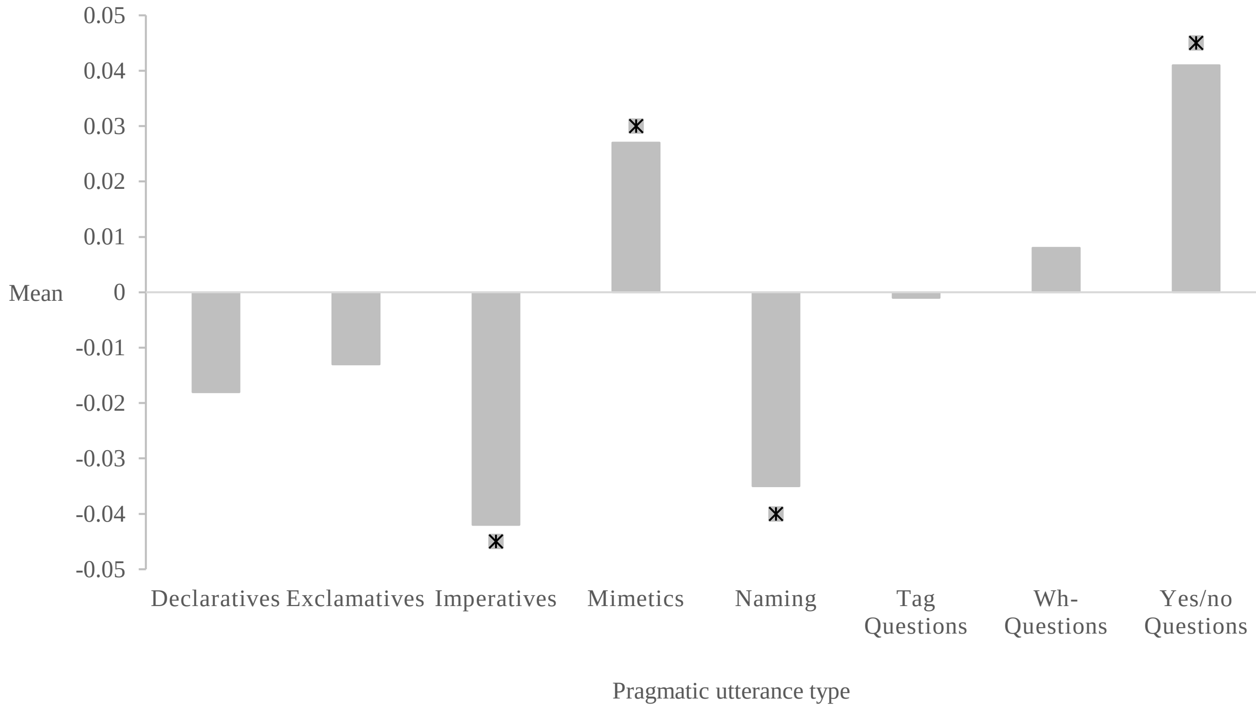


Figure 5.1. Mean difference in frequency of pragmatic utterance types as a proportion of total parental pragmatic utterances during symbolic and functional play conditions. **p* <.05, two tailed. Bars in the positive range indicate comparatively greater incidence in the symbolic play condition, whereas bars in the negative range indicate comparatively greater incidence in the functional play condition.

Table 5.5 and Figure 5.1 display the significant differences between play conditions in four of seven pragmatic types across the two play contexts. Although I have included it in the data, tag questions were rare and their use did not differ across conditions ($t(51) = -.44$, $p = .66$, $d = .06$). Because they did not affect the results when computed within the *yes-no* questions, I have maintained them as separate.

5.5 Discussion

Despite a well-attested empirical relationship between language acquisition and symbolic play (Bates et al., 1979; McCune, 1995), the underlying nature of this relationship is still unclear. The dominant interpretation of this relationship has followed Piagetian theory (Acredolo & Goodwyn, 1985; Bates et al.,1980; Bates et al., 1979), where language and play have a specific sequential observable developmental pattern. However, little is known about how symbolic play *as a context* influences children's linguistic environment. The current chapter examined this question, replicating similar work with the same cohort by Quinn (2016).

The results showed that at 24 months, children spoke significantly more, and their language was more complex during symbolic play. Thus, the first hypothesis, which predicted that greater language and interactional complexity would be observed during symbolic play than during functional play, was supported. This was consistent with the majority of the previous literature (e.g. Farver, 1992; Fekonja et al., 2005; Göncü, 1993), but is inconsistent with Quinn (2016), who did not find differences between infant's MLU in our participants and that of the same participants at 18 months. As she argued at the time, the infants' MLU at 18 months may have been too small to mark the difference, since most of them were still at the one-word stage (MLU = 1 or less). However, by 24 months, our cohort (MLU = 1.92) produced more utterances overall, which were in general more complex than their speech in functional play. This supports the hypothesis that symbolic play stimulates language production and complexity in children.

Whereas infants spoke more and used more complex language in symbolic play, the same results were not observed for caregivers. This is consistent with Quinn (2016), who reported the same result in this sample when the infants were 18 months. Thus, parents were less influenced by the play context than the infants.

Importantly, the distribution of different speech acts showed significant differences across the two play contexts. Consistent with the second hypothesis, more interactionally demanding utterances were present in symbolic play, namely questions (Rowe et al., 2016). In particular, caregivers produced significantly greater *yes-no* questions in symbolic play, and numerically more *wh-* questions. This result is slightly different from Quinn (2016), who found the opposite pattern. The commonality across the two time points is that symbolic play is characterized by a greater amount of interrogatives, which appear to play an important role in language acquisition because they actively engage the child in conversation (Golinkoff & Ames, 1979; Kavanaugh & Jirkovsky, 1982; Kruper & Uzgiris, 1987; Rowe et al., 2016; Soderstrom, 2007; Toda, Fogel, & Kawai, 1990), possibly because they play a scaffolding role by increasing the demands on infant language production (Morelock, Brown, & Morrissey, 2003; Morrissey, 2014).

The higher number of questions in IDS during symbolic play may be part of the explanation of why symbolic play and language are related. As we have described in Chapter 2 (see section 2.3.2) the inherent ambiguity associated with symbolic play necessitates a continuing need to negotiate meaning (i.e., to assign status functions to objects or people; see Rakoczy, 2008; Sutton-Smith, 1997), which in this data set seems to translate to greater use of questions on behalf of the competent play partner (i.e., the parent). Thus, questions invite shared understanding through the establishment of common ground, providing a foundation for a communicative exchange that is the basis of language acquisition (Hirsh-Pasek et al., 2015).

Mimetics were also significantly more frequent in symbolic play. This is consistent with general findings that mimetics are used frequently during free play (Fekonja et al., 2005), as well as findings that mothers use more sound effects in symbolic play contexts to signal pretense to their children (e.g., see Lillard & Witherington, 2004). Although the interaction between language acquisition and mimetics has not been studied to the extent that questions have, Quinn (2016) found a positive concurrent association between parental use of mimetics and language production and comprehension in these same infants when they were 18 months, suggesting mimetics may play a role in acquisition. One explanation for this effect is that mimetics could also help capture and maintain infant's attention, supporting social collaboration, like questions. The effect observed here is all the more interesting because the functional play toys might have seemed more likely to promote the use of mimetics, as they included animals whose calls could be mimicked, as well as noisy instruments (hammer and peg going *"bang bang"*, maraca or castanet noises).

Although the results were not significant, it is interesting to note that another subtype of questions, tag questions, may have a different developmental impact. As was the case at 18 months, tag questions were the only question subtype more frequently found in functional than in symbolic play at 24 months. Tag questions transform a declarative into an interrogative (Huddleston 1984; Huddleston et al. 2002). It is therefore likely that the incidence of tag questions is closely associated with the incidence of declarative and exclamative utterances, which are also more frequent in the functional play condition. Unlike other interrogative subtypes, tag questions do not actually request information like other types of questions (see Chapter 8 and Kimps, Davidse, & Cornillie, 2014). Rather, they usually assert a stance, only requiring an answer when there is a disagreement, a particularly rare occurrence (Gaskins, Miller & Corsaro, 1992). This could also explain why they are not as common in symbolic play, where direct questions would be favored to counteract any situational ambiguity.

The functional play context contained more imperative and naming utterances, which are used to direct and label activities (Xu, Cote, Baker, 2005). These seem to have little effect on language acquisition (Barnes et al., 1983; Blount, 1972; Tomasello, 2009; Wertsh & Tulviste, 1990). The function of both imperatives and naming is to convey information, either labelling, as is the case with naming (e.g., *this is a cat*), or providing instructions, as is the case with imperatives (e.g., *pull here*). It is likely that both types of utterances are more necessary in functional play because the toys are goal-oriented, and parents need to help the infants understand the toys' specific functions (O'Brien & Nagle, 1987).

Naming is used primarily to teach new labels to children, usually when a primary care giver points to an object and assigns a name or a label to it (Ninio, 1980; Ninio & Bruner, 1978). The toys in the functional play condition, being more concrete, were easier to name, which could explain why naming was more prevalent in this play condition. They included shapes, colors, and animals, often on the same toy, making it more likely for naming to occur, particularly at a time when children and their play partners are likely to focus on sensory play (color, shapes, sounds), repetitions of sounds, and representational play (animals, car, trucks; see Goldstein, 1994). It could also be that the more representational or unambiguous the object, the more likely it is to be named (Pellegrini, 2013). Conversely, more naming might be expected in symbolic play, since the ambiguity of object function needs to be negotiated. However, labelling might have been more indirect in symbolic play, contained within another utterance type, for example, as part of a question, "*do you think this is a blanket*?", while naming in the functional play setting often resembled a drill, "*this is a star, this is a circle."* This type of naming is less conducive to interaction, which seems to fit the context-based patterns found in this study.

Overall, the results presented in this chapter largely replicate Quinn's (2016) results, showing a complementary distribution of different speech acts in symbolic versus functional play. The distribution of utterance types varied slightly between 18 (interrogatives in symbolic play and imperatives and declaratives in functional play) and 24 months, but the overall pattern suggests that the difference between symbolic versus functional play reduces to a *negotiation of meaning* vs a *negotiation of actions*.

5.6 Conclusion

This chapter tested differences in the language parents and infants use during symbolic play when compared to functional play. Although parental language did not differ in terms of complexity and quantity, infants spoke more, and their language was significantly more complex during symbolic play. Further analysis of the pragmatic function of utterances in IDS suggested that parents were more likely to use questions and mimetics in symbolic play, two utterance types that have been positively linked to language acquisition. In contrast, imperatives and naming were more present in functional play. In comparison to interrogatives, imperatives and naming require less of a response from children. Thus, the data provide evidence that symbolic play is a more communicatively complex context, which may serve to stimulate dyadic interaction. The next chapters will look further into different aspects of these dynamic interactive patterns.

Chapter 6

Turn-Taking Dynamics during Symbolic Play

Chapter 5 showed that IDS in symbolic play may encourage children to participate in conversation more than in a comparable but non-symbolic context (i.e., functional play). Specifically, symbolic play contained more questions, infants spoke significantly more, and their language was more complex. These results suggest that the inherent ambiguity in symbolic play requires the negotiation and exchange of meaning (Sutton-Smith, 1997). That is, it requires collective intentionality (Rakoczy, 2006). Language must be understood within the context in which it is used (Clark, 1996), and symbolic play appears to be a more complex endeavor because of the fluid roles that objects and speakers can have within that context. This negotiation and exchange of meaning expands beyond speech acts themselves, which do not reflect the entire linguistic communicative process. Verbal communication is not limited to the number or type of utterances spoken. Rather, language fits within a greater social context, a specific situation, with an audience and partner in conversation (Schegloff, 2006; Heritage, 2012). The current chapter presents an analysis of this microsocial contextual exchange in the dyad by looking at the dynamics of conversational turns in a symbolic play versus a functional play setting.

6.1 Turn-taking Dynamics in Language Development

Language develops in interaction (Schegloff, 2007b). This is particularly true during infancy (Zimmerman et al., 2009). This interactivity is most obvious in patterns of conversational turns, the importance of which frequently have been identified for both language acquisition and adult communication (Hargrave & Sénéchal, 2000; Hirsh-Pasek et al., 2015;

Holler, Kendrick, Casillas, Levinson, 2016; Kaye & Fogel, 1980; Levinson & Torreira, 2015; Schegloff, 2007b; Zimmerman et al, 2009). For instance, Zimmerman et al. (2009) noted that the value of conversational turns stems from the opportunity they provide for children to practice and receive immediate feedback from their adult conversation partners, and, vice versa, allows the adult conversation partner to adjust in real time to the infant's skills. The immediate feedback and adjustment Zimmerman et al. described are tantamount to parental scaffolding (Vygotsky, 1978), which is prominent during dyadic play with a more advanced play partner (see Chapter 2 as well as Bornstein, et al., 1996; Damast, Tamis-LeMonda & Bornstein, 1996). More recently, both Hirsh-Pasek et al. (2015) and Quinn (2016) have shown that the balance of turns between infants and their parents is one of the best predictors for later infant vocabulary and grammar.

Turn-taking is a universal and challenging process at the limit of our cognitive capabilities (Levinson, 2016). Turn-taking happens extremely fast (the modal gap between turns takes a mere 200 milliseconds in adults) and adults perform this task with extreme accuracy, keeping overlap to a minimum. Although it is complex and likely involves sophisticated processes related to prediction, children have a good concept of turn-taking before language production even starts (Ervin-Tripp, 1978, 1979), with recent evidence suggesting that children are capable of turn-taking in the first six months of life (Levinson, 2016). Interestingly, turn gaps start to appear in infancy with about the normal adult 200ms gap between turns (Levinson, 2016). The gaps then increase in length as the children produce their first words and do not speed up again until the children are fluent in their native language, around age six. On the basis of these findings, Levinson (2016) suggested that turn-taking competes with language production for cognitive processing.

Casillas, Bobb, and Clark (2016) reported data in support of Levinson's (2016) hypothesis. In a relatively small sample of children (N = 5), followed longitudinally from age 20 and 41 months, they found that while children aim to initiate answers quickly, turn-gap time slows down proportionately to the complexity of their answers. Despite these promising results, psycholinguistics has mostly studied language production and comprehension separately from dialogue (see Levinson, 2016).

6.2 The Current Study

Apart from Casillas et al. (2016), observational studies of turn-taking between infant-caregiver dyads are rare. This chapter examines whether the complex interactional dynamics of symbolic play, as suggested by the results of Chapter 5, result in differences in turn-taking across the symbolic and functional play contexts. Four different aspects of turn-taking were rested. First, the number of conversational turns were compared between play settings, replicating Quinn's (2016) analysis of the cohort at 18months. Following those results, the hypothesis was that there would be more conversational turns in symbolic play. Second, the mean length of turn for each speaker was analyzed; that is, whose turn, on average, was longest, as well as the overall turn ratio, that is, how many turns did each participant control during the conversation. This is one way of determining which conversational partner carries most of the conversational burden in an interaction. In infants, it has been linked longitudinally to vocabulary and grammatical development (Hirsh-Pasek et al., 2015). The hypothesis was that children would bear a greater load of the conversation due to their greater need to negotiate meaning in symbolic play (see Chapter 5). Next, the duration of time gaps between turns across play contexts was investigated. Casillas et al. (2016) found that longer turn gaps were associated with more complex productions. Since in Chapter 5, children were found to produce more complex utterances in symbolic play contexts, symbolic play was predicted to result in significantly longer turn gaps. Finally, patterns of turn sequences were explored in the dyadic play interactions of the participants in each context to determine whether a difference existed in terms of who initiated and concluded turn sequences between play contexts. Based on Chapter 5 results, which showed that children speak more during symbolic play than in functional play, the hypothesis was that children were more likely to initiate turns in symbolic play.

6.3 Method

The analyses in this chapter were conducted on the same data outlined in Chapter 4.

6.3.1. Participants. The participants were the same as in Chapter 4.

6.3.2 Design. The design of this study is the same throughout the thesis and explained in detail in Chapter 4. Several features of turn-taking were analyzed: mean length of turn (MLT), number of turns, turn ratio, latency between turns (in ms), and patterns of turn sequences (initiation and conclusion). Significance was set at an alpha level of .05 using the LSR package in R (Navarro, 2015).

6.3.3 Coding. The dyads' conversational turns were analyzed using the CLAN software Mean Length of Turn (MLT) program (MacWhinney, 2013). Following Levinson (1983, pp. 295-296), a turn was defined as "the time during which a single participant speaks, within a typical, orderly arrangement in which participants speak with minimal overlap and gap between them".

Number of turns. Following the definition above, the number of turns were computed. Overlaps were ignored. While the same speaker was talking, each utterance was considered part of the same current turn. These computations were performed for each speaker (parent and child) separately. The raw frequency calculated in CLAN was then compared between conditions for each participant. Unlike in the MLU analyses in Chapter 5, utterances that consisted of only unintelligible vocal material were still considered to constitute a turn. However, non-verbal vocalizations such as moaning or sighing as a physical consequence of the infant's action (for instance, "ugh") were excluded, as well as gestures, because it was difficult to easily differentiate whether such expressions were meaningful (with communicative intent) or meaningless (without communicative intent; see Sacks, Schlegoff, Jefferson, 1974).

Mean length of turn (MLT). MLT was used as a measure of language complexity in each play condition, following previous research (see Golinkoff & Ames, 1979; Ninio & Snow, 1999). MLT is considered a "rough measure of conversational participation" (Sokolov & Snow, 1994, p. 34). It is thought to increase as children's conversational proficiency develops: the longer the turn, the more language complexity is possible (more opportunities for semantic and syntactic expansions). MLT was calculated for each participant in each condition.

The MLT measure was used instead of MLU (see Chapter 5) because it can assess the conversational load of each speaker, in order to determine who bears more of the conversation. To do so, the ratio of child MLT to parent MLT was computed. This ratio allowed the determination of the conversational load for each infant, which, as the child begins to assume a more equal share, should increase to approach 1 (MacWhinney, 2013).

MLT was coded by computing words instead of morphemes per turn, as recommended in the CLAN manual (MacWhinney, 2013, p. 26). The coding rules for MLT fit within the coding parameters defined in the previous section, for the number of turns.

Turn gaps. As detailed in Chapter 4, each play condition (functional or symbolic) averaged just under 11 minutes (M = 648s, SD = 52.62s) and ranged in duration between 9 mins and 12 mins 45s, therefore, the shortest common length of time was used for conversational turn coding in order to assess the same timeframe across participants. Exactly 9 minutes (540,000 ms) of each play condition were coded for the duration of time gaps between turns. Gaps were defined as the time between the end of one time-aligned utterance in ELAN and the beginning of another. Turn gaps were considered to be meaningful when they were 300 ms or shorter, following previous work finding that English conversation turn gaps between turns averaged around 300ms[4] (Casillas & Frank, 2017) and that infant/parent turn gap patterns are no longer relevant after 4.25 seconds (Balog & Roberts, 2004). In these studies, 90% of a one-year-old's utterances were considered pertinent to the previous turn if they were made within this timeframe (Balog & Roberts, 2004; Stivers et al., 2009). Longer gaps were excluded as they may not reflect a natural conversational transition (Stivers et al., 2009; Schegloff, 2007b) and could be due to drops in attention or activity changes.

Turn Sequences. If a speaker initiated and concluded a sequence of turns, it was coded manually. The coding closely followed guidelines for similar analyses in the field for MLU and TTR (see CLAN manual, MacWhinney, 2013, p.116; Brown, 1973, p. 54): The first 25 utterances of each condition were removed, and the entire condition was coded from that point. Only fully transcribed utterances were coded. Unintelligible or incomplete utterances were omitted. Turn initiation and conclusion were coded manually following Sacks' (1974) review of turn-taking systems. Speakers were coded as initiating a turn sequence when they were the first in the dyad to bring attention to a new topic, or to change the action/conversational focus (see Adamson, Bakeman, Deckner, & Nelson, 2012; Clark 1996; Schegloff, 1996). This was because

[4] Mean = 318, median = 302, stdev = 112 ms (Casillas & Frank, 2017)

turn-allocation techniques are distributed into two groups: (a) those in which the next turn is allocated by the current speaker's selecting the next speaker; and (b) those in which the next turn is allocated by self-selection (see Sacks et al., 1974). Turn-initiation required self-selection (b) to be coded as such. The turn conclusion, however, did not require self-selection. Rather, it was the last speaker to speak before a new sequence of turns was initiated (see Table 6.1 for an example).

Table 6.1

Coding Scheme for Sequences of Conversational Turns

Sequence of turns	Example (consider the interactions below to be sequential)
Mother initiation/Mother conclusion	Mother: is this a spoon, Mark? Child: yes Mother: can we eat something with it? Child: cake Mother: yummy!
Infant initiation/Mother conclusion	Child: a phone! Mother: yes, it is a phone. Mother: what would you like to do with it?
Infant initiation/Infant conclusion	Child: stir, stir, stir (started to stir cup with spoon) Mother: Aw, a nice cup of tea for me, thank you. Child: yes, yummy tea (hands the cup to mother)
Mother initiation/Infant conclusion	Mother: should we call Max? Child: hmm. Mother: We could invite him to tea. Child: yes!

6.4 Results

All variables described in the methods section (6.3.3) were tallied for each condition and analyzed using multiple two-tailed paired-sample *t*-tests conducted with a significance level of α = .05. The *t*-tests were reported with their effect sizes and confidence intervals, providing an unbiased and standardized measure of the magnitude of the observed effects. As in Chapter 5 (see section 5.4), this method was chosen because many of the dependent variables were interdependent, such as turn sequences (turn initiation and conclusion). Since each participant produced a finite number of turns in a finite amount of time, the more turns a parent initiated, the fewer the infant initiated.

6.4.1 Conversational turn. Table 6.2 shows that conversational turns were significantly greater during interactions in the symbolic play condition for both parents and infants (M_{parent} = 84.33, SD_{parent} = 21.61 and M_{infant} = 83.42, SD_{infant} = 21.71) than in the functional play condition (M_{parent} = 73.56, SD_{parent} = 30.54 and M_{infant} = 72.42, SD_{infant} = 30.22). Therefore, turn-taking between parents and infants occurred more frequently during symbolic play. The infant's proportion of turn ratio was also significantly greater in symbolic (*M* = .27, *SD* =.13) than in functional play (*M* =.21 *SD* =.11).

Table 6.2

Paired-Sample t-tests for Number of Turns

	Mean Difference	Df	t	P	Cohen's d	CI95 of d Lower bound	CI95 of d Upper bound
Parent Turn	10.77	50	2.85	.006*	.41	.17	.95
Child Turn	11	50	2.91	.005*	.42	.18	.96
Parent MLT	-2	50	-4.45	<.001*	.62	-1.27	-0.47
Child MLT	.14	50	1.43	.16	.17	-.11	.67
Child turn ratio	.05	50	3.43	<.001*	.43	.28	1.07
Turn Gap (ms)	111.23	50	3.65	<.001*	.65	.32	1.11

Note. *p <.05, two-tailed.

6.4.2 Turn gaps. Table 6.2 presents the results for turn transition time gap differences between play settings for a 9-minute portion of each play condition. They show that time gaps were significantly longer (in ms) in symbolic play (*M* = 296.39 ms, *SD* =174.25 ms) than in functional play (*M* = 221.1 ms, *SD* = 165.94 ms).

6.4.3 Turn Sequence Patterns. The results from the pairwise comparisons for sequences of turns are reported in Table 6.3 below. Infant Initiation/Infant Conclusion (Infant – Infant) patterns were the only significant results, showing that more Infant – Infant patterns were present in symbolic play (*M* = 2.88 *SD* = 1.33) than in functional play (*M* = 1.78 *SD* = 1.69).

Table 6.3

Paired-Sample t-tests for Turn Initiation as a Proportion of overall Number of Turns

						CI95 of d	
Initiation – Conclusion	Mean Difference	Df	T	p	Cohen's D	Lower Bound	Upper Bound
Infant – Parent	.02	50	1.26	.22	.15	-.14	.64
Infant – Infant	.02	50	2.71	.01*	.34	-14	.93
Parent – Infant	.01	50	1.55	.13	.23	-.08	.7
Parent – Parent	.004	50	.37	.72	.05	-.32	.46
N=52							

Note: Data are proportions of overall number of turns. **p* <.05, two-tailed.

6.5 Discussion

The current chapter investigated how early conversational turn patterns differ during caretaker-infant interactions in symbolic compared to functional play. Two hypotheses were tested and a third exploratory analysis was performed. First, based on Quinn (2016), who found similar results for these children when they were aged 18 months, it was hypothesized that infant-caretaker dyads would exchange more conversational turns during symbolic play. Second, based on previous findings that language is more complex during symbolic play (Belski & Most, 1981; Casby & Della Corte, 1987; Quinn, 2016; McCune, 1995; McCune-Nicolich, 1981; Nicolich, 1977; also see Chapter 5) and conversational turns are slower when language is more complex (Casillas, 2016), the hypothesis was that conversational turn gaps would be longer in the symbolic play condition. Third, turn sequence patterns were analyzed to determine if which member of the dyad introduced and concluded turns would differ between contexts.

The first hypothesis was supported: significantly more conversational turns were observed in the symbolic play condition than in the functional play condition for both caretakers and infants. Conversational turns were more numerous within symbolic play, suggesting that dyadic interactions are in part controlled by the play context. The infants also carried a greater amount of the conversational load in the symbolic play setting, a finding that has been shown to be a strong predictor of later infant vocabulary and grammatical skills (Hirsh-Pasek et al., 2015). These findings are consistent with Quinn's (2016) findings in the same participants at 18 months old. Interestingly, at both ages, the parent's language complexity did not seem affected by the greater number of turns. Parental turns, however, were significantly longer (MLT) in functional than in symbolic play, suggesting they were more likely to take over the conversational load. This is in line with the findings in Chapter 5, where more imperatives and naming were present in functional play; these two types of speech acts seldom require response and the results support the idea that parents play a more directive and instructive role in the functional play condition.

The results thus suggest that symbolic play promotes greater interaction between infants and caregivers and allows children to take the lead in conversation. Language is inherently social (Kuhl, 2007; Tomasello, 2009; Tomasello et al., 1993) and develops within an interactional context (Clark, 1993; Schlegoff, 2007b). It may be that the naturally interactive and social nature of symbolic play invites a more dynamic dialogue to occur (Weisberg et al., 2013).

The second hypothesis was also supported: significantly longer turn gaps were observed in symbolic than in functional play. Longer turn gaps have been associated with more complex language use (Casillas et al., 2016). Symbolic play, because it is both conceptually complex and behaviorally engaging, results in more complex interaction and more complex language use (see Chapter 5). These two results are no doubt related. Levinson (2016) suggested that turn-taking and language production are part and parcel of the same linguistic mechanism, especially during development: to maintain fast and accurate turn transition, speakers must predict the content and timing of the incoming turn and begin language encoding as soon as possible, while they still are processing the incoming data. This intensive cognitive processing means that the more complex the language (input or output), the slower the turn, as seen here in the symbolic play setting. Linking the results back to developmental theory, the data provide support for Vygotsky's argument that a child is "a head taller than himself " in symbolic play (Vygotsky, 1978, p. 102). That is, the context challenges their emerging linguistic skills such that they perform at higher levels than in comparable contexts.

The third analysis investigated whether the play manipulation affected which of the two speakers led the conversation. Two different measures were analyzed: (i) the turn-taking ratio of each participant, and (ii) their turn sequence pattern (i.e., who introduced and concluded a turn sequence). The turn ratio of children was greater in symbolic play. That is, children controlled a greater amount of the overall conversation in the symbolic play context. At the same time, the only significantly different turn sequence pattern across the two conditions was when infants both introduced and concluded a turn, which occurred significantly more often in symbolic play. This result is interesting in that it is not the parent who seems to draw the additional conversational investment from the child, but rather the context itself (i.e., symbolic play). This is important to note because we are clearly looking at an array of complex interconnected variables; the more we understand what does not change between contexts, the more likely we are to understand where the value lies in symbolic play. Because these findings were observed while the parents were unaware of being assessed, symbolic play seems to naturally induce a more dynamic and complex conversational context.

When paired with findings that adult-child conversations are robustly associated with language development (e.g., Romeo et al., 2018; Quinn, Donnelly, & Kidd, 2018; Zimmerman et al., 2009), the overall results of this chapter suggest that symbolic play may be a beneficial setting for the development of language, in part because infants and their parents have significantly greater numbers of conversational turns in symbolic play, longer parental turns, and a greater ratio of infant to parent turns. The more dynamic the interactions, the better the parent can adjust the zone of proximal development to benefit the infant (Taumoepeau & Ruffman, 2008; Fernyhough, 1996 Meins et al., 2002; Tamis-LeMonda, Bornstein, and Baumwell 2001). For instance, Tamis-LeMonda et al., (2001) tested maternal responsiveness and children's activities (including play) at 9 and 13 months, coded from videos of dyadic free play. Maternal responsiveness at both ages predicted the timing of children's achieving language milestones over and above children's observed behaviors. The added parental responsiveness afforded by the more dynamic interaction of symbolic play offers scaffolding and immediate error feedback to the infant (Chouinard & Clark, 2003), providing more opportunity for practice and improvement.

By providing opportunities for more conversational turns, symbolic play may have a positive influence on language development: conversational turns have been shown to increase activation of brain regions long known for their role in language. Notably, Romeo et al. (2018) found that the average number of conversational turns a child has in a day as measured by daylong recordings was associated with greater activation in part of Broca's area (left inferior frontal activation) during a story telling functional MRI task in 4 to 6-year-olds. The result held even after controlling for SES, IQ, and the quantity of adult words in the child's environment. Recently, Broca's area has been shown to play a greater role in receptive and expressive language processing (Hagoort, 2014), even though it is more traditionally associated with language production. Although this relationship has yet to be completely understood, it does provide insight that conversational turns may be a '*higher-level supralexical language process'* (Romeo, 2018, p.708). This clear, although not fully understood, importance of conversational turns supports theories that language development crucially relies on social interaction and social neural circuitry (Kuhl, 2007). The increased number of conversational turns in joint symbolic play supports previous suggestions that joint symbolic play is positively related to language development because it cultivates the very behaviors that are necessary to early communicative language skills (Hall et al. 2013; Hirsh-Pasek et al., 2009; also see Chapter 3).

There are some potential methodological limitations to these findings. In an effort to analyze a large set of participants, I analyzed a broad range of transitional turn times, determining the validity of a turn sequence based on maximum time gaps per Casillas and Frank (2017), rather than basing the selection on content (only testing gaps in adjacency pairs for instance) like Casillas et al. (2016) have done. Although my method is justified and ultimately supports previous findings irrespective of the methodological differences, future designs would benefit from analyzing specific turn sequences in large datasets. Transitional turn time research in infancy is very novel, and a wide array of methods should be applied to improve our understanding of its development.

6.6 Conclusion

Overall, the analyses reported in this chapter reveal that there were differences in conversational turn patterns between symbolic and functional play. These results suggest that symbolic play promotes greater conversational interaction, which has been demonstrated to provide a powerful communicative foundation for infant language acquisition (Golinkoff et al., 2015; Hirsh-Pasek et al., 2015; Quinn & Kidd, 2019; Romeo et al., 2018). Up to this point in the thesis I have shown that symbolic and functional play differ in the types of speech acts used and in their conversational patterns. The next chapter will focus on the content of these interactions. Specifically, I investigate whether symbolic and functional play differ in the degree to which infant-caregiver dyads overlap in conversational content.

Chapter 7

Content Alignment Dynamics during Symbolic Play

Chapters 5 and 6 showed that the type of play context influences the infant's socio-communicative environment. Patterns of language (Chapter 5) and conversational turn dynamics (Chapter 6) were different between symbolic play and a comparable but non-symbolic play context (functional play). Parent-infant dyads exchanged more questions and conversational turns during symbolic play, they had longer turn gaps, and the infants were more likely to control the conversation (greater turn-taking ratio and patterns of turn introduction and conclusion). These features of symbolic play, which have already been shown to be important to language acquisition (Hirsh-Pasek et al., 2015; Cartmill et al., 2013; Quinn, 2016; Rowe et al., 2016; Roseberry et al., 2014; Tamis-LeMonda, Bornstein, & Baumwell, 2001), were interpreted to derive from the inherent ambiguity in symbolic play (Sutton-Smith, 1997), which subsequently results in the need to establish meaning, a process that requires shared intentionality**.** Specifically, the dyads appear to be using language to negotiate meaning: more utterances and more questions establish the status function of objects whose meaning in symbolic play is fluid (Searle, 1995), thus establishing meaning 'in the moment'.

The current chapter further explores the dynamic nature of infant-caregiver conversation across the play contexts. Dialogue is an interactive and contextualized joint activity (Clark, 1996; Pickering & Garrod, 2004, 2006; Garrod & Pickering, 2009): in dialogue, each turn and its content is not isolated but linked to the content of other turns in an effort to align each speaker's linguistic representations at many levels (e.g., semantic, lexical, syntactic, phonological, and phonetic; see Pickering & Garrod, 2004). This alignment is central to successful dialogue (Pickering & Garrod, 2004, 2006; Garrod & Pickering, 2009). Due to its inherent ambiguity, symbolic play seems to require greater cooperation between interlocuters, and thus greater alignment. The current chapter presents an analysis of semantic content alignment across the symbolic and functional play contexts to test this hypothesis.

7.1 Content Alignment in Language Development

Communication accommodation theory (CAT) suggests that content alignment, such as the repetition of the same word or repetition of words or phrases that refer to the same concept, should be studied without separating the content from its communicative and temporal contexts (Gallois & Giles, 2015; Gallois, Ogay, & Giles, 2005; Gallois & Pittam, 1996; Giles, 2008; Baker et al., 2013). CAT distinguishes between levels of *accommodation*, a communicative behavior that helps reduce perceived interpersonal differences between speakers (Giles, Coupland & Coupland, 1991). Accommodation happens when word or structure selection, semantic content, accent, pitch, speech rate, utterance length, and turn-transition duration are adjusted to the conversational partner (Giles et al., 1991). Infant directed speech (IDS) is a good example of accommodation: in IDS, accommodation is visible through the speaker's effort to show contiguity (temporal connectedness) and contingency (contextual relevancy) to the child (Hirsh-Pasek et al., 2015), which have been shown to be important for word learning (Hirsh-Pasek et al., 2015).

Discursis, a computational program that was created to assess conversational content structure across the time-course of a conversation, was used to study accommodation and other content alignment patterns in both parent and infant interactions (Angus, Smith, & Wiles, 2012). Speaker contingency was assessed by reviewing how content was introduced, maintained, and repeated within the conversation. Contiguity was assessed by analyzing how this content was connected temporally (e.g., over short, medium, or long distances during the interaction). Assessing whether this dynamic exchange of content varies between contexts for the same interlocuters will further determine how the symbolic element of symbolic play influences infant-caregiver communication.

7.2 The Current Study

Several studies have shown that repetitions are advantageous for language development (Che et al., 2018; Clark, 2006; Soderstrom, 2007; Tamis-LeMonda et al., 2001). Case studies also provide evidence that the more a child leads the conversation, the more advanced the child's language ability will be (Dale & Spivey, 2006; MacWhinney, 2013). This chapter aims to build directly upon these findings. In addition to repetitions, Discursis analyzes conceptual recurrence. It does so by combining semantically-related words into groups of concepts, to determine whether or not conversation partners align their content and achieve common ground (Angus, Rooney, McKenna, Wiles, 2012; Angus, Watson, Smith, Gallois, Wiles, 2012; Angus, Smith et al., 2012; Clark, 1996; Cretchley, Gallois, Chenery, & Smith, 2012; Garrod & Clark, 1993; Garrod & Pickering, 2009). It tracks these conceptual recurrence patterns across time, providing an overview of the exchange of information across the conversation at a micro level (utterances) and a macro level (the entire conversation) (Dale & Spivey, 2005, 2006). Discursis also allows the researcher to determine a number of content alignment patterns. For example, it permits assessing whether an infant has acknowledged the adult's content, which has been a topic of research in child language development (e.g. Clark, 1996; Clark, 2007, 2009; Clark & Bernicot, 2008; Wong & Andrews 2002).

Since its conception, Discursis has been used successfully to analyze internal group dynamics and the dissemination of information in conversation (Angus, Rintel, & Wiles, 2013; Angus, Rooney et al., 2012; Angus, Watson et al., 2012; Angus, Smith et al., 2012; Atay et al., 2015; Baker et al., 2013; Baker, et al., 2015 Cretchley et al., 2012; Tolston, Riley, Mancuso, Finomore & Funke, 2018; Watson, Angus, & Gore, & Farmer, 2015) at both a qualitative (Angus, Watson et al., 2012) and a quantitative level (Angus, Smith et al. 2012; Baker et al., 2015; Watson et al., 2015). In one finding, for instance, the same doctor-patient conversation was analyzed in its entirety (including all the concepts within the conversation) and thematically (looking only at medical concept exchanges). The study revealed that by removing non-medical concepts from the analysis, doctor-patient interactions were less effective than initially perceived (Angus, Watson et al., 2012). In other words, the doctor was not able to relay the medical information to the patient even though the overall conversation seemed to be successful. This highlights the value in automating the analysis of conversations.

In the present study, Discursis was used to analyze the participants' conversation across the two play settings. Since symbolic play is a complex joint activity (see Chapters 5 and 6), it was hypothesized that dialogue within this context would require greater cooperation between interlocuters, in other words, greater conceptual alignment (Atay et al., 2015). As observed in the previous chapter on turn-taking, infants were more likely to start new conversational turns in the symbolic play condition; knowing this happened at a structural level within the conversation, an attempt was made to assess if the same occurred semantically by analyzing conceptual recurrence. The general themes also were compared for each play condition, to attempt to pull apart possible differences between them.

7.3 Method

This chapter continues to examine data at the third timepoint of the longitudinal study described in the Chapter 4.

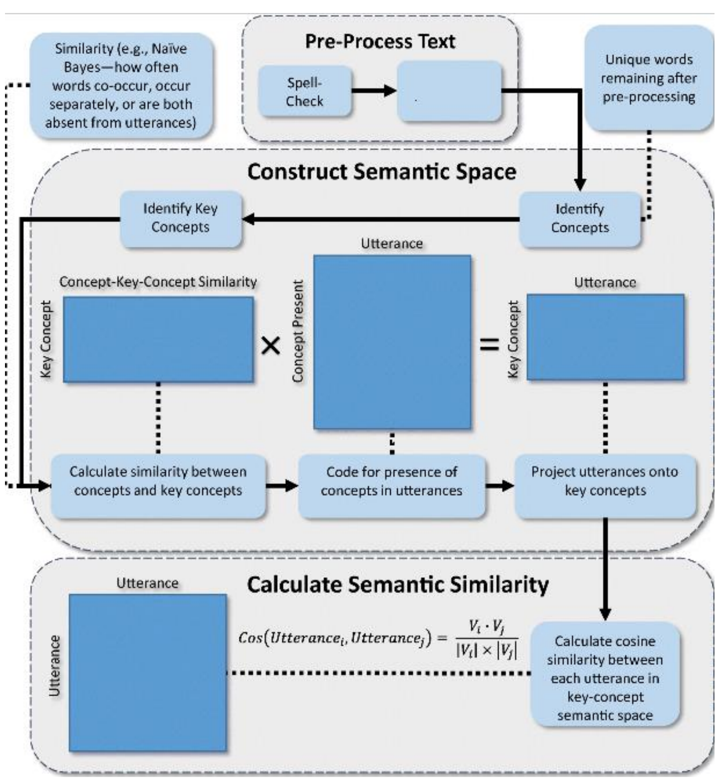
7.3.1 Participants. The play sessions of 52 dyads were included in the upcoming analyses; for more information, please refer to Chapter 4.

7.3.2 Design. Conceptual patterns in the transcript were determined using Discursis (Angus, Rooney et al., 2012; Angus, Watson et al., 2012; Angus, Smith et al., 2012; see below). The dependent variables were conceptual recurrence and conceptual introduction. Conceptual recurrence assessed what concepts were repeated by each member of the dyad at different distances in the conversation. The distance from the original concept was also determined and operationalized as short repetitions (the concept is repeated within 1 or 2 utterances), medium repetitions (3 to 5 utterances), and long repetitions (more than 5). Conceptual introduction focused on which member of the dyad introduced a concept to the conversation. The results were then computed, and their means compared between conditions in R. Significance was set at an alpha level of .05 using LSR package in R (Navarro, 2015).

Discursis. Discursis detects and extracts thesaurus-based concepts from transcripts of conversation using a program called Leximancer, which identifies concepts via statistical algorithms that compute associations between adjoining words in high-dimensional space (Cretchly et al., 2012; Smith et al., 2003; Smith & Humphreys, 2006). This is a two-step process of semantic text extraction and relational mapping of concepts. Discursis uses Leximancer's capacity to detect lexical and semantic co-occurrences within a sliding time window in the text to construct a matrix of representations of words defined by their co-occurrence. For instance, if the words "tea" and "cuppa" (colloquial Australian English for tea) frequently occur within the same window of text, they will be conceptually linked. These representations are then compared using similarity metrics to determine semantic and grammatical clusters across the conversation (see Smith & Humphreys, 2006 for a detailed review of the Leximancer program) and to create a list of concepts. In Discursis, this list of concepts is displayed visually across the duration of the conversation. Discursis also computes a number of concept metrics that may be used for further analysis.

7.3.3 Coding. Video and audio recordings were aligned and transcribed in CHAT format (MacWhinney, 2013) with ELAN Linguistic Annotator software (Tacchetti, 2017). Play transcripts were then post-processed to be read in Discursis (see Appendix B1 for format details).

The three main processing steps were: pre-processing, concept selection/semantic space construction, and repetition analysis/semantic similarity calculation. These steps are outlined in Figure 7.1.



Note. This chart was adapted with permission from Tolston et al., 2018

Figure 7.1 Discursis processing flow chart – how the semantic similarity matrix (Discursis plot) is produced

Once Discursis extracts the list of concepts, it regroups them under a number of key concepts called *themes* by ordering the concepts that consistently appear together within the conversation. Each utterance is then coded for the presence of concepts and themes, finally to calculate the similarity between each utterance in the theme semantic space (see Figure 7.1). This process allowed the computation of self and other repetitions of concepts and themes for both participants for each utterance across the conversational timeline. It also calculated the distance between each repetition and gathered them into three levels: short repetitions (the concept is repeated within 1 or 2 utterances), medium repetitions (3 to 5 utterances), and long repetitions (more than 5). Output included raw numerical values for distance. These were used to compute and compare means between conditions. The Discursis dimensions of analysis described above are represented in Figure 7.2.

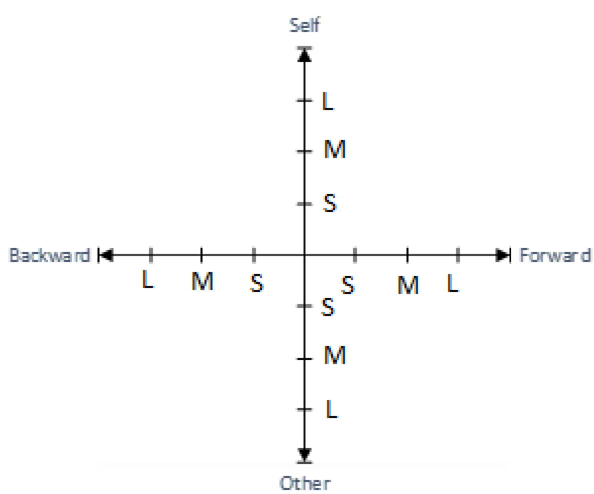


Figure 7.2 – Multi-dimensional representation of Discursis conceptual analysis (reproduced, with permission, from Angus, 2017, personal communication, April 30, 2018)

In Figure 7.2, the origin (0, 0) represents the ‘current utterance’ being analyzed in Discursis. For instance, this might be a child’s utterance. If overlap occurs between concepts in the current utterance and the immediately preceding one by the child’s caregiver, this would constitute a Short backwards Other repetition of that concept.

Concept selection. The concepts and the number of concepts to be included in the Discursis analysis were selected automatically by the program for each transcript. Two options are available to select concepts in Discursis. The first does it automatically based on the overall number of terms in the sample, while the second allows the selection of a predetermined number of concepts to include (for instance 75 or 100 concepts). I determined that the automatic selection was more likely than selecting a predetermined number of concepts to yield meaningful concepts because in a sample of young speakers, like that analyzed here, the number of concepts varies greatly between participants (from 8 to 45 in functional play, for example) and remains relatively small compared to those present in adult conversations. Automatic selection also limited researcher bias.

In order to confirm that automatic selection was appropriate, concepts were also selected manually and compared to the automatic concept selection for 10 transcripts or about 20% of the sample (19.61%). The comparison confirmed that the automatic concept selection systematically resulted in more precise concept selection, requiring fewer manual adjustments to the concept list post-processing. The results of the automatic selection yielded fewer concepts overall, and fewer meaningless concepts (such as fillers like “*hmm*”). This decision therefore limited the number of overall concepts to the minimum, limiting conceptual granularity. This outcome is supported by previous findings by Smith and Humphreys (2006) and Tolston et al. (2018), who determined that the larger the number of concepts, the greater the conceptual granularity. Concept granularity means the subdivision of a more general concept into two, for instance, the concept '*color*' gets separated between '*red*' and '*green*'. Although granularity might help distinguish content more precisely within otherwise similar utterances in conversations between adults, additional granularity would tend to separate utterances with identical content in this data set because one member of the dyad (i.e., the 24-month-old) still had a relatively low MLU ($M_{symbolic}$ = 1.967, $SD_{symbolic}$ = 0.609 and $M_{functional}$ = 1.87, $SD_{functional}$ = 0.471). For example, the utterances *'good boy'* and *'nice work'* would be classified as two different concepts, when they are both conceptual praises by the same speaker and should be grouped as one. This example also demonstrates one of the major advantages in analyzing semantic rather than only lexical or phrasal repetitions. It allowed an expanded understanding of repetitions in order to focus on whether the topic of conversation was picked up by each interlocutor, rather than specific words.

Overall, the number of concepts ranged between 13 and 41 in the symbolic play condition and 8 and 45 in the functional play condition (See Table B2 in the Appendix). In one case, (ID7), simple semantic selection (term-based option in Discursis, see Table 7.1) was used instead of Leximancer because the conversation did not present enough concepts to be analyzed in Leximancer. Once the concepts were defined automatically, I performed a final manual review, which allowed me to correct errors and regroup concepts when it had not been done automatically. It also enabled the removal of non-meaningful concepts when needed (see stop-word list options below).

Stop-word list. Usually, adult conversations analyzed in Discursis are processed using a stop-word list (see Figure 7.1), which allows function words (articles, preposition, etc.) to be excluded from the concept list. Because the data comprise relatively short conversations between a caregiver and an infant, whose language production and use of function words is limited, no stop-word list was used. While this theoretically incurred the risk of turning function words into semantic concepts, function words develop late in infants; even 24-month-olds are still unlikely to have many function words in their active vocabulary (Tomasello, 1987). The risk is that function words may be counted as concepts for parental self-repetitions, but this seldom happened in this data set, probably because function words are rare in IDS (Jasbi, Jaggi, & Frank 2018). A manual review of a subset of the data confirmed the rarity and when it did occur, the function word concept seed was removed during the pre-processing phase (see Figure 7.1).

Table 7.1 describes the Discursis setting options and the selections made for the analyses in this chapter. Leximancer was selected to determine concepts except in the case of ID7 (see Concept Selection subsection). The number of concepts was set to automatic (see Concept selection section). No corpus or use metadata were created (e.g. link to online databases). The concepts were edited manually post processing (Concept Seed Editing) to merge concepts that were not merged automatically, and to regroup similar concepts or remove meaningless ones. Finally, the distance between repetitions was set manually (Plot settings)**.**

Table 7.1

Discursis Settings

Advanced Settings	*Selection*
Concept Model	Leximancer (term-based for ID 7 functional condition only)
Number of Concepts	Automatic
Concept Learning Corpus	None
Metadata	None
Stop-word List	None
Concept Seed Editing	Merge concepts
	Regroup similar concepts like ‘mum’ and ‘mummy’ or ‘mummy’s’ as well as ‘drink’ and ‘drinking’ (lemmas).
	Remove concepts which should not be included such as functional words, missing transcriptions, and expressions without clear meaning
Plot settings (repetition distance)	Short (2 or fewer utterances) Medium (3 to 5 utterances apart) Long (more than 5)

Discursis output. Discursis output included two types of computations (primitives and metrics; see Discursis primitives and CAT metrics subsections below) and two types of visual mapping of the conversation: a map of recurring concepts and themes (Figure 7.3) and a temporally sensitive conversational concept plot (Figures 7.4 and 7.5).

Concept and theme map. The relationship between concepts and themes can be visualized with the Discursis concept map. Each theme is capitalized and represented by a color circle. A theme comprises a number of concepts (concepts are represented by a gray dot). The greater the size, the more prevalent the theme within the conversation. The lines between concepts show whether they are connected temporally (i.e., used together or in close proximity).

Concept and theme maps can overlap (Figure 7.3) or be presented separately (Themes: Figure 7.9; Concepts: Figure 7.10). In Figure 7.3 for example, four themes recurred in that play session. This dyad primarily discussed *'tea'*, *'teddy'*, *'look'*, and *'sit'*. In addition, there were two types of themes, instructional themes when one member of the dyad asked the other (or the teddy) to *'look'* and *'sit'*, and toy themes such as *'teddy'* and *'tea'* where the dyad discussed the toys included in their playset. We also can see that the tea theme included the use of the concepts *'cup'*, *'tea'*, *'bye'*, and *'mummy'*. This means most of the time when the concept of tea was mentioned, the other three concepts occurred. The overlap of the themes *'look', 'sit'*, and *'teddy'* mean that they happened within close proximity themselves, whereas the *'tea'* theme was addressed separately by the dyad.

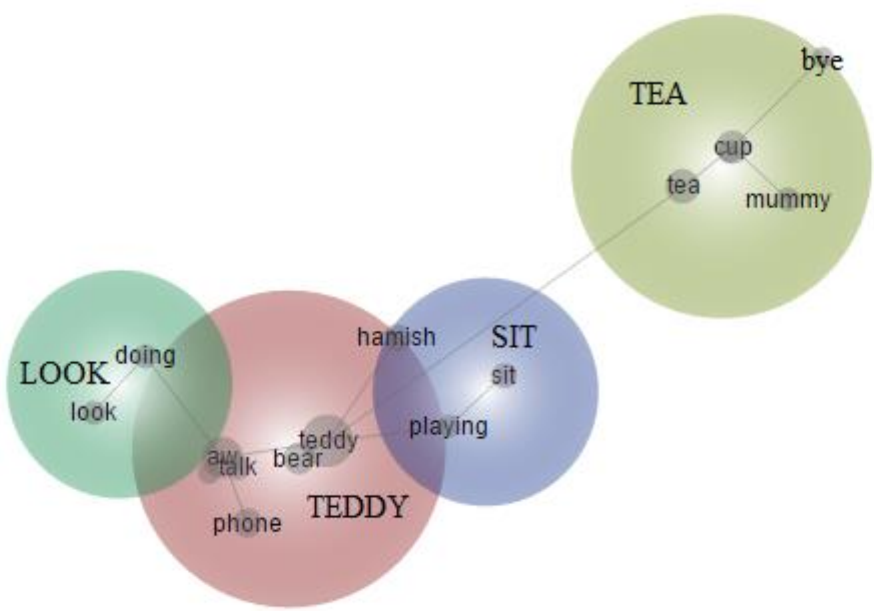


Figure 7.3 Discursis concept and theme map for ID 3 Symbolic Play Condition

Temporally sensitive conversational plot. In Figures 7.4 and 7.5, each color block represents a turn in the conversation, progressing diagonally from top left (the beginning of the conversation) to bottom right (the end of the conversation). Pink blocks represent the infant's utterances and green blocks, the parent's utterances. The size of each block is proportional to the total word length of the turn (in words). Below the diagonal, additional blocks represent concept repetitions across turns. They refer back on the diagonal to the initial use of the concept. Single color blocks represent self-repetitions and bicolor blocks represent other-repetitions, in which the color of the upper triangle refers to the speaker who introduced the concept (see Baker et al., 2013 for more details).

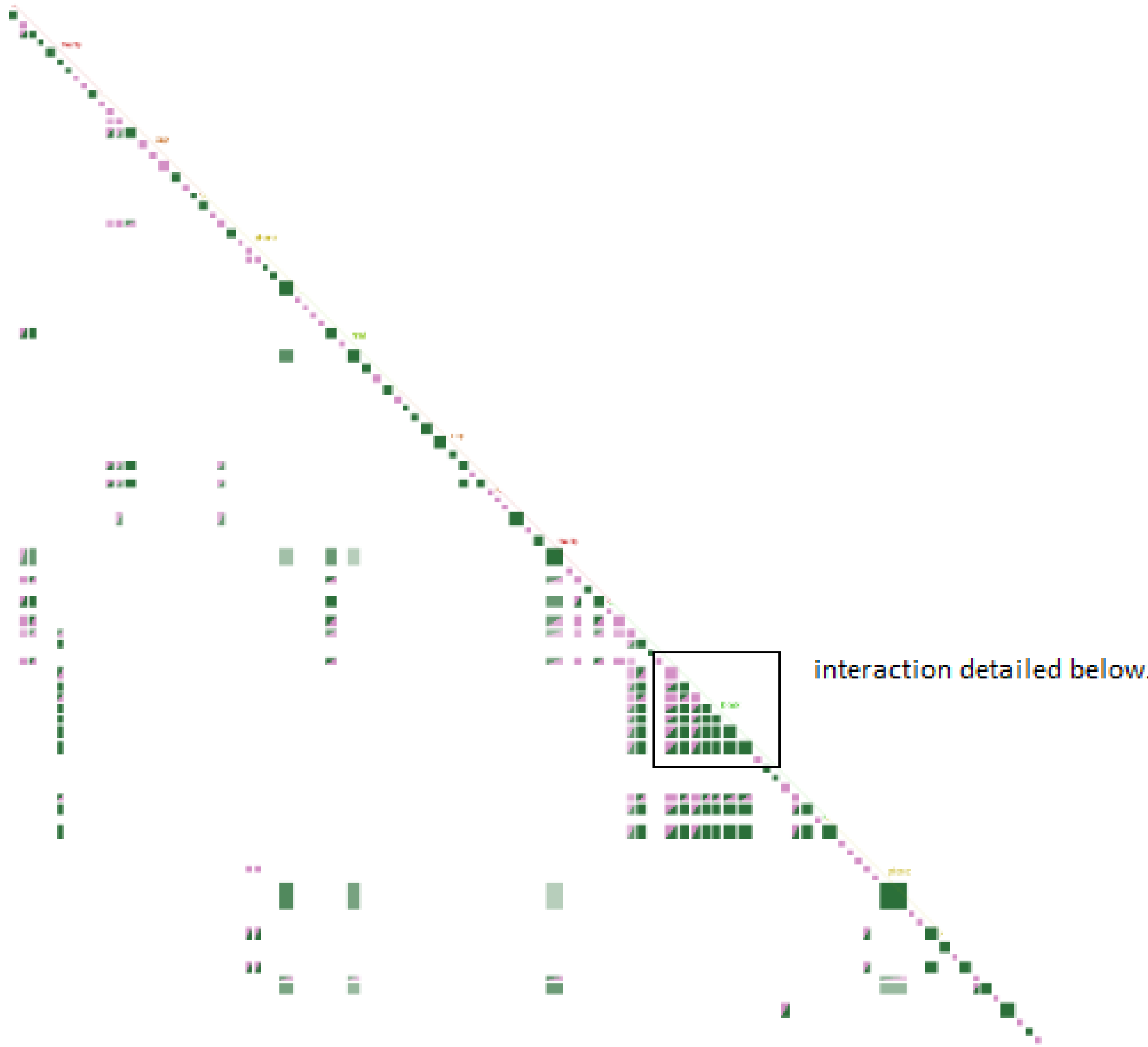


Figure 7.4 Temporally sensitive conversational plot

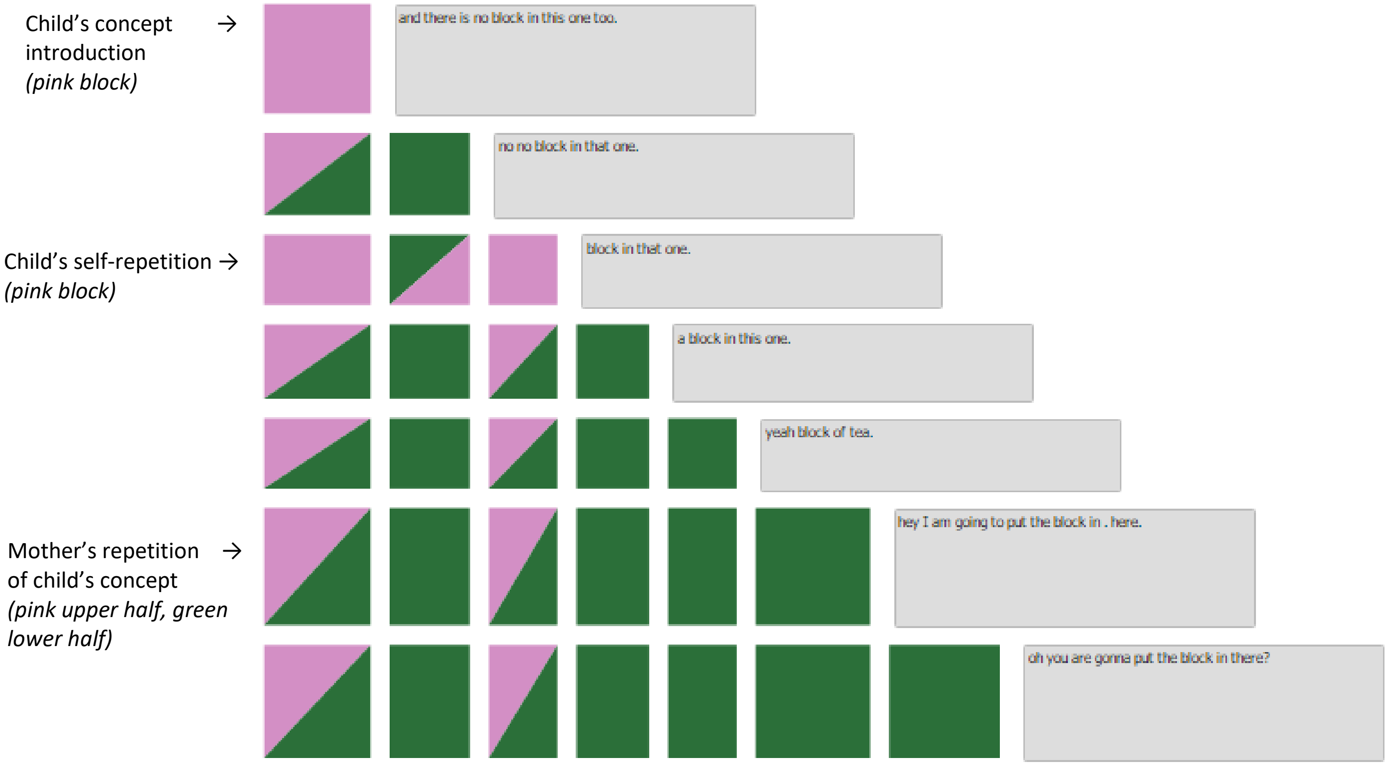


Figure 7.5 Zoomed-in section of the conversational plot

Discursis Primitives. The recurrence plots were developed based on an output list called primitives, which computes repetitions along the following three dimensions: Speaker (Self, Other), Time (Backward or Forward in time from current timepoint), and Distance (Short – 2 or fewer utterances apart, Medium – 3 to 5 utterances apart, Long – more than 5 utterances apart), so that each utterance would have a three dimensional rating or primitive (for instance Self-Forward-Long or SFL). Table 7.2 shows the 12-dimension combinations or primitives that were analyzed for this study; the abbreviations in this table will be used to refer to the primitives throughout this chapter.

Table 7.2

Discursis Dimensions

Code [formulas]	*Dimension*	*Metrics*	*Example*
OBS	Other Backward Short	Accommodation	Child – Teddy! (OBS – 1 away) Mother – This is a Teddy bear, you are right.
[OFM – (1-OFS)]		Leadership	
OBM	Other Backward Medium		Mother – Let's have a cup of tea (OBM – 3 away) Child – Mommy look. Mother – What is it? Child – another cup!
OBL	Other Backward Long		Child – Red. (OBL – 5 away) Mother – Good job! Child – Hammer, hammer, hammer. Mother – This is great hammering, Evan. Child – Hammer, hammer. Mother – You hammer all the red ones.
OFS	Other Forward Short		Child – Teddy! Mother – This is a Teddy bear, you are right. (OFS – 1 away)
OFM	Other Forward Medium		Mother – Let's have a cup of tea Child – Mommy, look. Mother – What is it? Child – another cup! (OFM – 3 away)
[OFM x OBM]		Engagement	
OFL	Other Forward Long		Child – Red. Mother – Good job! Child – Hammer, hammer, hammer. Mother – This is great hammering, Evan. Child – Hammer, hammer. Mother – You hammered all the red ones. (OFL – 5 away)

[OFL – OBL]		Influence	
SBS	Self Backward Short	Ownership	Mother – Look, this could be a blanket. (SBS – 1 away) Mother – We can use this as a blanket for Teddy.
SBM	Self Backward Medium		Mother – Can you make us a cup of tea? (SBM – 3 away) Child – No coffee! Child – Coffee with milk. Mother – Ok, a cup of coffee.
[SBM + SFM]		Fixation	
SBL	Self Backward Long		Mother – Why don't we make a tower. (SBL – 6 away) Child – a tower with the blocks. Mother – yes, here's one block Child – Three blocks. Mother – Four blocks. Mother – Good counting. Mother - We're building a castle's tower.
SFS	Self Forward Short		Mother – Look, this could be a blanket. Mother – We can use this as a blanket for Teddy. (SFS – 1 away)
SFM	Self Forward Medium		Mother – Can you make us a cup of tea? Child – No coffee! Child – Coffee with milk. Mother – Ok, a cup of coffee. (SFM – 3 away)
SFL	Self Forward Long		Mother – Why don't we make a tower. Child – a tower with the blocks. Mother – yes, here's one block Child – Three blocks. Child – Four blocks. Mother – Good counting. Mother – We're building a castle's tower. (SFL – 6 away)

Note. Table 7.2 uses examples with lexical instead of semantic matches to facilitate the understanding of each dimension.

The specific distance for Short, Medium and Long repetitions was set manually to fit the length of the conversations being analyzed. Although the multi-dimensional primitives in Table 7.2 suggest symmetry between variables (also see Figure 7.2), where one's "*Self-Backwards-Short*" repetition will be followed by their "*Self-Forwards-Short*" repetition, it is important to note that the symmetry is not complete (see Example 7.1 below). Indeed, although the parent's *"Other-Forward-Long"* repetitions and the infant's "*Other-Backward-Long"* repetitions are symmetric, the symmetry is only possible after the first five utterances and before the last five utterances. In other words, the second utterance can never be read as *"Other-Backward-Long"* (OBL) but it could be an *"Other-Forward-Long"* repetition (OFL). If there are more OBL repetitions at the end of the transcript than OFL repetitions at the beginning, there is no symmetry. The example below has one more OBL than OFL and conversely, one more SFL than SBL.

Example 7.1 Consider the excerpt below to be a complete conversation. Repetitions are in italics, the repetitions that will not be symmetrical are underlined. The first 4 and last 4 utterances in which the asymmetry may occur are pointed out.

Conversation begins

Mother	hah! who's in there!
Child	<u>*Teddy!*</u> (<u>SFL</u>) (SFS)
Mother	*Teddy!* (SBS)
Mother	that is right!
Mother	what is he doing?
Child	xxx.
Mother	oh, it is a *phone*! (OFS)
Child	a *phone* for *Teddy*? (OBS) (SBL)
Mother	is there a *call* for you? (OFS)
Child	there is a *call* for (OBS)
Child	*uppa*. (OBS)
Mother	*up above* that, no it is not on that *spoon*, is it? (OBS) (SFS)

The first four utterances cannot be Self-Backward-Long or Other-Backward-Long.

Mother	aw there is a *spoon*. (SBS)	
Child	*yeah!* (SFS)	
Child	*yes.* (SBS)	
Child	yes. (SFS) (SBM)	
Mother	hah.	
Mother	ah.	**The last four utterances cannot be Other-Forward-Long or Self-Forward-Long.**
Mother	what else is in there?	
Mother	aw.	

Conversation ends

Note. This excerpt is taken from participant ID1, in the symbolic play condition. (OFL – Other Forward Long, OFS – Other Forward Short, SFS – Self Forward Short, SBS – Self Backward Short, SFL – Self Forward Long)

CAT metrics. With the 12 three-dimensional primitive combinations above, Discursis computes a number of CAT metrics (see Atay et al., 2015 for a detailed description of the metrics and their computations). For the purpose of this study, the following metrics were analyzed: Accommodation, Leadership, Engagement, Influence, Fixation, and Ownership. They are described in the current subsection and presented in Table 7.2.

The *Accommodation* metric corresponds to the OBS primitive. It is representative of the current utterance adapting to the most recent previous utterance. It has been shown to demonstrate active listening or engagement (Atay et al., 2015).

The *Leadership* metric is used to determine the first use of a concept and subsequent repetitions. The leadership metric measures the degree to which a speaker contributes concepts that are not direct repetitions of the immediate previous utterance, and that are also repeated by subsequent utterances. For a given utterance *t*, leadership is determined by summing the recurrence of every successive utterance by every other person within the metric-relevant range. This sum is then scaled by $1-OBS(t)$ to attribute higher leadership scores to people who introduce the conceptual content that other people have subsequently talked about in the immediate conversation.

The *Engagement* metric measures the degree to which the current utterance contains concepts mentioned by other people in the temporal vicinity (forward and backward), essentially measuring how on-topic the current utterance is in the context of the surrounding conversation. The engagement metric for an utterance is determined by summing the recurrence of every preceding and following utterance by other people within the metric-relevant range.

The *Influence* metric measures the degree to which concepts contained in an utterance are used forward in time when these same concepts have not been used previously or whether the speaker's concept will influence the future conversation. The influence metric for an utterance is asymmetric (Example 7.1). It is determined by summing the recurrence of every preceding utterance by a different person and subtracting this sum from the summed recurrence of every subsequent utterance by a different person within the entire conversation. A largely positive influence implies that the utterance contains concepts that have been repeated by other people strongly in the future; if largely negative, the utterance uses concepts mentioned by other people in the past that do not recur strongly in the future.

Fixation measures the degree to which a person repeats their own concepts within a medium range conversational time frame. The fixation metric for an utterance is determined by summing the recurrence of every preceding and successive utterance by the same person within the metric-relevant range.

The *Ownership* metric assesses whether a speaker expands their own concept, another form of accommodation in that it attempts to facilitate communication. Ownership corresponds to the SBS dimension combination.

7.4 Results

This study evaluated variations in conceptual content, conceptual introduction, and conceptual recurrence between the functional and symbolic play conditions. Proportions of conceptual recurrence results were averaged for each participant in each condition. These means were then compared using multiple two-tailed paired sample *t*-tests conducted with a significance level of $\alpha = .05$. As in the previous chapters, this method was chosen because many of the dependent variables were interdependent. Discursis provides almost completely symmetric results, therefore, the likelihood of one type of repetition has an effect on the likelihood of another (OBS_{parent} and OFS_{infant} are interdependent, for instance). Concept introduction and content are similarly interdependent and are affected by time and speaker. The more one speaker says, the less the other has the opportunity to speak. Therefore, the *t*-tests were reported with their effect size and confidence intervals, providing an unbiased and standardized measure of the observed effects.

7.4.1 Temporally sensitive conversational plot. Figure 7.6 shows the Discursis plots for one dyad (ID30) across the symbolic and functional play conditions. They clearly show more interactive conversations in symbolic than in functional play, as revealed by the greater number of repeated concepts expressed in symbolic play conversation. The more color blocks under the diagonal, the more concept recurrence (see detailed explanation on how to read the plots in Section 7.3.3 – Concept selection). The plots for all dyads are available for comparison in Appendix B (B3 to B106) and reveal similar patterns to that shown in ID30. The plots were created based on the primitive calculations, which are statistically analyzed in the next section.

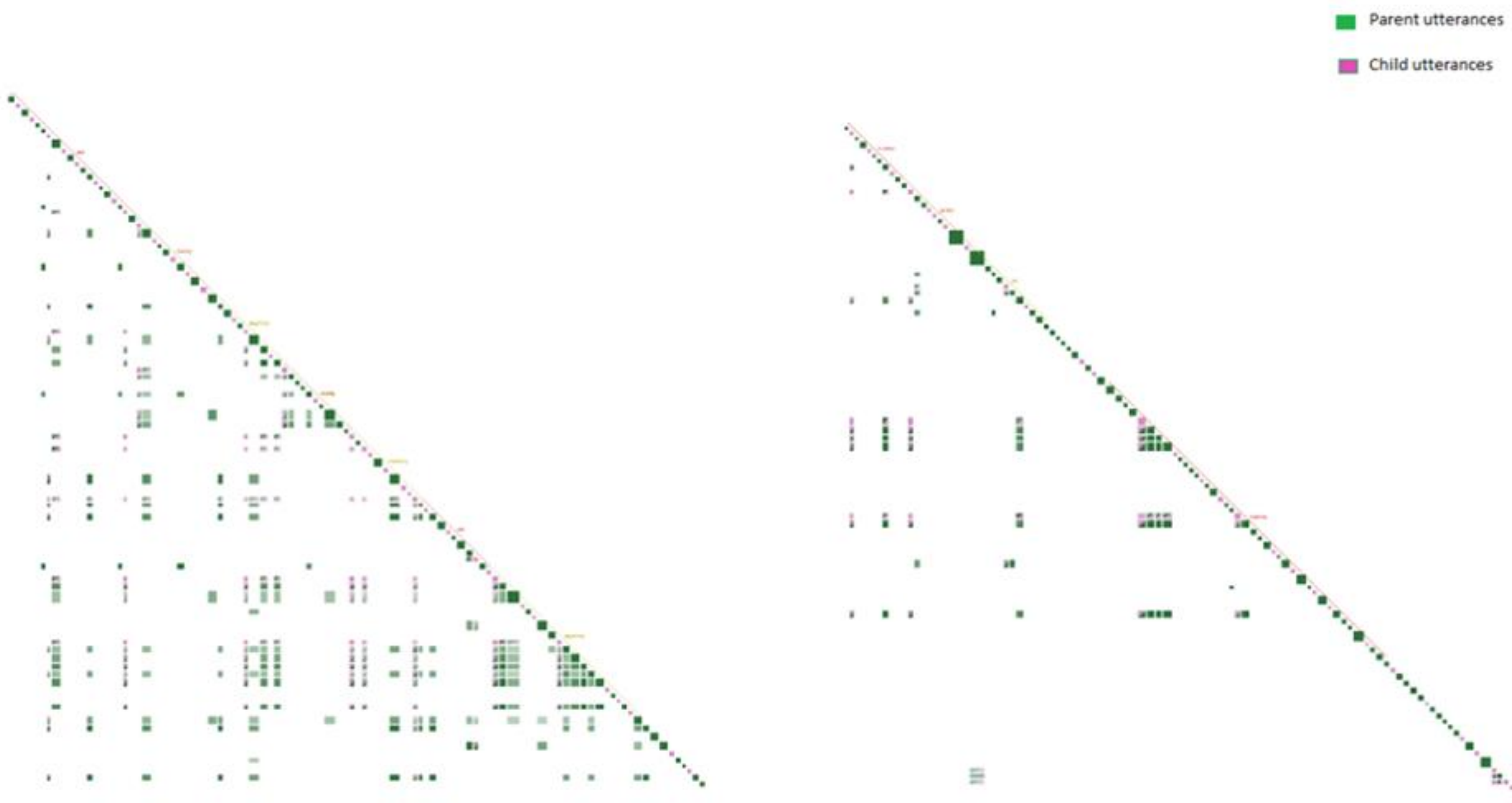


Figure 7.6 Discursis temporally sensitive conversational plots for ID 30 symbolic play condition (left) and functional play condition (right)

7.4.2 Number of concepts per condition. The number of concepts for each participant in the symbolic play condition ranged between 13 and 41 in the symbolic play condition (*M* = 27.65, *SD* = 6.04) and between 8 and 45 in the functional play condition (*M* = 25.73, *SD* = 8.74). The number of concepts for each participant for each condition are listed in the Appendix (Table B2).

7.4.3 Content alignment. Figure 7.7 shows the means and standard deviations for parental content alignment for each combination of repetition patterns computed in Discursis in the symbolic and functional conditions. Figure 7.8 shows the same for infants.

As suggested in the Discursis conversational plots of Figure 7.6 (also see Appendix B3-B106), the results of paired sample *t*-tests comparing the means of each participant in each condition show significantly more concept repetitions in the symbolic than in the task-oriented play condition in both infant (Table 7.3) and parent (Table 7.4) language.

Discursis Primitives

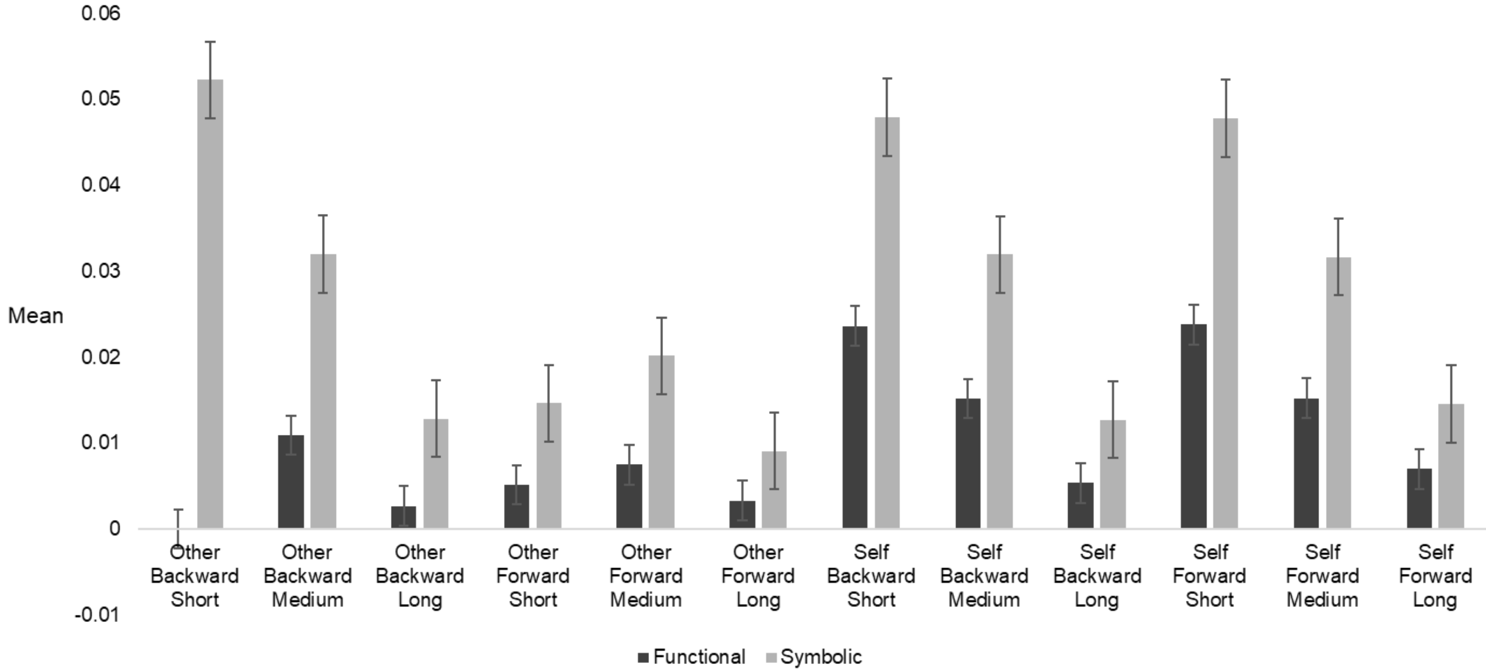


Figure 7.7 Means and Standard Deviations for Parent-Concept recurrence in raw numbers

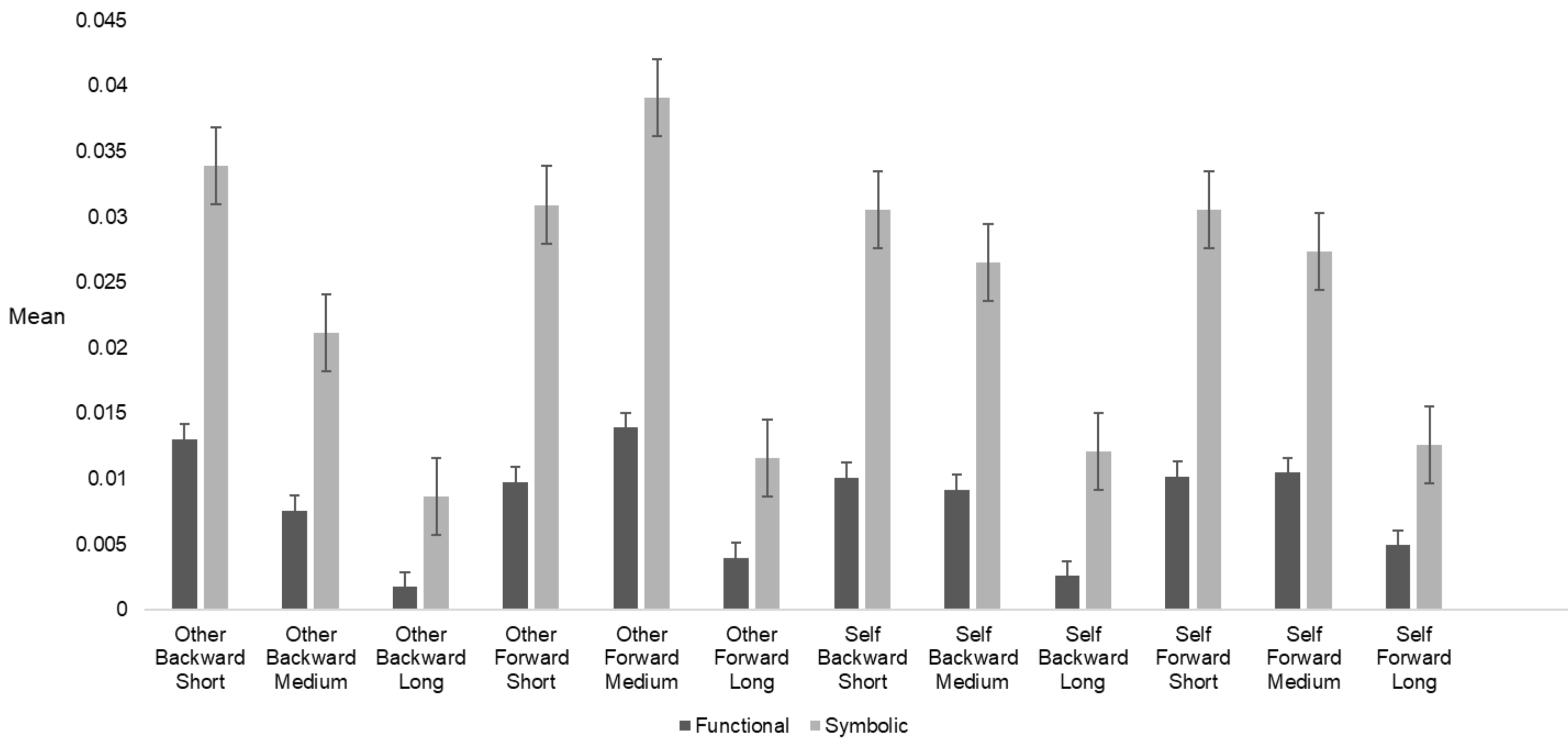


Figure 7.8 Means and Standard Deviations for Infant-Concept recurrence in raw numbers

Table 7.3

Paired-Sample T-tests for Child Concept Recurrence Between Conditions

Recurrence Type	Mean Difference	df	T	p	Cohen's d	CI95 of d Lower bound	CI95 of d Upper bound
Other Backward Short	0.0209	51	5.1	.000*	.86	.59	1.41
Other Backward Medium	.0136	51	5.96	.000*	.93	.75	1.58
Other Backward Long	.0069	51	7.24	.000*	1.31	.99	.1.85
Other Forward Short	.0211	51	4.86	.000*	.97	.55	1.36
Other Forward Medium	.0252	51	7.26	.000*	1.11	.99	1.85
Other Forward Long	.0076	51	6.35	.000*	1.06	.82	1.66
Self Backward Short	.0205	51	4.08	.000*	.79	.4	1.2
Self Backward Medium	.0173	51	4.31	.000*	.76	.44	1.24
Self Backward Long	.0095	51	5.46	.000*	.99	.66	1.48
Self Forward Short	.0203	51	4.003	.002*	.78	.38	1.18
Self Forward Medium	.0169	51	3.99	.002*	.71	.38	1.18
Self Forward Long	.0076	51	3.46	.001*	.62	.28	1.07

Note. *p <.05, two-tailed.

Table 7.4

Sample T-tests for Parent Concept Recurrence Between Conditions

Recurrence Type	Mean Difference	df	T	P	Cohen's d	CI95 of d Lower bound	CI95 of d Upper bound
Other Backward Short	.0359	51	6.2	.000*	1.1	.79	1.63
Other Backward Medium	.0211	51	7.63	.000*	1.14	1.06	1.93
Other Backward Long	.0101	51	7.07	.000*	1.29	.95	1.81
Other Forward Short	.0096	51	4.60	.000*	.76	.5	1.31
Other Forward Medium	.0127	51	5.80	.000*	.87	.72	1.55
Other Forward Long	.0057	51	6.39	.000*	1.01	.83	.1.67
Self Backward Short	.015	51	5.23	.000*	.95	.61	.1.43
Self Backward Medium	.0168	51	5.86	.000*	.99	.73	1.56
Self Backward Long	.0074	51	5.39	.000*	.98	.64	1.47
Self Forward Short	.024	51	5.25	.000*	.96	.62	.1.44
Self Forward Medium	.0164	51	5.93	.000*	.98	.75	1.58
Self Forward Long	.0076	51	5.75	.000*	.94	.71	1.54

Note. *p <.05, two-tailed.

CAT metrics. Tables 7.5 and 7.6 show results of the *t*-test comparison of CAT metrics between functional and symbolic play for parent (7.5) and infant (7.6) language. Leadership was significantly more prevalent in symbolic play for parents; Leadership, Influence, and Fixation were significantly more prevalent in symbolic play for infants.

Table 7.5

Paired-Sample t-tests for Parent Metrics Between Conditions

Metric	Mean Difference	df	*t*	*p*	Cohen's d	CI95 of d Lower bound	CI95 of d Upper bound
Leadership	.01	51	6.15	<.001*	.87	.79	1.62
Engagement	-0.19	51	-.19	.85	.04	-.04	.35
Influence	.02	51	1.3	.2	.26	-.13	.64
Fixation	-0.002	51	-.12	.91	.02	-.41	.36

Note. *p <.05, two-tailed.

Table 7.*6*

Paired-Sample T-tests for Infant Metrics Between Conditions

Metric	Mean Difference	df	*t*	*p*	Cohen's d	CI95 of d Lower bound	CI95 of d Upper bound
Leadership	.02	51	5.86	<.001*	1.06	.73	1.56
Engagement	.02	51	5.69	<.001*	.99	.7	1.53
Influence	.001	51	1.24	.22	.22	-.14	.63
Fixation	.02	51	3.65	<.001*	.67	.32	1.11

Note. *p <.05, two-tailed.

7.4.4 Combined concept and theme maps. The maps on the left side of Figures 7.9 and 7.10 show the main themes and concepts used in the functional play condition, across all the participants. On the right side, the maps show the same data for the symbolic play condition. There were 10 main themes in functional play and 9 in symbolic play, as well as 28 concepts in functional and 28 in symbolic play. Concept and theme maps for each condition are presented side by side for ease of comparison. The functional play condition revolves around two primary themes, '*look*' and '*blocks*', while the symbolic play condition is centered on the main theme of ‘*tea*’. The centrality of the primary theme in symbolic play displays a more interconnected conversation, whereas two separate conversations occur in functional play.

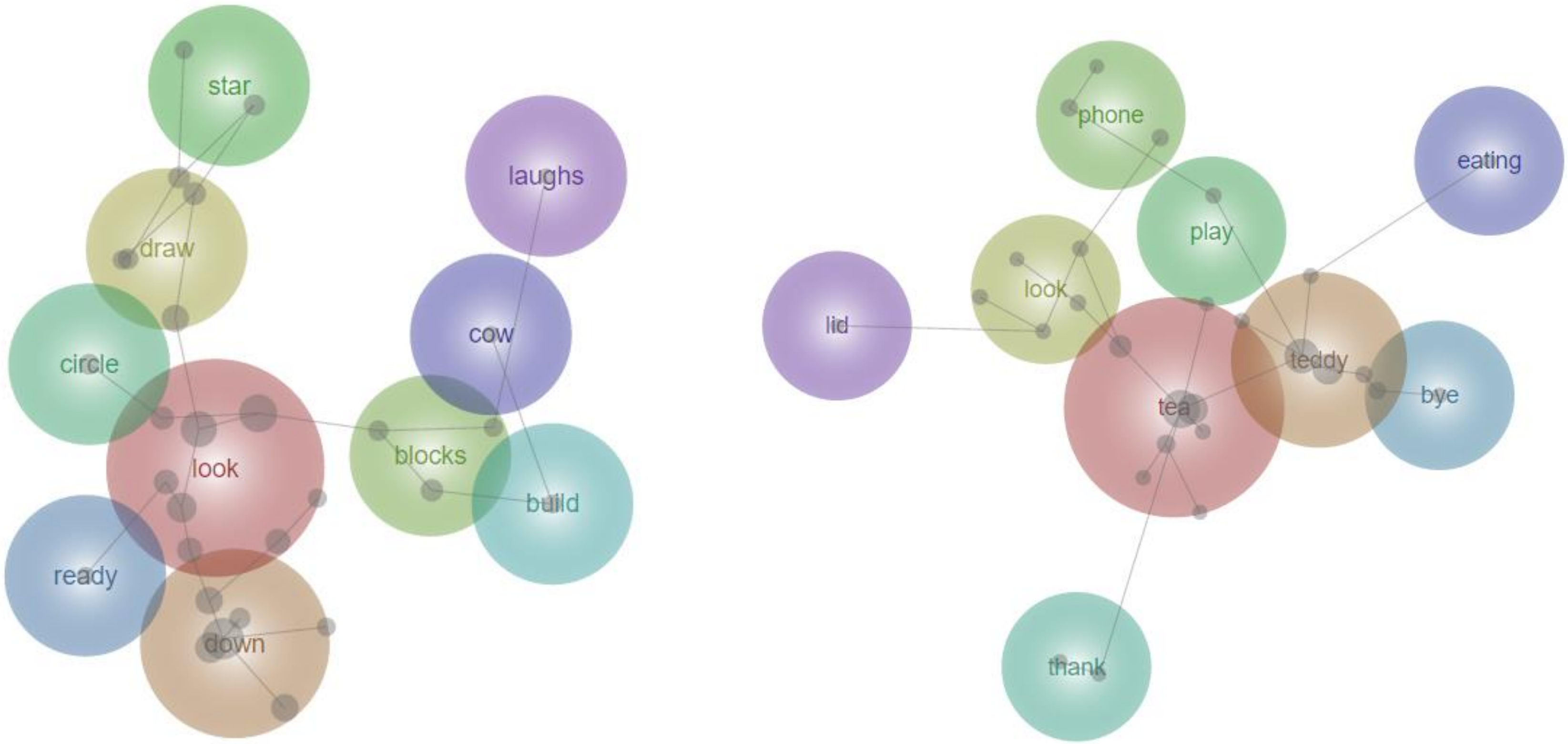


Figure 7.9 Overall theme maps for functional play (left) and symbolic play (right) for all participants.

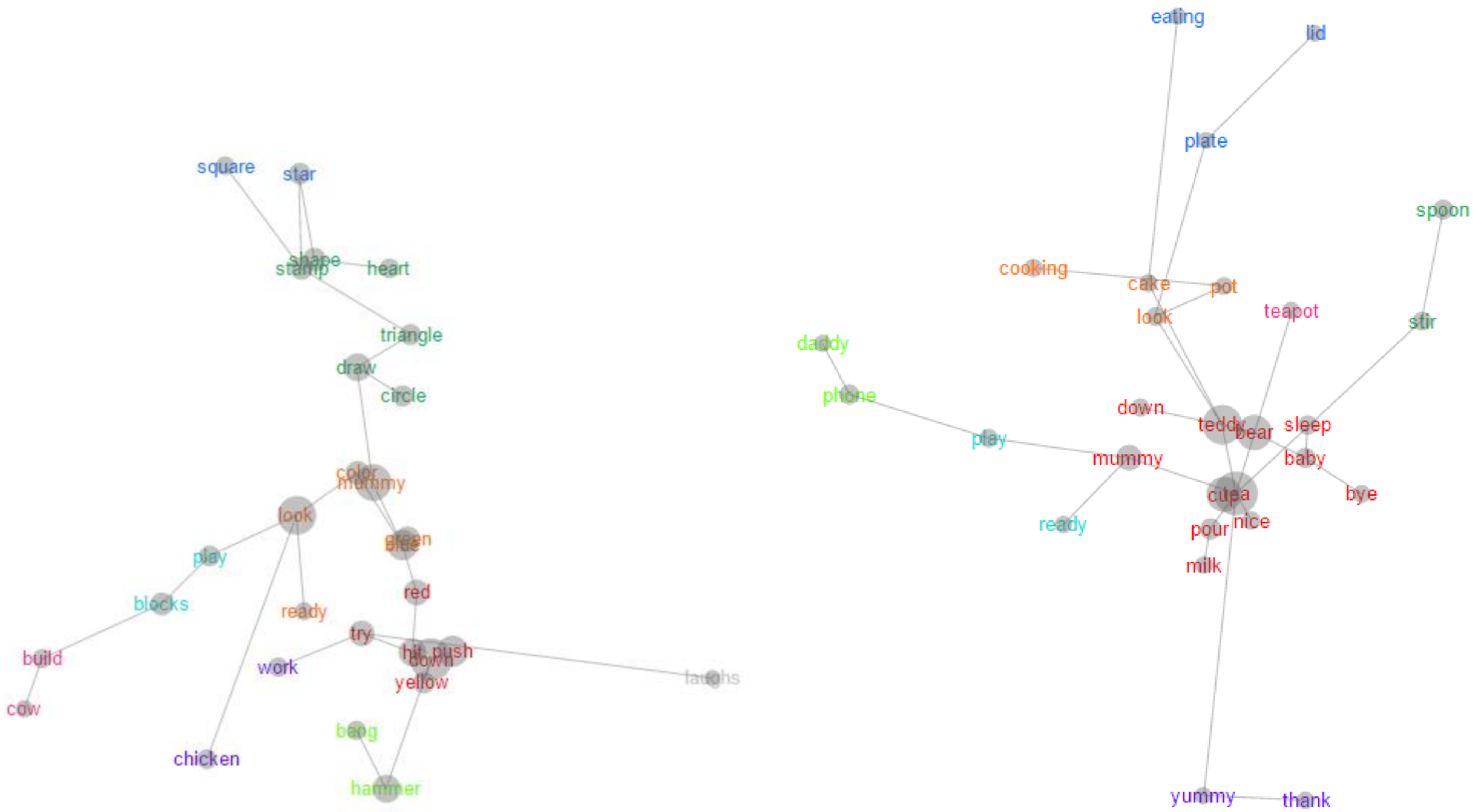


Figure 7.10 Overall concept maps for functional play (left) and symbolic play (right) for all participants.

7.5 Discussion

The current chapter investigated how patterns of content alignment differ during caretaker-infant interactions in symbolic compared to functional play. To this end, one hypothesis was tested, and two exploratory analyses were performed. First, since symbolic play is a complex joint activity, it was hypothesized to require greater interaction and cooperation between interlocuters, in other words, greater conceptual alignment (Atay et al., 2015). Second, which dyad member introduced concepts and themes was explored in each setting. In the previous chapter on turn-taking, infants were found more likely to start new conversational turns in the symbolic play condition; knowing this happened at a structural level within the conversation, an attempt was made to assess if the same occurred semantically by looking at conceptual recurrence in the transcripts. Third, the general themes for each play condition were compared, to pull apart possible differences between them.

The first hypothesis was supported: significantly more concept and theme repetitions were observed in the symbolic play condition. This was true for all the Discursis primitives tested, across dimensions. The greater number of *'Other'* repetitions confirms that the communicative exchange is greater in symbolic play: both speakers are more likely to expand on their conversation partner's concepts. In addition, speakers do appear to make a greater effort to align their semantic linguistic representation in symbolic play. In other words, they use more repetitions and maintain topics longer. Previous research has already shown that parent and infants are particularly likely to align in conversation, for instance, by using repetitions to confirm that they have understood each other (Clark & Bernicot, 2008; Che et al., 2018). The rate of maternal repetitions has been shown to predict child utterances (MLU), syntax (DSS; Lee & Canter, 1971), and vocabulary diversity (VOCD) in later development (Che et al., 2018). Tamis-LeMonda et al., (2001) also showed that maternal repetitions predict vocabulary development, combinatorial speech, and past-event talk. Verb learning was greater during socially contingent interactions (Roseberry et al., 2014). Building on their results, this study's findings support the idea that symbolic play might benefit acquisition through repetition.

The potentially beneficial role of symbolic play in language development is further supported by the analysis of specific CAT patterns of alignment. In both infant and parent language, symbolic play provided significantly more opportunities for accommodation, which has been shown to demonstrate active listening and engagement in conversations (Atay et al., 2015). Both children and caregivers were significantly more likely to adapt their utterances in symbolic play to the most recent previous utterance. Their level of ownership was also significantly greater in symbolic play. Ownership means a speaker maintains his or her own topic of conversation, and like accommodation, it has been shown to facilitate comprehension (Atay et al., 2015). For infants, engagement and fixation patterns were more significant in symbolic play. More engagement means that they were more likely to mention their conversation partner's concept within a close temporal vicinity, suggesting they were attentive to what their partners were trying to communicate (Angus, Rooney et al., 2012). At the same time, they were more likely to repeat their own concept, or show greater fixation (Angus, Rooney et al., 2012).

Although the results were not significant, it is interesting to note that parents showed smaller amounts of engagement and fixation in symbolic play. In other words, they were numerically more likely to give up their own concepts to the benefit of the infant's (infant fixation) in the symbolic play condition, and they were numerically more likely to use the infant's concept (parent engagement) in functional play. These two non-significant findings are worth noting because they were the only two CAT patterns to be more prevalent in functional play than symbolic play.

As an extension of the first hypothesis, the second analysis assessed which member of the dyad was more likely to introduce new concepts into the conversation or, in CAT terms, who demonstrated more leadership and in what context. Parents and infants showed significantly more leadership in symbolic play, with both introducing more concepts. In addition, the difference between the means was greater for infants than parents in symbolic play, suggesting that infants introduced more concepts than their parents, which could be particularly beneficial to language development, according to previous research. For instance, Che et al. (2018) found that maternal repetitions of child-related concepts facilitated language development over time. In addition, case study evidence has proposed that conversational leadership and MLU are positively correlated (Dale & Spivey, 2006). Chapter 6 showed that infants were more likely to lead the conversations in symbolic play by starting more conversational turn sequence initiation. The current chapter reported that infants are also more likely to lead the conversational content selection.

A final exploratory analysis investigated whether conversational content was different between play settings. Although the number of key concepts and themes were similar in both conditions, a difference appeared when comparing them. In functional play, the central theme was *'look'*, while *'tea'* was the central theme for symbolic play. In other words, the functional play conversations were more likely to be centered around an attention-getter and symbolic play was more likely to be centered around a content-rich term. More attention-getter themes (i.e., *'ready' 'down')* and concepts (i.e., *'try')* were seen in functional play overall than in symbolic play (i.e., the theme *'look'* and the concept *'ready')*. In addition, the distributional pattern of themes and concepts appeared to be more interconnected in symbolic play, where everything revolved around the most common theme, *'tea'*; functional play was more dispersed, showing two almost completely parallel themes (drawing and puzzle-making). The findings suggest that symbolic and functional play have different linguistic environments that reflect differences in interaction, where symbolic play focuses on the negotiation of meaning, and functional play on the negotiation of actions.

While both contexts involve common routines and actions, the presence of more attention-getters in functional play suggests that parents are more likely to demonstrate actions in that play context (i.e., how to make a puzzle or hammer a peg: "look, this is how you do it"). These attention-getters are often conveying information, either labelling or providing instructions, two types of utterances that were more prevalent in functional play in Chapter 5 (naming and imperatives). As I have suggested then, it is likely that instructional information is more necessary in functional play because the toys are goal-oriented, and parents need to help the infants understand the toys' specific functions (O'Brien & Nagle, 1987). The specific functions of these toys also limit the possibilities to maintain interconnected themes during the functional play session: when the dyads speak about the puzzle, they are less likely to speak about the drawing board. This, in turn, may limit the complexity of the linguistic exchange in that setting.

At the same time, the presence of more content-rich terms in the symbolic context stems from the necessity to negotiate the meaning of the interaction in order to palliate the conceptual ambiguity of the context. Pretending to make tea, for instance, requires language to explain whether the cup is full or empty, and whether the block is sugar or cake. This ambiguous context requires that each member of the dyad knows what the other knows; that is, that they establish collective intentionality (Rakoczy, 2006, 2008; Tomasello et al., 2005; Tomasello & Carpenter, 2007; Hare & Tomasello, 2004; also see Chapter 2). It also provides a context that is flexible enough for the conversation to be more interconnected during the play session, possibly facilitating the exchange of more complex information between speakers (see Chapter 8 for more on informational exchanges).

To my knowledge, this chapter is the first attempt to use Discursis within the field of language development. As such, it is important to note that more analysis of parent-infant interactions should be performed using Discursis and should be systematically compared to other methods so that the methodological decisions can be tested. It is important to note that Discursis cannot account for non-verbal communication or speaker's pauses because it is based on transcriptions. However, we know that non-verbal communication is particularly useful for early language development (Iverson & Goldin-Meadow, 2005; Wagner, Nusbaum, & Goldin-Meadow, 2004). Understanding Discursis temporally sensitive plots requires extensive training and practice for most users to gain confidence in their ability to interpret the patterns accurately. However, once this is achieved, Discursis has much potential. The program offers a unique visual and time-sensitive overview of content exchanges in a conversation without separating content from its communicative and temporal contexts. Thus, it has the potential to provide valuable insights into interaction across language development. It would be helpful if more researchers used the tool to study early interaction.

7.6 Conclusion

This chapter continued to investigate how symbolic play differs from functional play by focusing on content alignment in conversation across the two contexts. Overall, the results suggested that greater content alignment and accommodation in symbolic play, which also had greater amounts of concept repetitions. The symbolic play conversations were more interconnected and content-rich than those of the functional play condition.

At this point in the thesis, conversational patterns, speech acts, and semantic content have all been shown to differ between symbolic play and functional play. Greater alignment and accommodation of content suggest that patterns of informational exchange may differ between settings along the same lines, but such a suggestion has never been tested in parent-infant dyadic interactions. The next empirical chapter does so by examining participants' epistemic stance across the two play contexts.

Chapter 8

Parent and Infant Epistemic Stance in Symbolic and Functional Play

> *"[...] orientations to, and the management of, states of knowledge in both absolute and relative terms are abiding and ubiquitous features of human interaction..."* (Heritage, 2018, p.44).

This thesis has shown thus far that patterns of language between parents and their 24-month-old infants are more complex and dynamic in symbolic play when compared to a similar non-symbolic play setting. In the current sample, language in the symbolic play context contained more questions, infants spoke significantly more, and their language was more complex. More dynamic conversational turns, longer turn gaps, more repetitions, greater content alignment and accommodation were observed in symbolic play. These patterns of social interaction point towards the possibility that patterns of informational exchange may differ between contexts as well. The previous chapters' results suggested that the inherent ambiguity in symbolic play requires a greater negotiation and exchange of meaning. That is, it is more difficult to achieve collective intentionality in that context. Collective intentionality is a uniquely human behavior that forms the basis of communicative exchange, driven by the desire to share experiences and information with others (Rakoczy, 2006, 2008; Tomasello et al., 2005; Tomasello & Carpenter, 2007; Hare & Tomasello, 2004; also see Chapters 2 and 3). If collective intentionality is more difficult to achieve in symbolic play, it should mean that the exchange of information is greater in symbolic play. This proposal is tested in the current chapter.

8.1 Informational Exchange

The study of informational exchange between speakers has been the primary focus of the field of conversational analysis (CA) (Sacks, 1963, 1984; Schegloff, 2007a, 2007b), which was developed as a method to systematically study social interaction through language (Heritage, 2009; Heritage, 2012; Markee, 2000; Sacks et al., 1974). Among other things, CA was developed as a tool to assess the changing levels of knowledge between speakers. In this vein, Hallett, Chandler, and Krettenauer (2002) noted that CA is concerned with how information is conveyed for any given utterance through the study of the level of knowledge of both speaker and recipient.

Child language studies using CA are rare, and a comprehensive treatment of the current dataset using CA is beyond the scope of this thesis. Instead, this chapter borrows from the field's theoretical perspective to analyze the gradient of knowledge and informational exchange between infants and parents during play. Specifically, this chapter uses Heritage's (2012) methodological assessment of epistemics to determine the exchange of knowledge between our speakers' identity (who they are and what they know) and their action in interaction, or language within each turn sequence (Raymond, 2018; Raymond & Heritage, 2006). Ochs (1993) argued that knowledge develops in the interaction of language and social identity; she argued that knowledge is shaped by speakers through the verbal performance of social acts like symbolic play and the exchange of epistemic stances. Throughout the lifespan, knowledge develops along an inverted U-shaped curve, where it increases steadily from infancy into adulthood and decreases again into old age (Hallett et al., 2002). The current study focuses on infants' conversations with their primary caretakers, and thus, the knowledge base of the latter is no doubt significantly greater than that of the former (Hallett et al., 2002). Regardless of the differences in their current knowledge, each speaker begins a conversation with an understood and relatively steady level of knowledge, which Heritage (2012) calls *epistemic status*. A speaker's knowledge changes across the conversation, based on its context and the subject area being discussed. Heritage calls this more fluid type of knowledge *epistemic stance*.

Parents and their infants will have a relatively large difference in epistemic status, since the parents' overall knowledge is significantly greater than their infants' (both language skills and subject knowledge). Yet, their epistemic stance (ES) will ebb and flow during the course of the conversation, just like that of two adults would. The concept of ES is used in this chapter to assess the *'territories of knowledge'* (Heritage, 2012, p. 1) of both parents and infants in each play condition. Using the concept of ES allowed me to determine if parents and infants exchange information in a similar fashion in symbolic and functional play, or, as was the case with the previous chapters' findings, if a distinctive pattern emerges in each context.

8.2 The Current Study

Informational exchange in language development has not been studied extensively. The rare examples (Hallet et al. 2002; Ochs, 1993) have looked at the use of specific epistemic words that demonstrate explicit knowledge such as '*I think*' or '*I see*' or '*I hear'*. However, Heritage's methodology (2012) analyzes implicit epistemic stance within turns and based on the responses of the speakers. For example, if one says "I am hungry" and the other responds "let's have dinner", it is clear that the respondent has acquired the knowledge of the original speaker (food is required). ES, as defined by Heritage (2012), apparently has not been used to study gradients of knowledge in parent-infant conversations. This could be in part related to the fact that an infant's knowledge is presumed to be limited. That being said, as long as information is being exchanged, diverging dynamic and interactive patterns of ES in parent-infant language should be found in the same way they can be found in adult conversations. To begin this process and to continue assessing whether symbolic play leads to more complex interactional dynamics that differ from other play contexts (see previous empirical chapters 5, 6, and 7), this chapter was designed to compare each participant's levels of knowledge within the sequences of turns that were analyzed in Chapter 6 (also see Method Section 8.3) across the two play conditions.

ES was assessed within sequences of turns in the transcripts. Sequences of turns were used because they allow one to hone in on the meaningful conversational exchanges of knowledge within the conversation. As Enfield and Sidnell (2017) stated, conversations should be analyzed in sequences, because a statement is only complete based on the response it triggers (for some caveats for this approach, see Heritage, 2018 and pp. 2-3 in Heritage, 2012). Turn sequences are actions in interaction, they serve or enact a specific purpose (see Table 8.2). A speaker's choice of words is *'purposive and goal-oriented'* (Enfield & Sidnell, 2017, p. 530). Their turn-at-talk is relevant to decide what to do next and how in the conversation.

For each utterance within a sequence, the knowledge gradient between the infants and their caretakers was determined. In other words, I determined who knew more within each utterance, or if they had the same level of knowledge. Although it could be hypothesized that patterns of language would be different between both contexts because previous chapters have already shown that conversational patterns, speech acts, and semantic content differed between symbolic play and functional play in this data set, no hypothesis was drawn about the directionality of this difference. Since this is the first study of its kind in language development, it was important for the analysis to be exploratory rather than constrained to hypotheses that could not be sufficiently grounded in theory.

8.3 Method

This chapter continues to examine data at the third timepoint of the longitudinal study described in the Chapter 4 – Research Outline and Methodology.

8.3.1 Participants. The play sessions of 52 dyads were included in the upcoming analyses, for more information, please refer to the participant's information in Chapter 4.

8.3.2 Design. The epistemic stance (ES) of each utterance within a sequence of turns was the dependent variable of this study (see Coding Section 8.3.3 and Chapter 6 for details on sequences of turns coding). Both the speaker's and recipient's epistemic stances were assessed. ES was operationalized as the speaker's or the recipient's level of access to a targeted element of knowledge or information, in accordance with Heritage's definition (2012; see examples in Table 8.1). Their stance was determined to be either superior (K+) or inferior (K-) to the other person's knowledge at the time of the utterance. Results were then computed and compared between symbolic and functional conditions in R. Significance was set at an alpha level of .05 using LSR package in R (Navarro, 2015).

8.3.3 Coding.

Turn sequences. To create a turn sequence, turn initiation and turn conclusion were coded manually following Sacks' (1974) review of turn-taking systems (see Section 6.3.3 for details). Speakers were coded as initiating a turn sequence when they were the first in the dyad to bring attention to a new topic, or to change the action or conversational focus (Adamson et al., 2012; Clark 1996; Schegloff, 2007a). A turn ended with the last utterance before a new sequence of turns was initiated (see Table 8.1).

Epistemic Status. Speakers producing sequence-initiating actions (e.g., First Pair Parts) for recipients must consider the recipient's relative access to the territory of knowledge being discussed. As Heritage (2012) observed, and Raymond (2018) further developed, people's social relationships and experiences "occupy different positions on an epistemic gradient (more knowledgeable [K+] or less knowledgeable [K−]), which itself may vary in slope from shallow to deep" (Heritage, 2012, p. 6). This relative access to knowledge before the conversation starts is their epistemic status.

Following Heritage's definition, a parent's epistemic status was considered to be significantly greater than that of an infant in this data set. This disequilibrium was important to note so that the effect of the changing gradients of epistemic stance between speakers could be analyzed within the framework of their epistemic status. Although epistemic congruency between stance and status is often expected, it does not have to be (Raymond & Heritage, 2006; Raymond 2018). The varying levels of congruency are analyzed here.

Epistemic Stance. Both parent's and infant's ES were coded manually and analyzed using the CLAN software (MacWhinney, 2013). For each utterance, the speaker's and the recipient's ES were coded as superior (more knowledge than the other participant) or inferior (less knowledge than the other participant). Figure 8.1 shows how this gradient of knowledge was defined.

The coding closely followed guidelines for similar analyses in the field, for instance MLU and TTR (see CLAN manual, MacWhinney, 2013, p.116 and Brown, 1973, p. 54): the first 25 utterances of each condition were removed, and the entire condition was coded from that point. Only fully transcribed utterances were coded. Unintelligible or incomplete utterances and singing were omitted. Although the resulting dependent variables are interdependent (the more the speaker knows, the less the recipient is likely to know), they do not have to be. Indeed, the speaker's and recipient's ES can be the same (for an example, see Table 8.1, second utterance).

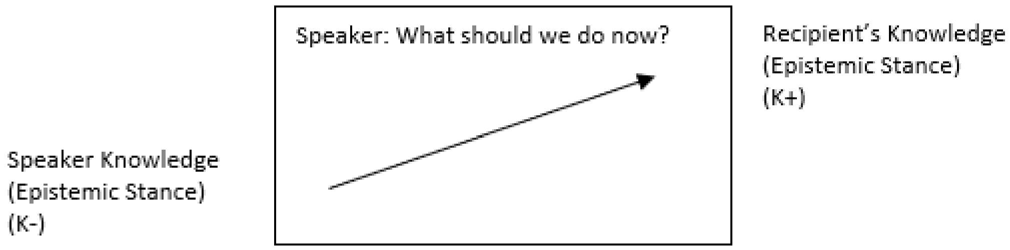


Figure 8.1 Epistemic stance gradient (adapted from Heritage, 2012)

Table 8.1

Coding Scheme for Sequences of Conversational Turns and Epistemic Stance

Sequence of turns	Example (consider the interactions below to be sequential)	Epistemic Stance (Speaker, Recipient)
	Mother: is this a spoon, Mark?	SK+ RK-
Mother initiation	Child: yes	SK+ RK+
Mother conclusion	Mother: can we eat something with it?	SK- RK+
	Child: cake	SK+ RK-
	Mother: yummy! *	SK+ RK+ SK+ RK-
Infant initiation	Child: a phone!	SK+ RK-
Mother conclusion	Mother: yes, it is a phone.	SK+ RK+
	Mother: what would you like to do with it?	SK- RK+
Infant initiation	Child: stir, stir, stir (started to stir cup with spoon)	SK+ RK-
Infant conclusion	Mother: Aw, a nice cup of tea for me, thank you.	SK+ RK-
	Child: yes, yummy tea (hands the cup to mother)	SK+ RK+
Mother initiation	Mother: should we call Max?	SK- RK+
Infant conclusion	Child: hmm.	SK- RK-
	Mother: We could invite him to tea.	SK+ RK-
	Child: yes!	SK+ RK+

Note. K+ means superior Knowledge or ES and K- means inferior Knowledge or ES.
***** In this utterance, the mother both acknowledges she knows it is cake and introduces it is *'yummy'* therefore ES is coded twice for both levels of knowledge.

Table 8.2 illustrates the parallel between the epistemic stance (superior or inferior) of specific syntactic devices (turn design features) and their action interpretation, as outlined by Heritage (2012). Indeed, Heritage (2012) determined that epistemic stances interact with syntactic devices to determine information exchange. For instance, a superior epistemic stance (K+) *declarative with rising intonation* continues a statement (see Example 8.1), whereas an inferior epistemic stance (K-) *declarative with rising intonation* questions the recipient (see Example 8.2). This systematic link between the epistemic stance of a statement and its purpose (action interpretation) should allow us to draw conclusions as to what it means to have more or less speaker and recipient knowledge within a conversation (see Section 8.4).

Example 8.1

Mother: No, Dad is at work.

Child: Daddy drink tea. Eat supper.

Mother: The thing is, Dad is at work. (declarative with rising intonation, K+, the mother continues her previous statement)

Example 8.2

Mother: You want some tea. (declarative with rising intonation, K- based on next intervention from the mother)

Child: Teddy go to sleep.

Mother: or not.

Table 8.2

Epistemic Stance and Action Formation

Turn Design Feature	**K+ Epistemic Stance** (Within Speaker's Epistemic Domain)	**K- Epistemic Stance** (Not Within Speaker's Epistemic Domain)
	Action Interpretation (Given what is 'known in common' epistemic stance of speaker and recipient relative to the targeted state of affairs).	
Declarative Syntax	Informing	Declarative
Declarative Syntax with Final Rising Intonation	Continuing	Questioning
Tag Questions	Mobilizing support for an assertion	Seeking Confirmation
Negative Interrogative Syntax	Assertion	Request for information
Interrogative Syntax	Pre-informing question Known answer question Rhetorical question	

Note. Adapted from Heritage, 2012

Epistemic Stance Pairs. Epistemic stance was analyzed for differences between the conditions individually and in pairs, as they would naturally occur in the conversation. These contextualized pairs are presented in Table 8.3. Speakers with superior ES could have a recipient with either inferior or superior ES. When both speaker and recipient had the same superior knowledge in an utterance (SK+/RK+) it meant in this instance that speakers would have *the same* ES. The reverse was true as well (SK-/RK-). When inferior knowledge was true for both speaker and recipient, it usually meant they did not understand each other, or the speaker asked a question and the recipient could not or did not answer. To ensure reliability, 11.5 percent (6 out of 52) of the coding was performed again blind to the original coding and compared. The overall agreement was substantial (98.3%).

Table 8.3

Epistemic Stance Contextualized Pairs

Pair	**Speaker**	**Recipient**
SK+/SK-	Superior epistemic stance	Inferior epistemic stance
SK+/RK+	Superior epistemic stance	Superior epistemic stance
SK-/RK-	Inferior epistemic stance	Inferior epistemic stance
SK-/RK+	Inferior epistemic stance	Superior epistemic stance

8.4 Results

The epistemic stance of the participants was tallied for each play context. The frequency of each classification was coded manually and converted into a proportion of the total utterances per condition, thus giving the probability of the specific epistemic stance pattern. To do so, the number of times the parent had a superior or inferior knowledge stance as a speaker (SK+ or SK-) and a recipient (RK+ or RK-) were tallied for comparison between conditions. The same was done for infant's ES. The mean and standard deviation for participants in each play settings is recorded in Table 8.4.

The epistemic stance for each participant in both conditions was then analyzed using multiple two-tailed paired-sample *t*-tests conducted with a significance level of $\alpha = .05$. The *t*-

tests were reported with their effect sizes and confidence intervals, providing an unbiased and standardized measure of the magnitude of the observed effects. The analyses in this chapter followed the same strategies as those in previous chapters (see Chapter 4 for details). Table 8.4 shows the mean and standard deviation for all four variables for parents and infants in symbolic and functional play.

Table 8.4

Epistemic Stance Level Mean and Standard Deviation for both Participants in both Conditions in Raw Numbers

	Symbolic Play				Functional Play			
	Parent		Child		Parent		Child	
Epistemic Stance	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Inferior Recipient ES	19.65	13.71	30.61	16.95	17.3	10.66	21.25	17.24
Superior Recipient ES	48.8	26.83	21.06	13.42	35.36	22.82	19.24	13.29
Inferior Speaker ES	28.16	14.5	5.88	5.36	18.18	12.45	6.3	5.14
Superior Speaker ES	40.29	26.87	45.84	24.38	34.52	21.39	34.12	25.63

Note. ES: Epistemic Stance

8.4.1 Infant's Epistemic Stance. Table 8.5 shows *t*-test comparisons between the proportion of utterances for each ES levels in symbolic and functional play. Infants had significant more instances of superior speaker epistemic stance, and significantly more instances of inferior recipient epistemic stance in the symbolic play condition.

Table 8.5

Paired-Sample t-tests for Infant Epistemic Stance Levels

Epistemic Stance	Mean Difference	df	*T*	*p*	Cohen's *d*	CI_{95} of *d* Lower bound	Mean Difference
Superior Speaker ES	11.73	51	4.04	.00*	0.54	.39	1.19
Inferior Speaker ES	-0.43	51	-.54	.59	0.14	-.49	.28
Superior Recipient ES	1.82	51	1.21	.23	0.08	-.15	.62
Inferior Recipient ES	9.35	51	4.3	.00*	0.46	.44	1.24

Note. **p*<.05, two-tailed. ES: Epistemic Stance

8.4.2 Parent's Epistemic Stance. Table 8.6 shows that parents had significantly more instances of inferior speaker epistemic stance (symbolic: M = 28.16, SD = 14.5; functional: M = 18.18, SD = 12.45) and significantly more recipient superior epistemic stance instances in the symbolic play condition (symbolic: M = 48.8, SD = 26.83; functional: M = 35.36, SD = 22.82).

Table 8.6

Paired-Sample t-tests for Parental Epistemic Stance Levels

Epistemic Stance	Mean Difference	Df	*T*	*p*	Cohen's *d*	CI$_{95}$ of *d* Lower bound	Mean Difference
Superior Speaker ES	5.8	51	1.82	0.07	0.24	-0.03	.74
Inferior Speaker ES	10.06	51	5.13	0.00*	0.74	.6	1.41
Superior Recipient ES	13.69	51	4.42	0.00*	0.55	.46	1.27
Inferior Recipient ES	2.22	51	1.19	.24	0.18	-.15	.62

Note. *p<.05, two-tailed. ES: Epistemic Stance

8.5 Discussion

The current chapter explored differences in epistemic stance between symbolic and functional play. The level of knowledge of the infant and the caretaker was determined for each utterance within a turn sequence. First, I tested the hypothesis that, like other patterns of language, patterns of knowledge would differ between both play conditions. Second, I explored how these patterns of knowledge changed between speakers, recipients, and play conditions.

The first hypothesis was supported: patterns of epistemic stance were different between symbolic and functional play. Like conversational patterns, speech acts, and semantic content in previous chapters, levels of epistemic stance differed between symbolic play and functional play in this data set. However, the patterns were different for infants and caregivers. Infants' epistemic stance varied significantly in two of the four possible dimensions between functional and symbolic play. In symbolic play, their superior speaker ES was significantly greater than in functional play. For example, when Liam said, *"I am a robot"* to his mother, he displayed a superior speaker ES because he knew he was a robot while his mother was just being informed of the transformation (during this utterance, she went from inferior to superior recipient ES). In symbolic play, infants' inferior recipient ES was also significantly greater than in functional play. For instance, when Liam's mother said, *"It doesn't work like that"*, Liam displayed inferior recipient ES because he knew less about how it worked than his mother at that instant.

Parents' epistemic stance varied in a complementary way to the infants: they were significantly more likely to have inferior speaker ES and superior recipient ES in symbolic play. When his mother asked Liam, *"What are you eating?"* she genuinely did not know and therefore displayed an inferior speaker ES. A little while later, when she said, *"Where did bear go?"*, she already knew the answer because she had hidden the teddy bear behind her back; thus, she displays superior speaker knowledge, which is uncommon for a question that is usually a request for information (see Table 8.2). Overall, based on these results, it appears that the context of symbolic play triggers a different exchange of knowledge patterns from that of functional play.

Although the four dimensions of epistemic stance analyzed here are not designed to be symmetric (Heritage, 2012, 2013), it is worth noting that the significance of the results is symmetric between parents and infants. In symbolic play, when one had significantly more superior speaker knowledge (the infant) the other had significantly more superior recipient knowledge (the parent). In other words, when the children led the conversation, the parents understood them. The exchange of knowledge was successful. The reverse was true as well: the parent had significantly more inferior speaker knowledge and the infant significantly more inferior recipient knowledge in symbolic play. When the parents sought information in symbolic play, the children were less likely to understand or provide information.

When interpreted according to Heritage's taxonomy (2012, 2013; also see Table 8.2), the results suggest infants were significantly more likely to inform and build on previous information as speakers in symbolic play. They also were more likely to assert information, and use *'know answer questions'* in symbolic play. *'Know answer questions'* can be thought of as a type of rhetorical question. When Emily hid the bear behind her back and said "Woo, woo, where did you [bear] go?", she knew where the bear was, so that her speaker knowledge was superior even though she was asking a question, which usually suggests the speaker is in need of information. She did not ask the question to know the answer in this case, rather she asked it to inform her mother of the rules of the game she was playing. As recipients, infants were significantly more likely to know less, and thus were more likely to receive answers or novel information in symbolic play. Inferior recipient knowledge also meant participants' territories of knowledge were less likely to converge. In other words, infants were less likely to fully understand the message of the parent in symbolic play. This supports the previous chapter's evidence that symbolic play is a challenging context for language development.

Although the results were not significant, inferior speaker knowledge was greater for infants in functional play. Of all the variables for both participants, only this one was more prevalent in functional than symbolic play. Infants were more likely to seek information and confirmation in functional play, possibly because they were less likely to lead the conversation in this context, as demonstrated in chapters 6 and 7. The parents' speech acts could explain why children were likely to seek confirmation: parents were more directive in functional play (see Chapter 5), and children might have felt that they needed to be sure before answering. Other interpretations are possible; for instance, children might have been sure of the answer but be wrong, or children might have answered a different question. This situation appeared regularly in the transcript and usually meant that the child intended to change the conversation: "*What color is the star, Emily?*" asked the mother; "*Shaker*" answered Emily. Overall, these results are consistent with the findings from previous chapters, in that functional play and symbolic play elicit different patterns of interaction, with less joint engagement in functional play.

Parental speaker knowledge was significantly more likely to be inferior in symbolic play than in functional play. At the same time, their recipient knowledge was significantly more likely to be superior. Indeed, as speakers, they were more likely to use declaratives, seek information, and request information. In other words, they were more likely to actively draw the infants into the conversation, supporting the findings in Chapter 7 that children were more engaged in symbolic play. As recipients, they were more likely to already know the content of what the infant was saying, an outcome that is not surprising considering the large slope between a parent's and an infant's epistemic status: the parent's epistemic status is superior to that of the child's, so the parent is more likely to already know the information the infant is asking for or trying to convey (see Section 8.3.3, Epistemic Status). This is not necessarily driven by the infant's stance as a speaker but rather by the parent's greater epistemic status.

Overall, the results support the suggestion that symbolic play may act as a zone of proximal development for language because it is simultaneously information-rich, engaging, and challenging (Vygotsky, 1967), likely driven by its inherent ambiguity, which necessitates greater levels of collective intentionality (Hall et al., 2013; Hare & Tomasello, 2004; Quinn & Kidd, 2019; Rakoczy, 2006, 2008; Tomasello et al., 2005; Tomasello & Carpenter, 2007). Indeed, symbolic play could be a demanding context where language and social identity converge to help develop epistemic knowledge (Ochs, 1993). Specifically, symbolic play may scaffold infants' language skills more than functional play because the former gives infants more opportunities to lead the conversation (superior speaker knowledge) and they are less likely to know or understand the parent's input (inferior recipient knowledge), suggesting that they must perform a more difficult task at the best of their capacities.

8.6 Conclusion

Overall, the analyses reported in this chapter show that patterns of knowledge were different for infants and parents and in the symbolic and functional play conditions. These results suggest that socio-communicative qualities of parent-infant interaction fostered by the symbolic play context include the tendency to exchange more information in symbolic play and a greater ability of the infants to lead the conversation in that context.

Chapter 9

General Discussion

In this thesis' concluding chapter, the principal results of each empirical study are discussed within the context of the research questions outlined in Chapter 1. To preface the conclusions, the premise is that the socio-linguistic context of symbolic play constitutes a communicatively rich environment for infants' language development, constituting a zone of proximal development deriving from the need to establish collective intentionality during interaction for the purposes of meaning-making. Finally, the limitations of the current research are discussed, as well as its implications and future directions for research.

9.1 Principal Results: A Review

The four empirical chapters of this thesis compared symbolic and functional play across four different dimensions of interaction, addressing four research questions:

- Do parent and infant speech acts differ between play settings? (Chapter 5)
- Do dyadic conversational turns differ between play settings? (Chapter 6)
- Does semantic content vary between play settings? (Chapter 7)
- Do informational exchanges vary between play settings? (Chapter 8)

Following is a brief recapitulation of each study and what their individual findings bring to the literature in light of the research questions.

9.1.1 First study: the language of parent-child interactions during symbolic play.

Chapter 5 addressed the first research question. The results suggested that the play context influenced the distribution of parental utterance types and the subsequent verbal communication between parent-infant dyads. Although parental language did not differ in terms of complexity and quantity, infants spoke more during symbolic play and their language was also more syntactically complex. In functional play, parents were more likely to label (naming) and direct (imperatives) their infant's behavior, whereas in symbolic play parents presented infants with more opportunities to participate in conversations through the use of questions. Parents also used more mimetics in symbolic play.

In this same cohort, Quinn (2016) found that at 18 months, both parental questions and mimetics were positively associated with language production and comprehension. One interpretation of these findings is that symbolic play invites proactive responses from infants, thus supporting social collaboration and scaffolding communicative exchange. The findings at 24 months in this study were comparable to Quinn's (2016), suggesting that symbolic and functional play have different linguistic ecologies that reflect differences in interaction. Notably, symbolic play involves the negotiation of meaning (e.g., using a block as a sugar cube), whereas functional play involves the negotiation of action (e.g., hammering a peg).

Comparing the current results to Quinn's (2016), the distribution of utterance types varied slightly between 18 (interrogatives in symbolic play and imperatives and declaratives in functional play) and 24 months (interrogatives and mimetics in symbolic play and imperative and labeling in functional play), but the contrasting pattern persisted across ages. The parents requested more information in symbolic play and informed or directed their infants more in functional play. One interpretation is that the dichotomous patterns of parental language mirror the distinct play settings. When parents focused on negotiation of meaning (symbolic play) they have to ask questions to understand what the infants mean (e.g., what is being served from the saucepan at any given time) and when they focus on the negotiation of actions (functional play) they assume an instructive role where they focus on teaching specific actions to the children (e.g., how to put a puzzle together). Previous research has shown that exposure to parental language varies according to the social environment (e.g. Garvey & Kramer, 1982; Peisner-Feinberg, et al., 2001; Weizman & Snow, 2001; Quinn 2016; Unhjem et al., 2014; for a complete review see Hoff, 2006). The current research confirms these results by demonstrating that specific play contexts provide different opportunities for children to interact with different forms of language. Each context either facilitates or impedes conversational interaction (Heubner & Meltzoff, 2005) because it provides specific experience with different speech acts and pragmatic functions (Camaioni et al., 1998). Precisely, those that occur more commonly in symbolic play promote interaction, providing infants with opportunities to develop their ability to communicate with others (Rakoczy, Tomasello, & Triano, 2004; Rakoczy 2006; Striano, Tomasello, & Rochat, 2001; Tomasello, 1999; Vygotsky, 1962, 1978).

9.1.2 Second study: turn-taking dynamics during symbolic play. Chapter 6 investigated turn-taking dynamics, with the results suggesting that the play context influenced patterns of turn-taking. Specifically, in symbolic play infants and their parents had significantly greater numbers of conversational turns, there were longer parental turns, and a greater ratio of infant to parent turns. In addition, conversational turn gaps were found to be longer in symbolic than in functional play. The infants bore a greater amount of the conversational load in the symbolic play setting, a finding that has been shown to be one of the best predictors of later infant vocabulary and grammatical skills (Hirsh-Pasek et al., 2015). Thus, symbolic play appears to promote communicative complexity, which may underlie past demonstrations of a link between symbolic play and language (Bornstein et al., 1996; Quinn, Donnelly, & Kidd, 2018; Lewis et al., 2000; Lyytinen et al., 1997; Reynolds et al., 2011; Stagnitti et al., 2016; Tamis-LeMonda & Bornstein, 1994; Ungerer & Sigman, 1984; also see Chapter 3).

This suggestion is supported by several lines of research. For instance, Quinn (2016) found that conversational turns were positively and concurrently associated with language development in the same cohort at 18 months. Like her, several others have found that adult-child conversational patterns were robustly associated with language development (Romeo et al., 2018; Zimmerman, 2009). Hirsh-Pasek et al., (2015) showed that an infant's turn-taking ratio was one of the best predictors of later infant vocabulary and grammatical skills. Additionally, Casillas et al., (2016) showed that conversational turns slowed down as utterances were more complex. Combined, these results suggest that symbolic play facilitates more complex, dynamic, and interactive conversations between infants and caregivers. The naturally interactive and social pattern of symbolic play invites a more dynamic dialogue to occur (Weisberg et al., 2013), and these interactive and social patterns have been shown by some to positively impact language development (Clark, 1993; Schlegoff, 2007b).

9.1.3 Third study: content alignment dynamics during symbolic play. Chapter 7 examined semantic concept alignment across the two play contexts using the computational tool Discursis and continued to reveal key differences in language use between symbolic and functional play. Infant-caregiver dyads were more likely to repeat concepts, align their content and accommodate their play partners in symbolic play, such that conversations were more interconnected and content-rich than those of the functional play condition. The results also showed more opportunities for active listening and engagement in symbolic play (also see Atay, 2015). Infants in particular were more likely to maintain their subject of conversation and engage in the conceptual content introduced by parents in symbolic play.

Once again, the behaviors that we observed more frequently in symbolic play have been positively linked to language development. For example, Che et al., (2018) reported that the rate of maternal repetitions in IDS predicted vocabulary and syntactic development. Tamis-LeMonda et al., (2001) reported that the rate of maternal repetitions may predict vocabulary development, combinatorial speech, and past-event talk, and Roseberry et al. (2014) showed that verb learning was greater when more engagement occurred. Conversations contingent with the infants' interests, needs, or wants have been described as more advantageous to language learning (e.g., Begus, Gliga, & Southgate, 2014; Orr & Geva, 2015). Building on these results, this study's findings support the argument that symbolic play provides a fertile context for language development because it fosters repetitions and engagement. Once again, this is likely to stem from the socio-cognitive requirements of symbolic play: whereas functional play requires the negotiation of actions (centralized around the attention-getter *"look"*), symbolic play requires the negotiation of meaning (centralized around content-rich themes like *"tea"*). Thus, an important pre-condition for the exchange of meaning - collective intentionality - requires the greater communicative effort and collaboration that is seen in symbolic play, but it ultimately may have benefits for language development.

9.1.4 Fourth study: differences in parent and infant epistemic stance in symbolic play. Chapter 8 investigated the exchange of knowledge to determine the patterns of epistemic stance in symbolic and functional play. The results showed that children were more knowledgeable speakers in symbolic play (e.g., they introduced more information), and that parents were more knowledgeable recipients (e.g., they already knew the information). When parents spoke, they were less knowledgeable in symbolic play (e.g., they sought more information) and the children were less likely to know what the parents said (e.g., the information provided to them was novel or they did not understand). Overall, the results suggest that children are active conversational leaders in symbolic play, but that the complexity of the context means they are prone to shortcomings and errors in understanding when parents introduce topics.

One interpretation of the results of Chapter 8 is that symbolic play is a challenging communicative context with specific features that may be related to language development. Symbolic play may have a scaffolding role for infants' language skills because infants are offered more opportunities to lead the conversation (superior speaker knowledge) and they are also less likely to know or understand the parent's input (inferior recipient knowledge), suggesting that they are expected to perform at the best of their capacities in symbolic play. At the same time, parents are more likely to engage the children in conversation (inferior speaker knowledge) and more likely to understand them (superior recipient knowledge), and therefore also play a scaffolding role.

9.2 Theoretical Implications

This thesis attempted to determine what defined the well-established relationship between symbolic play and language development. Chapter 2 noted two competing theories to understand the relationship: Piaget proposed that infants simply demonstrate their mastery of symbolic representation in the symbolic play context (Piaget, 1962; Piaget & Inhelder, 1977; Inhelder, Lézine, Sinclair, & Stambak, 1972), whereas Vygotsky described symbolic play as an active context within which mastery of symbolic representation is achieved (Vygotsky, 1978). While the relationship of symbolic play to language at least partially hinges on the capacity for symbolic representation (Bühler, 1990) the findings from this thesis support Vygotsky's suggestion that the interactionally rich context of play provides a fertile environment within which children can learn and hone socio-communicative skills important for language.

Particularly prominent features of symbolic play that have been shown to be linked to language development include (with studies cited that have demonstrated links):

- parental questions (e.g. Golinkoff & Ames, 1979; Kavanaugh & Jirkovsky, 1982; Kruper & Uzgiris, 1987; Rowe et al., 2016; Soderstrom, 2007; Toda et al., 1990)
- conversational turns (e.g. Quinn 2016; Romeo et al., 2018; Weisburg et al., 2013)
- repetitions (e.g. Che et al., 2018, Tamis-LeMonda et al., 2001, Roseberry et al., 2014)
- engagement (e.g. Atay, 2015; Begus et al., 2014; Orr & Geva, 2015).

Consistent with arguments made by Hall et al. (2013) and Quinn and Kidd (2019), the source of these behaviors may be linked to the requirement in symbolic play to establish collective intentionality (Rakoczy, 2006, 2008). In symbolic play, the collective conception of ideas or objects is transient and more likely to fluctuate. The added contextual ambiguity (Sutton-Smith, 1997) and greater requirement for the negotiation of meaning of the symbolic play context makes it challenging for the dyad to establish shared intentionality (Hare & Tomasello, 2004; Rakoczy, 2006, 2008; Tomasello et al., 2005; Tomasello & Carpenter, 2007). This additional difficulty may make symbolic play an ideal zone of proximal development (ZPD Vygotsky, 1978) for socio-communicative development (Tomasello & Carpenter, 2007).

Indeed, symbolic play may scaffold infants' language skills more than functional play because they are offered more opportunities to lead the conversation. In symbolic play:

- infants were more likely to introduce novel information: they had greater speaker knowledge (Chapter 8) and more concept introductions (Chapter 7).
- Infants were more likely to participate in the conversation: they had a greater turn-taking ratio (Chapter 6)

These findings support previous work by Begus et al., (2014) and Orr and Geva (2015), who found that conversations contingent with the infants' needs and interests are beneficial to language learning. Socially contingent interactions can improve language development (Roseberry et al., 2014). These findings highlight the importance of infants' active engagement (Chapter 7 and 9) in acquiring information during conversations, and the capacity for symbolic play to provide a context in which this engagement is fostered and contingent on the needs of the infant.

In addition, in symbolic play infants were required to perform at the best of their capacities in symbolic play with their parents' support (scaffolding). They were less likely to know or understand the parent's input (Chapters 5 and 8) because of the increased demands on infant language production (Morelock et al., 2003; Morrissey, 2014). Such parental scaffolding during symbolic play has been found to promote the development of symbolic play and language in early childhood (Bornstein et al., 1996; Damast et al.,1996; Tamis-LeMonda et al., 1992; Tamis-LeMonda & Bornstein, 1994). As infants navigate symbolic relations in symbolic play, they gain the ability to separate referent from object. They also have more opportunities to practice this ability with greater complexity when interacting with their caretaker, particularly when sharing one another's attention (also see Bornstein et al., 1996; Bretherton et al., 1989; Lyytinen, 1989; Ungerer et al., 1981; Weisberg, et al., 2015).

Overall, this thesis demonstrates that symbolic play is a setting which provides a communicatively rich environment that may have a positive influence on infants' language development. Symbolic play promotes engagement as well as dynamic and collaborative actions, interactions, and negotiations. It requires that the dyad elucidates symbolic transformations like object substitution within a common referential frame. The dyad must reach a common understanding about what each object stands for and what is the nature of the pretend situation (Brown et al., 1996; Fekonja et al., 2005; McCune-Nicolich, 1981; Pellegrini, 2009; Rakoczy, 2008). These findings demonstrate the social and dynamic construction of meaning in symbolic play, such that language both stems from and later progresses towards supporting social contexts (Bruner, 1983; Nelson, 2009; Vygotsky, 1978).

9.3 Limitations

Although the design of the study discussed in this thesis was longitudinal, the choice was made to analyze concurrent data only at 24 months. This had the advantage to allow me to replicate Quinn's (2016) speech act analysis, as well as focus on more individual variables and novel techniques. Yet, it is clear that the longitudinal design of this study offers untapped opportunities to compare contextual individual differences within participants at 18 and 24 months. The longitudinal within-subjects design would allow for the direct comparison of parent-child interactions across contexts and this rare longitudinal dataset should be analyzed further. Now that the 24-months-old children's data has been transcribed and coded, such analysis could be run.

A large part of the value of this thesis lies in the novel methods of analysis utilized (Discursis software, Epistemic Stance coding methodology), but specific risks stem from using such innovative procedures. Coding decisions should be tested, metrics further researched, and the studies replicated to increase the value and reliability of these findings (although some reliability work exists for Discursis, see Atay et al., 2015).

In addition, it is important to note that these results are likely to be at least partly culturally-dependent. Indeed, symbolic play has been shown to be significantly moderated by culture (Lillard, 2017). The current study had a fairly homogenous sample, which limits the ability to generalize from the findings. First, the sample was primarily composed of middle-class Caucasian mothers residing in Canberra, Australia. Only four fathers participated. While previous research has found few differences in parent-child interaction based on parent gender (Tamis-LeMonda, Baumwell, & Cristofaro, 2012), it is important to acknowledge that the results are potentially limited by the primary inclusion of mothers. Second, the average socio-economic status of the population of Canberra tends to be higher than other Australian states and territories. The participants reflected this: a large majority of parents were university graduates. Previous research has shown that SES influences a child's linguistic experience and outcomes, with children from lower SES strata having less input (Hart & Risley, 1995; Hoff, 2006; Tamis-LeMonda et al., 2012). Thus, the findings should be replicated in a more diverse sample drawn from a wider socio-economic range.

9.4 Future Directions

Several avenues offer possibilities for future research. The current study analyzed infant and caregiver speech across play contexts; however, early in development, children make considerable use of non-verbal communicative strategies such as gestures. Infants use communicative gestures to direct their play partner's attention during conversations (Bruner, 1983; Carpenter, Nagell, Tomasello, Butterworth, & Moore, 1998; Tomasello, Carpenter, & Liszkowski, 2007), and a host of past research has shown that gestures help scaffold language development (e.g., communicative pointing: Cartmill, Hunsicker, & Goldin-Meadow, 2014; McNeill, 2005; for a meta-analysis of the topic, see Colonnessi, Stams, Koster, & Noom). One way in which gestures may be important in symbolic play is as both attention getters and ways to establish status functions in the moment. In this same sample, Quinn and Kidd (2019) found that

18-month-olds and caregivers produced more in-hand representational gestures in symbolic play (e.g., pretending a cup is a hat), supporting this assertion. Adding a non-verbal component to an analysis of dialogue would allow a more comprehensive picture of the introduction and maintenance of concepts across both the verbal and non-verbal domains.

A logical extension of the argument that symbolic play constitutes a ZPD for language development is the development of play-based language interventions. Intervention studies attempting to connect language development and symbolic play (Dansky, 1980; Morrissey, 2014; Nicolopoulou et al., 2013; Weisburg et al., 2015; Williamson & Silvern, 1990) are still relatively uncommon, but results are promising. For instance, Stagnitti et al. (2016) reported that children attending a school with a play-based curriculum showed significant gains in language across the first 6 months of their first year when compared to a group of children who were attending mainstream schools. The results of the current study showed significant differences in infant-caregiver interaction simply by changing the types of toys with which the dyad played. This simple manipulation could form the basis of an intervention that targeted play skills and by implication, language development, the benefit being that such an intervention could be run with infants at an age when language development is beginning to rapidly accelerate.

9.5 Conclusion

There has been a long-documented empirical link between symbolic play and language. While the dominant explanation for this relationship has appealed to Piagetian constructivist theory, an alternative explanation is that symbolic play provides a challenging and communicatively-rich context within which children can acquire and extend their linguistic skills. That is, following Vygotsky (1971) and modern socio-cultural theory (Bruner, 1983;

Nelson, 2009; Rakoczy, 2006, 2008, Tomasello, 2003), symbolic play constitutes a ZPD. Across four empirical chapters, this thesis has revealed the communitive richness of dyadic infant-caregiver symbolic play, showing that it promotes several behaviors linked to language development. The findings thus support the suggestion that the processes underlying the symbolic play-language link may be inherently social in nature, emerging from the inherently ambiguous nature of the activity, which necessitates the distinctly human skill of collective intentionality.

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Appendices

Appendix A

Chapter 4: Methodology

A1 Semi-structure Interview

Participant ID: Date of Administration:

Age:	Year	Month	Day
Interview Date:			
Birth Date:			
Chronological Age:			
Sex:			

Language spoken at home:

Was the child born at full-term?

Do they have any known or suspected developmental or cognitive delay (e.g., as identified by maternal health nurses?)

Siblings? Yes / No Ages? Sex?

Does the child live with both parents?

Does the child attend childcare?

If so, at what age did they start attending childcare?

If so, how frequently do they attend childcare?

Primary caregiver (e.g., mother, father, grandmother)

Mother's age:

Mother's place of birth:

Mother's highest level of education: Mother's occupation:

Father's age:

Father's place of birth:

Father's highest level of education: Father's occupation:

Caregiver's age:

Caregiver 's place of birth:

Caregiver 's highest level of education:

Caregiver 's occupation:

Participant ID: Date of Administration:

*** Questions to elicit evidence for developmental or cognitive delay may include: Y/N

Does your child:

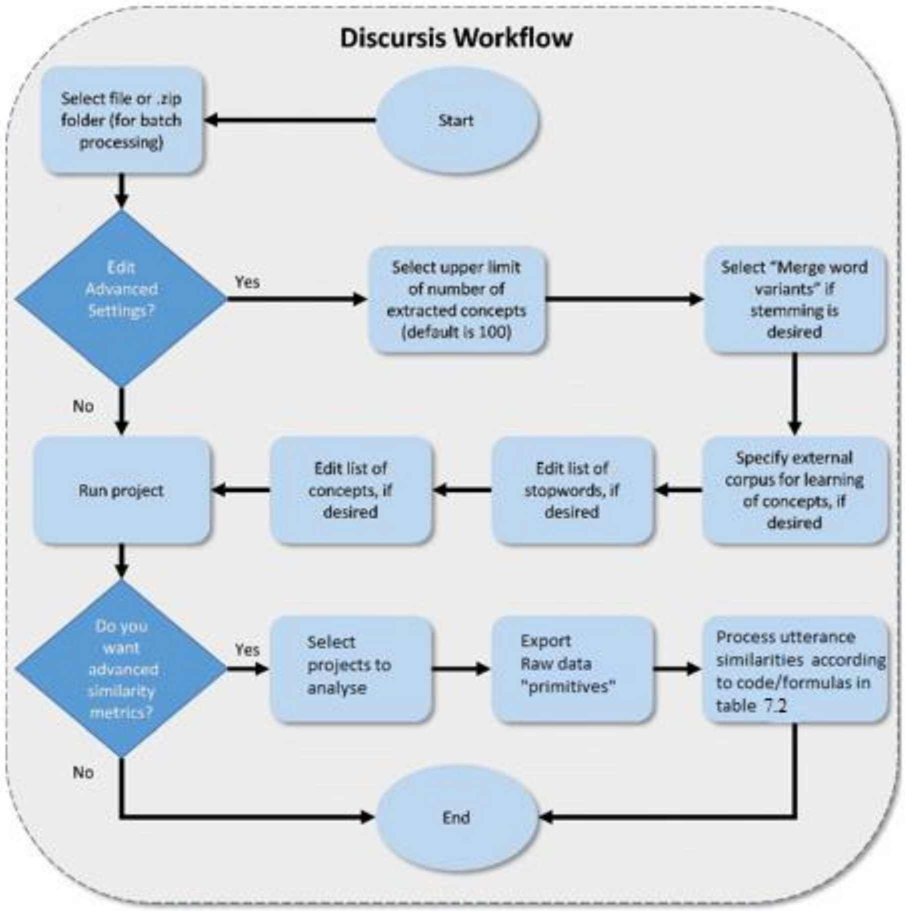
1. Demonstrate an understanding of the meaning of no and yes, or word or gesture with the same meaning (e.g., stops activity briefly; continues activity, smiles briefly)?
2. Listen to a story for at least 5 minutes (i.e., remains relatively still and directs attention to the storyteller or reader)?
3. Say "Da-da", "Ma-ma", or another name for parent/caregiver (including their first name)?
4. Point to object he/she wants that is out of reach?
5. Point or gesture to indicate preference when offered a choice (e.g., "Do you want this one or that one?")?
6. Repeat or try to repeat common words immediately upon hearing them (e.g., ball, car, go)?
7. Name at least three objects (e.g., bottle, dog, favourite toy)?
8. Say one-word requests (e.g., up, more, out)?
9. Drink from a cup or glass (may spill)?
10. Let someone know when he/she has a dirty nappy? (vocalise, pull at nappy)?
11. Feed him/herself with a spoon?
12. Suck from a straw?
13. Show interest in children the same age, other than siblings (watches them, smiles at them)?
14. Imitate simple actions (clap hands, wave good-bye)?
15. Use actions to show happiness or concern for others (hug, pat arm, hold hands)?
16. Show a desire to please others (shares snack or toy)?
17. Walking (may be unsteady and fall occasionally)?
18. Climb off and on low objects?
19. Stand for at least 3 minutes?
20. Turn pages of a board or cloth book one at a time?
21. Put objects into a container?
22. Remove an object from a container?

Notes:

Appendix B

Chapter 7: Content Alignment Dynamics during Symbolic Play

Figure B1
Discursis Workflow



Note. Discursis Workflow Chart adapted with permission from Tolston, 2018.

Table B2

Number of concepts per condition

ID	Symbolic Play	Functional Play
1	27	22
2	25	30
3	36	21
4	23	34
5	30	28
6	32	31
8	30	34
9	31	32
10	26	8
11	25	34
12	34	27
13	30	28
14	34	22
15	26	25
16	29	38
17	25	14
18	34	26
20	29	14
21	38	38
22	33	30
23	31	8
24	27	41
25	24	22
26	33	21
27	29	36
28	33	28
29	29	22
30	34	28
31	26	27
32	41	31
33	28	17
34	25	25
36	30	28
37	24	33
38	34	26
39	26	34
40	33	45
41	32	34
42	29	12
43	33	36
44	24	33
45	20	19
46	18	15

ID	Symbolic Play	Functional Play
47	19	38
48	24	16
49	28	20
50	20	15
51	15	18
52	15	18
53	16	16
54	13	14

Figure B3

Discursis Temporally Sensitive Conversational Plot for Participant 1 – Symbolic play

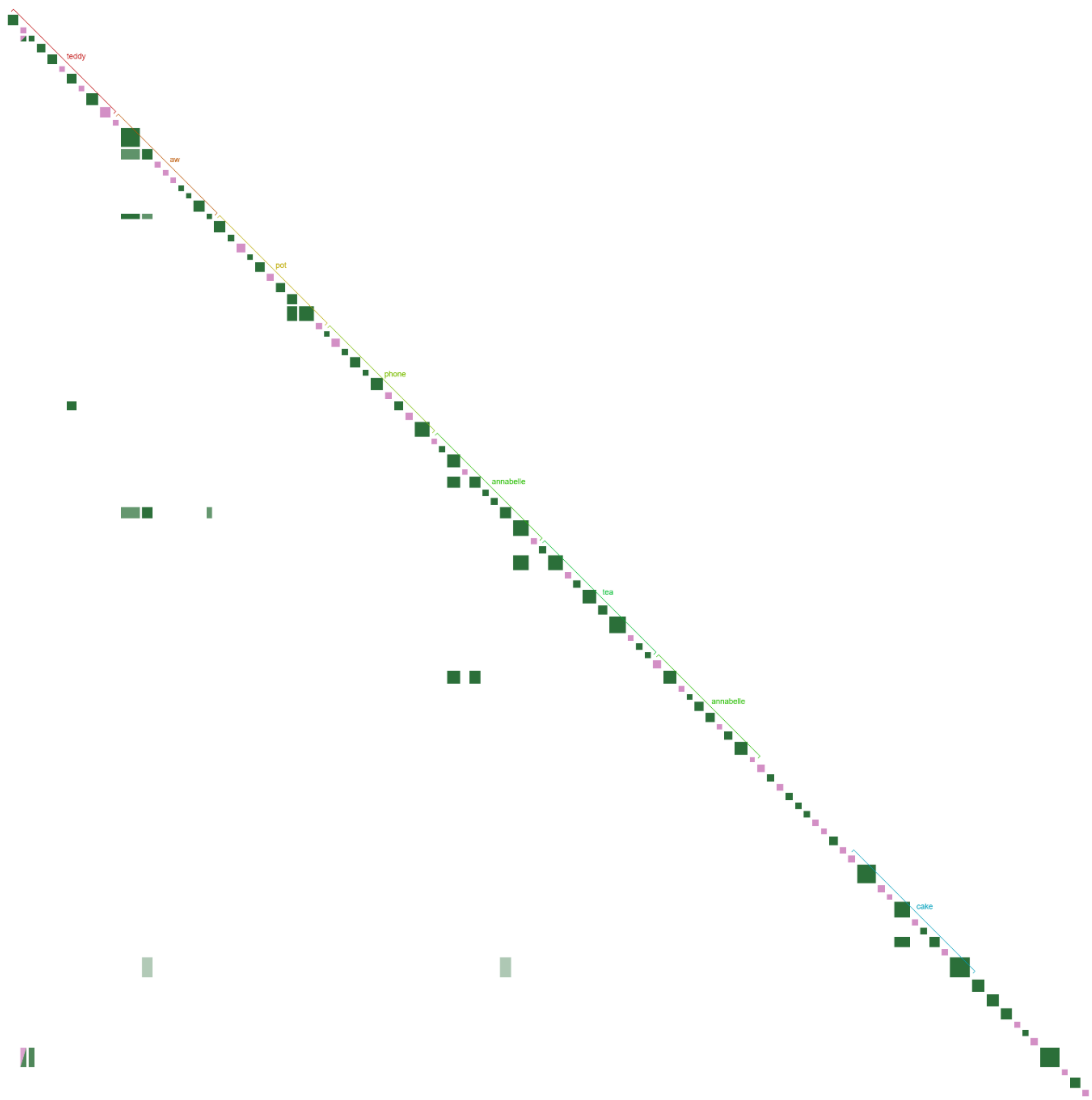


Figure B4

Discursis Temporally Sensitive Conversational Plot for Participant 1 – Functional play

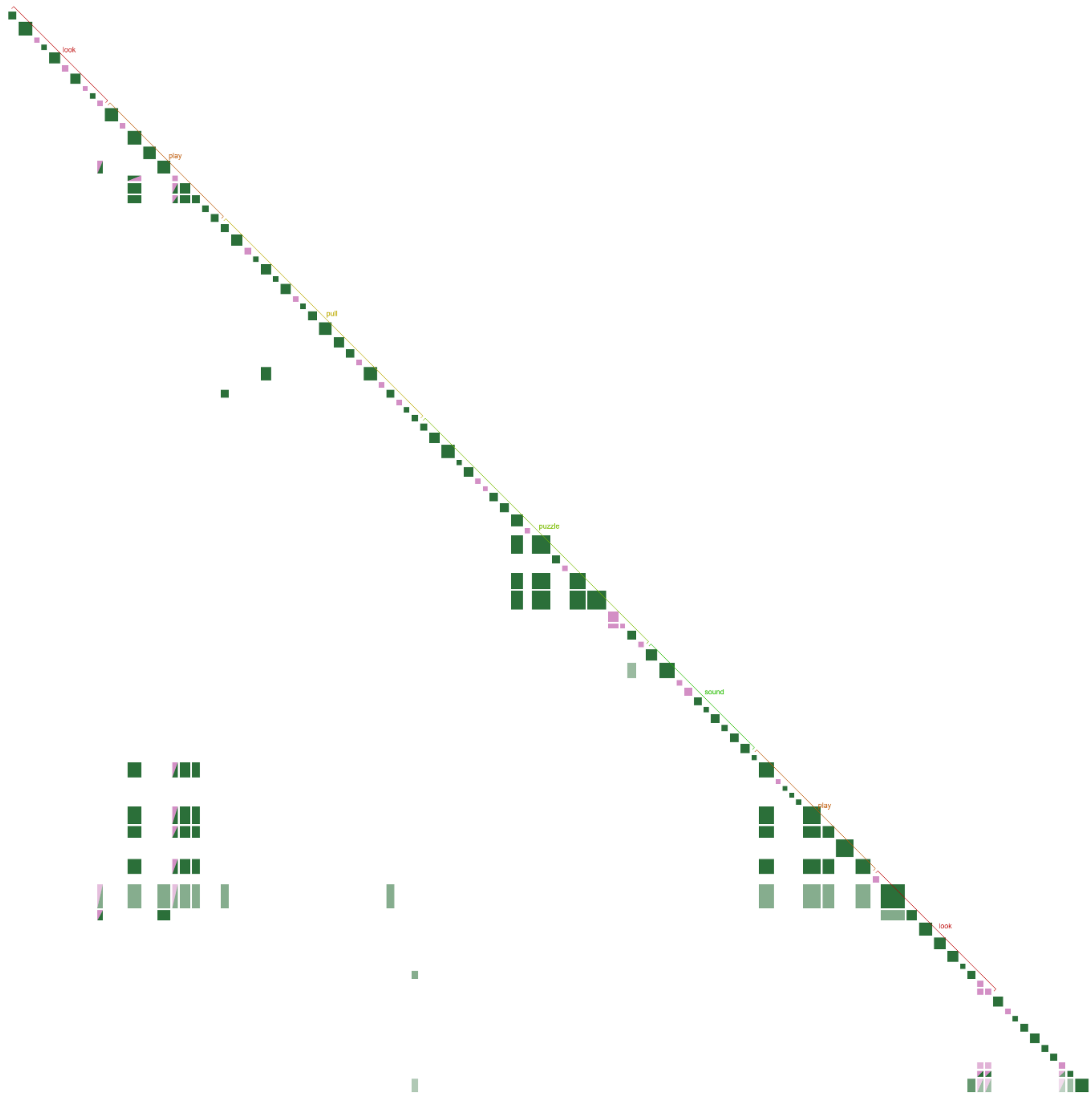


Figure B5

Discursis Temporally Sensitive Conversational Plot for Participant 2 – Symbolic play

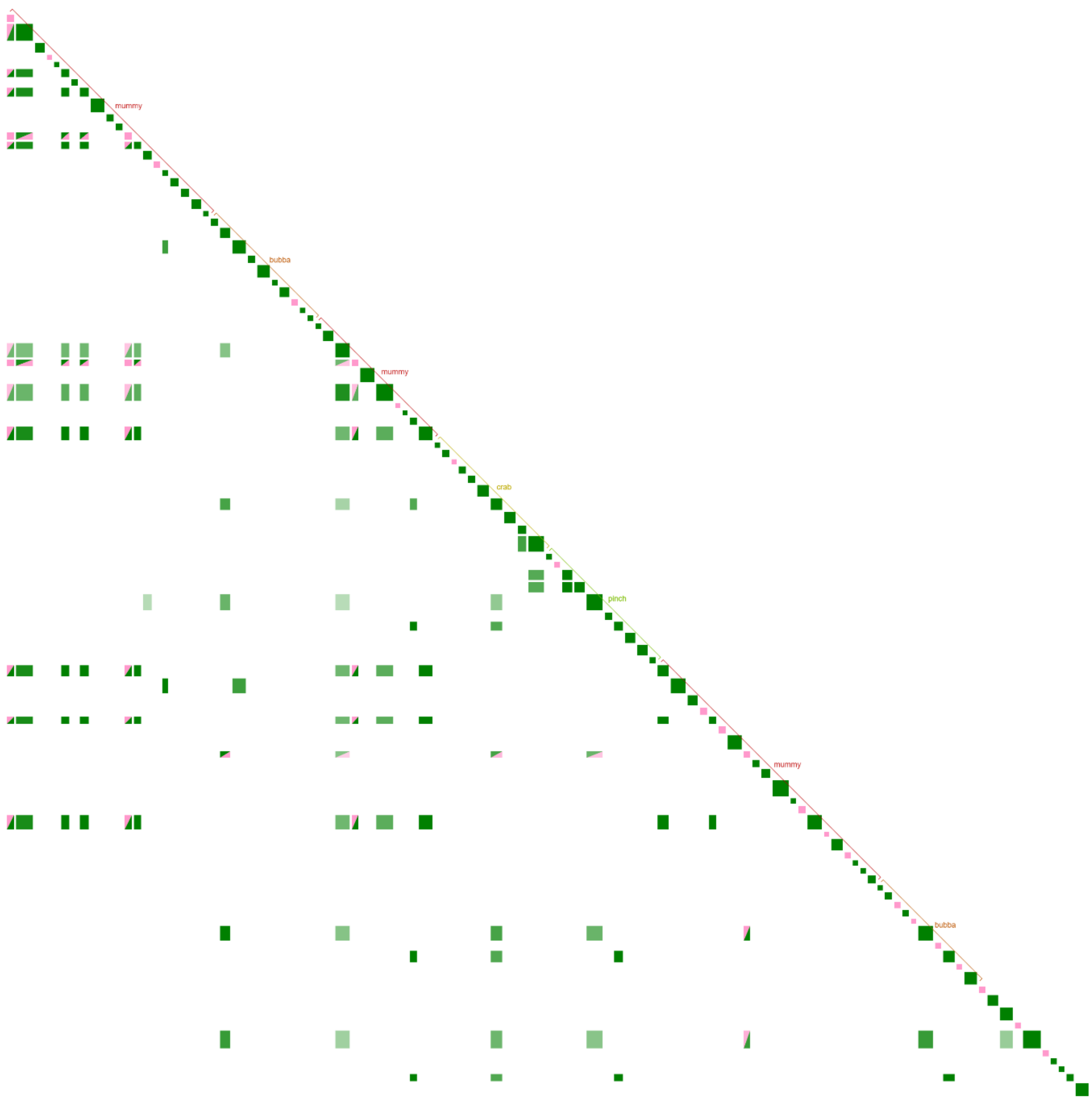


Figure B6

Discursis Temporally Sensitive Conversational Plot for Participant 2 – Functional play

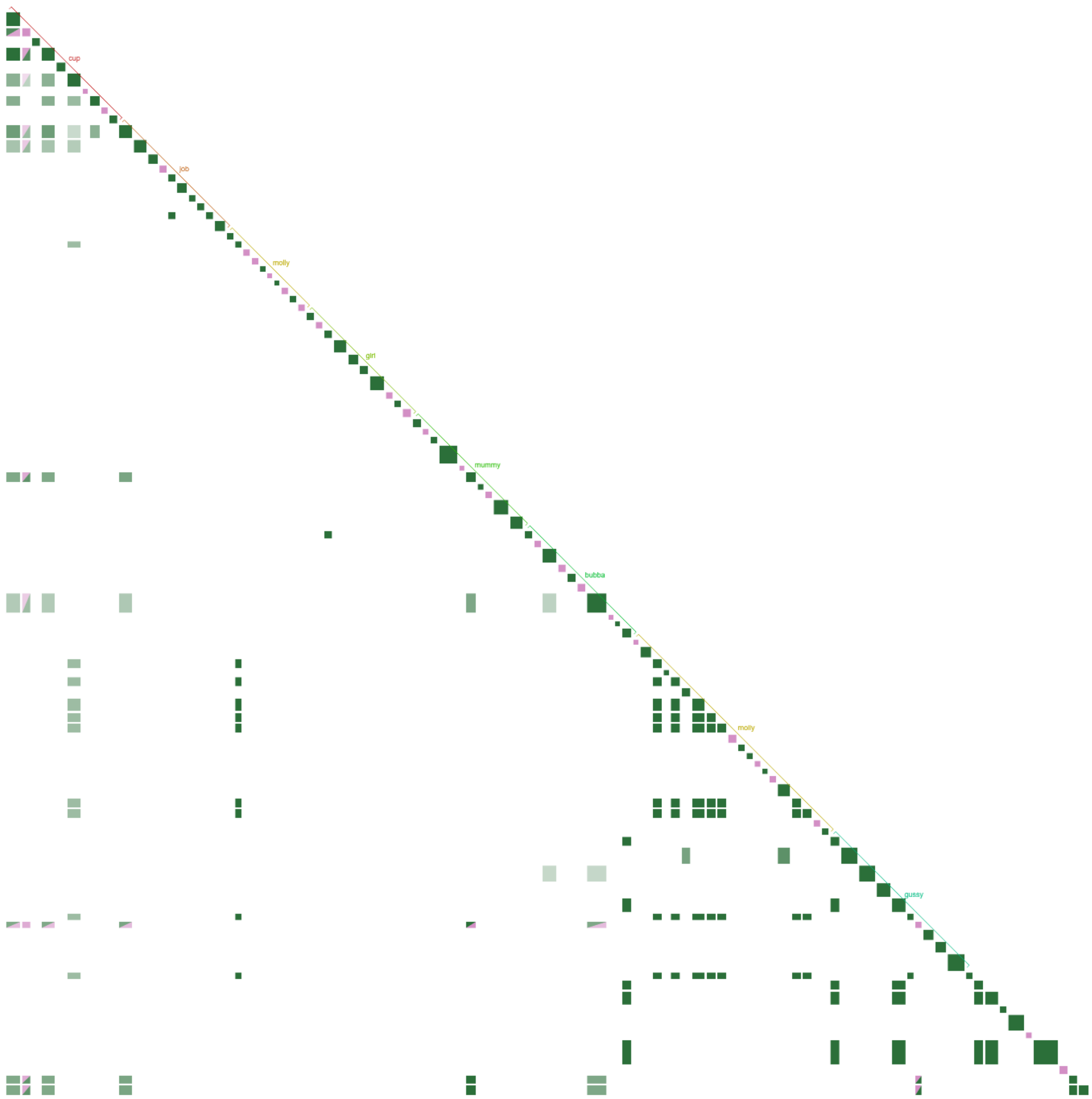


Figure B7

Discursis Temporally Sensitive Conversational Plot for Participant 3 – Symbolic play

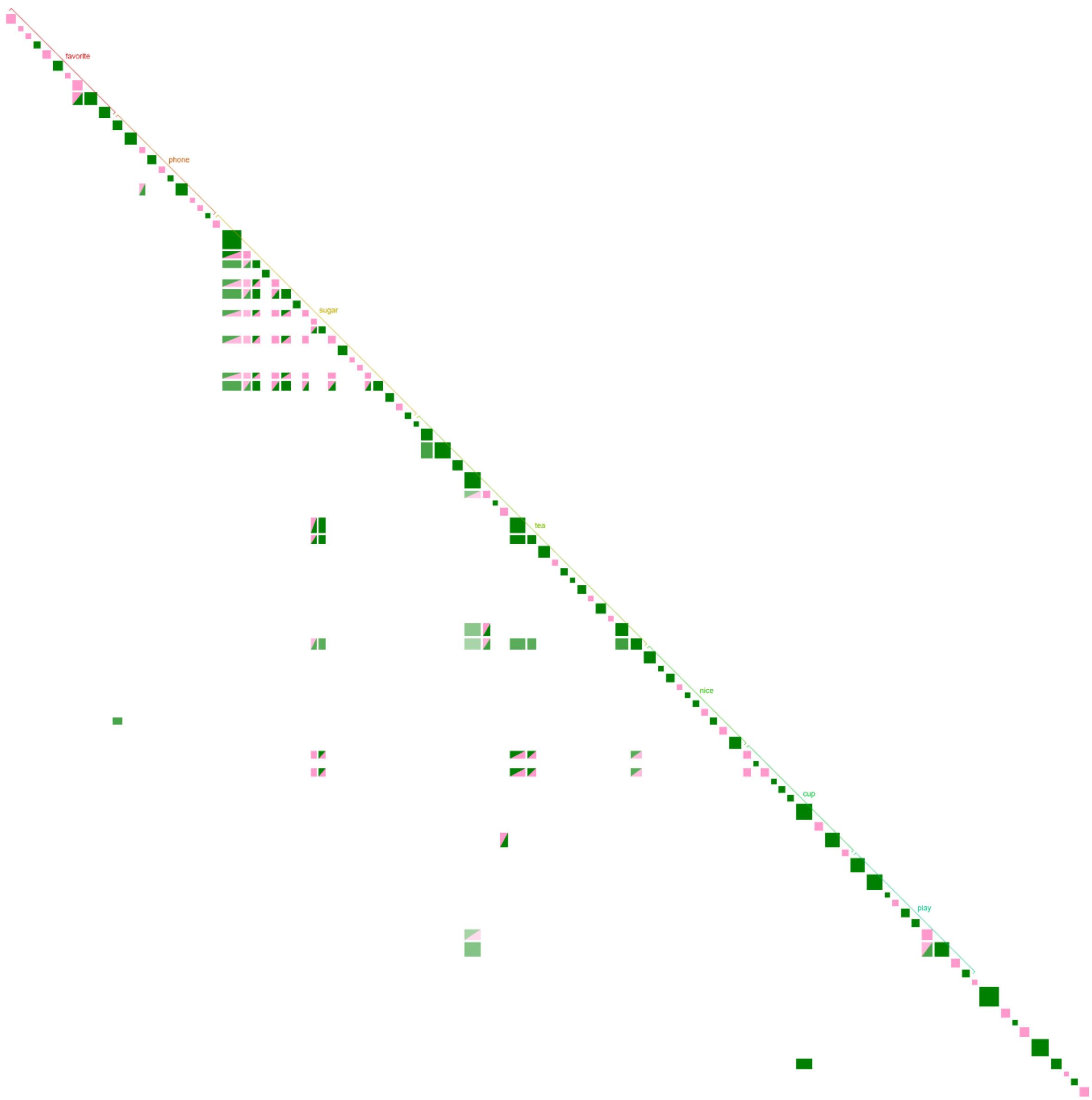


Figure B8

Discursis Temporally Sensitive Conversational Plot for Participant 3 – Functional play

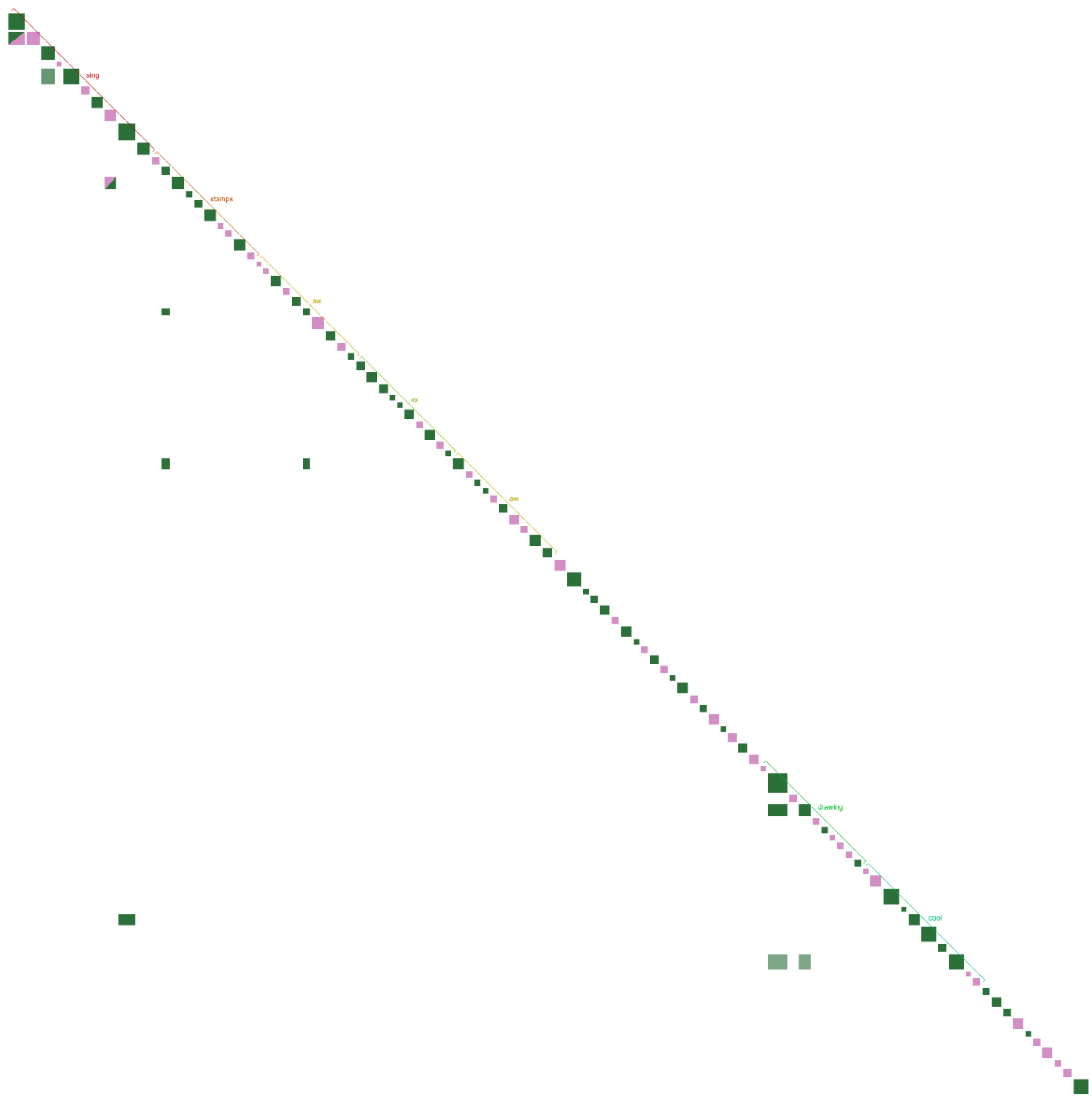


Figure B9

Discursis Temporally Sensitive Conversational Plot for Participant 4 – Symbolic play

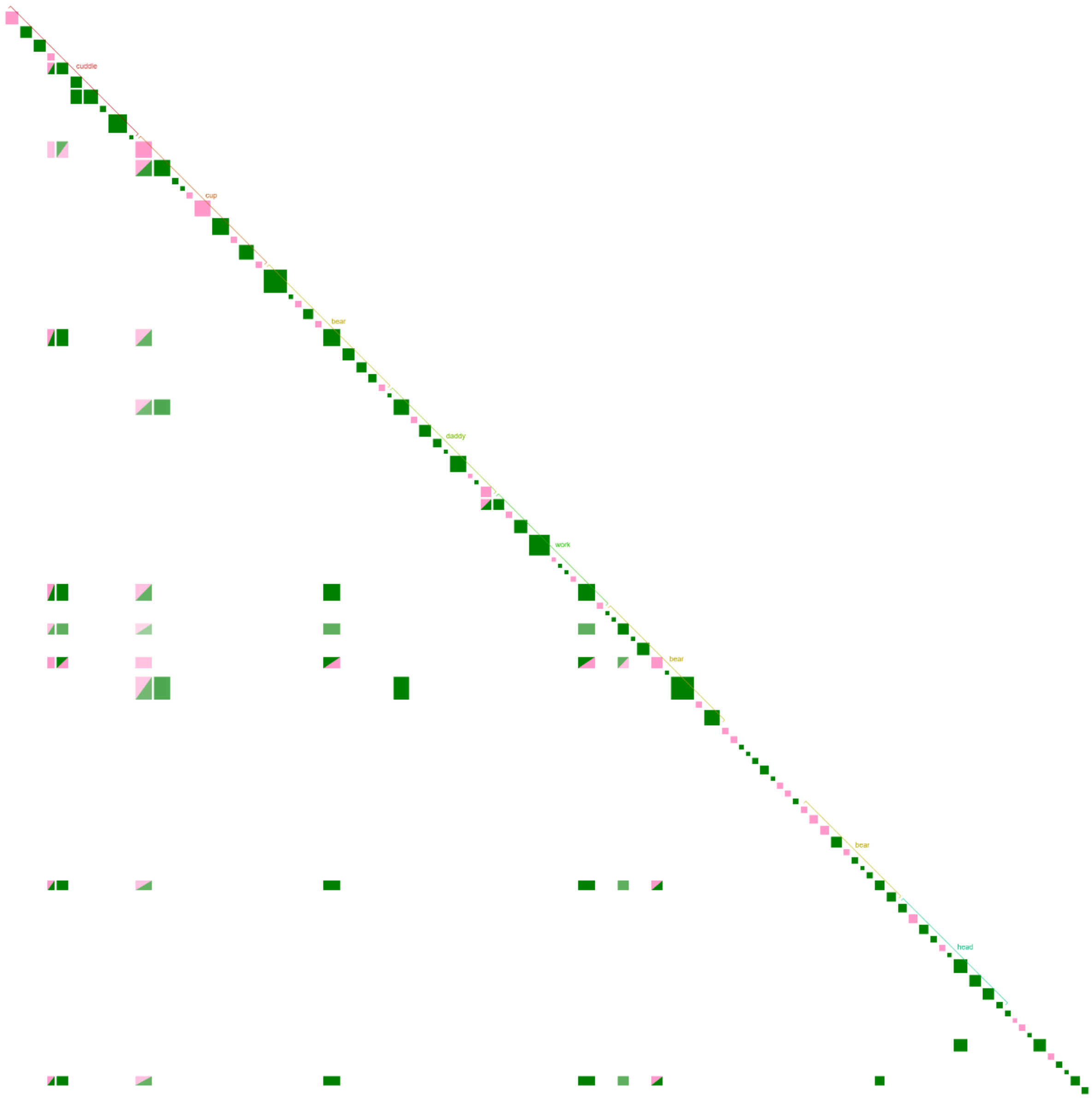


Figure B10

Discursis Temporally Sensitive Conversational Plot for Participant 4 – Functional play

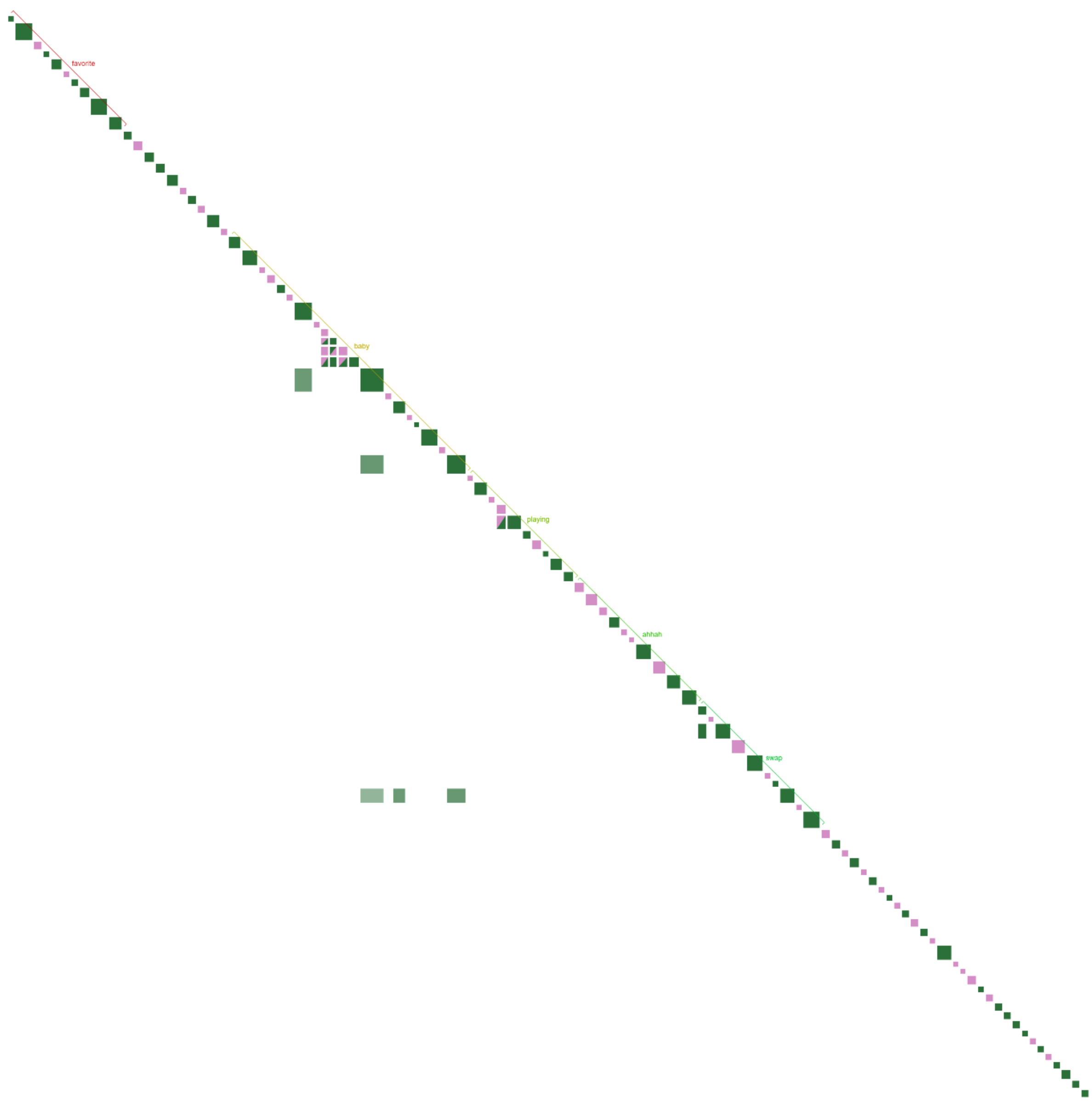


Figure B11

Discursis Temporally Sensitive Conversational Plot for Participant 5 – Symbolic play

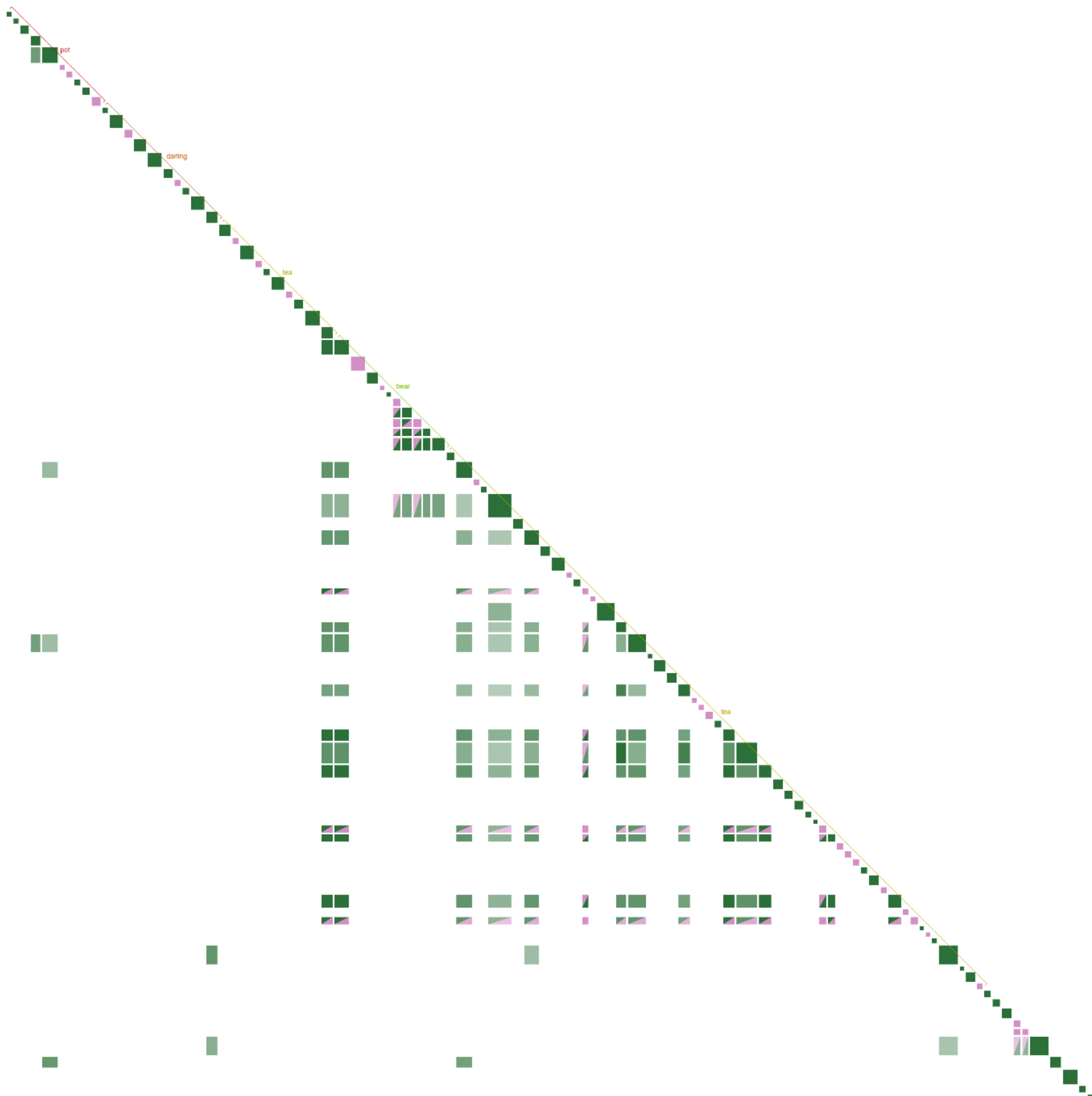


Figure B12

Discursis Temporally Sensitive Conversational Plot for Participant 5 – Functional play

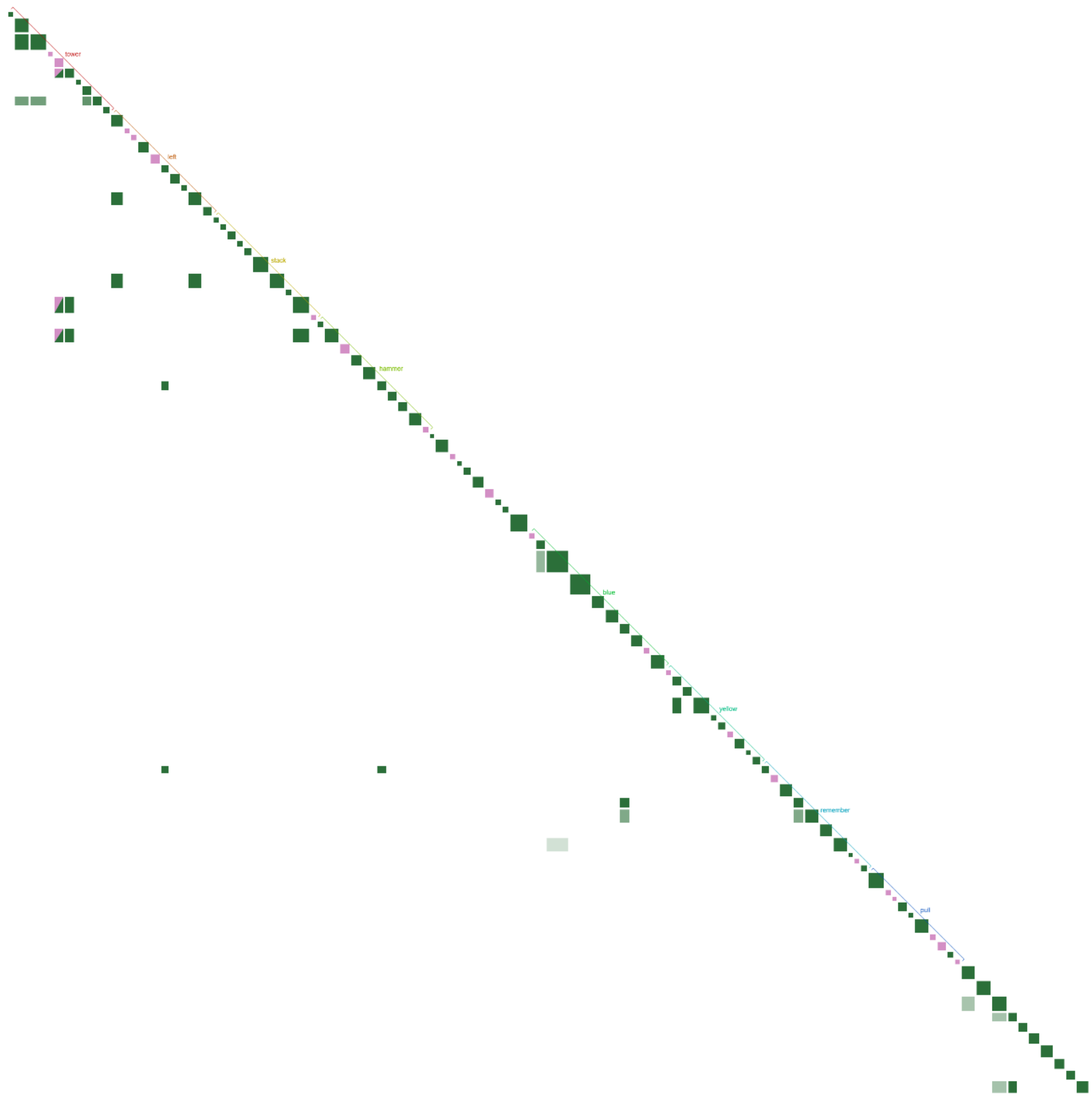


Figure B13

Discursis Temporally Sensitive Conversational Plot for Participant 6 – Symbolic play

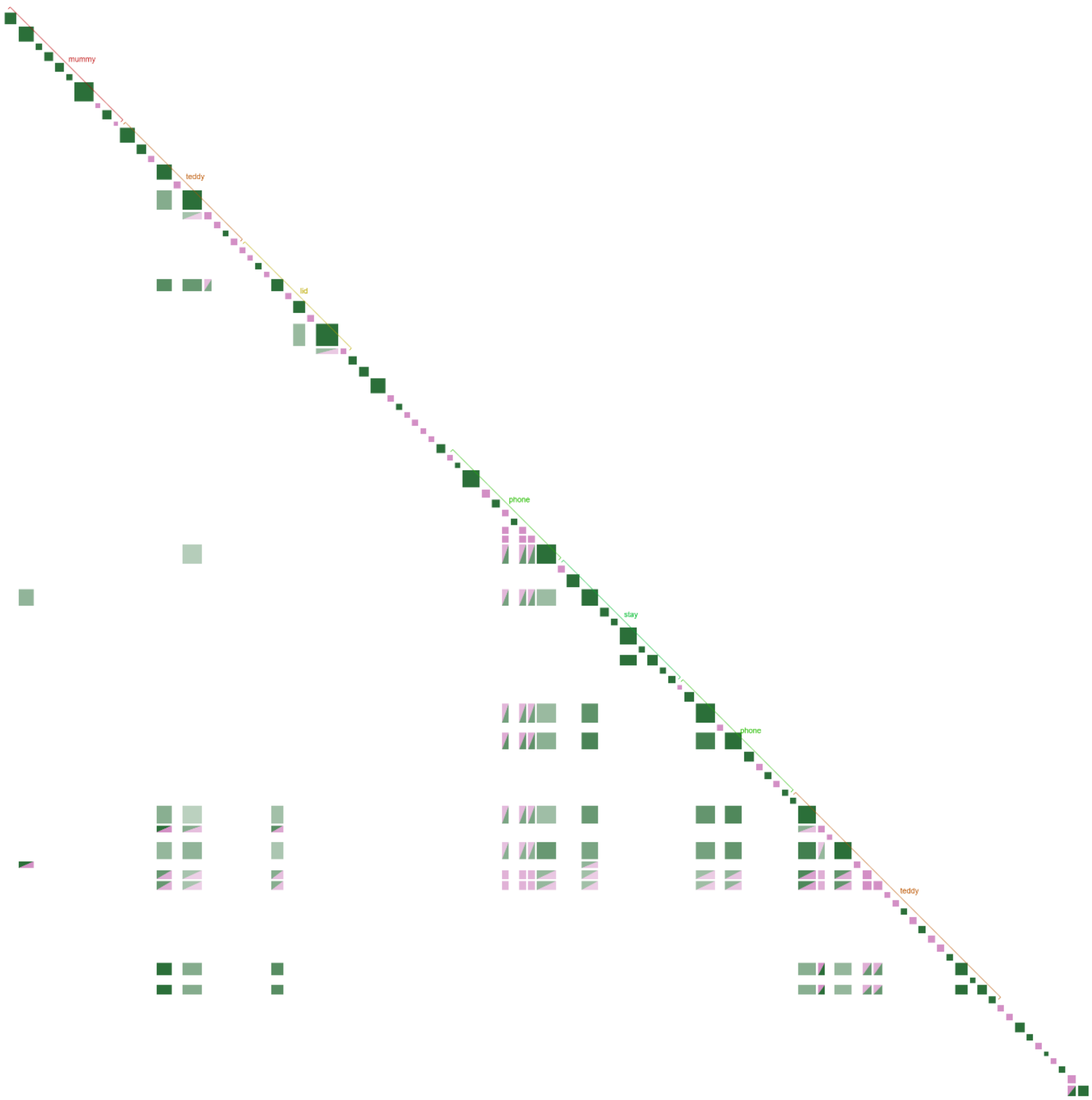


Figure B14

Discursis Temporally Sensitive Conversational Plot for Participant 6 – Functional play

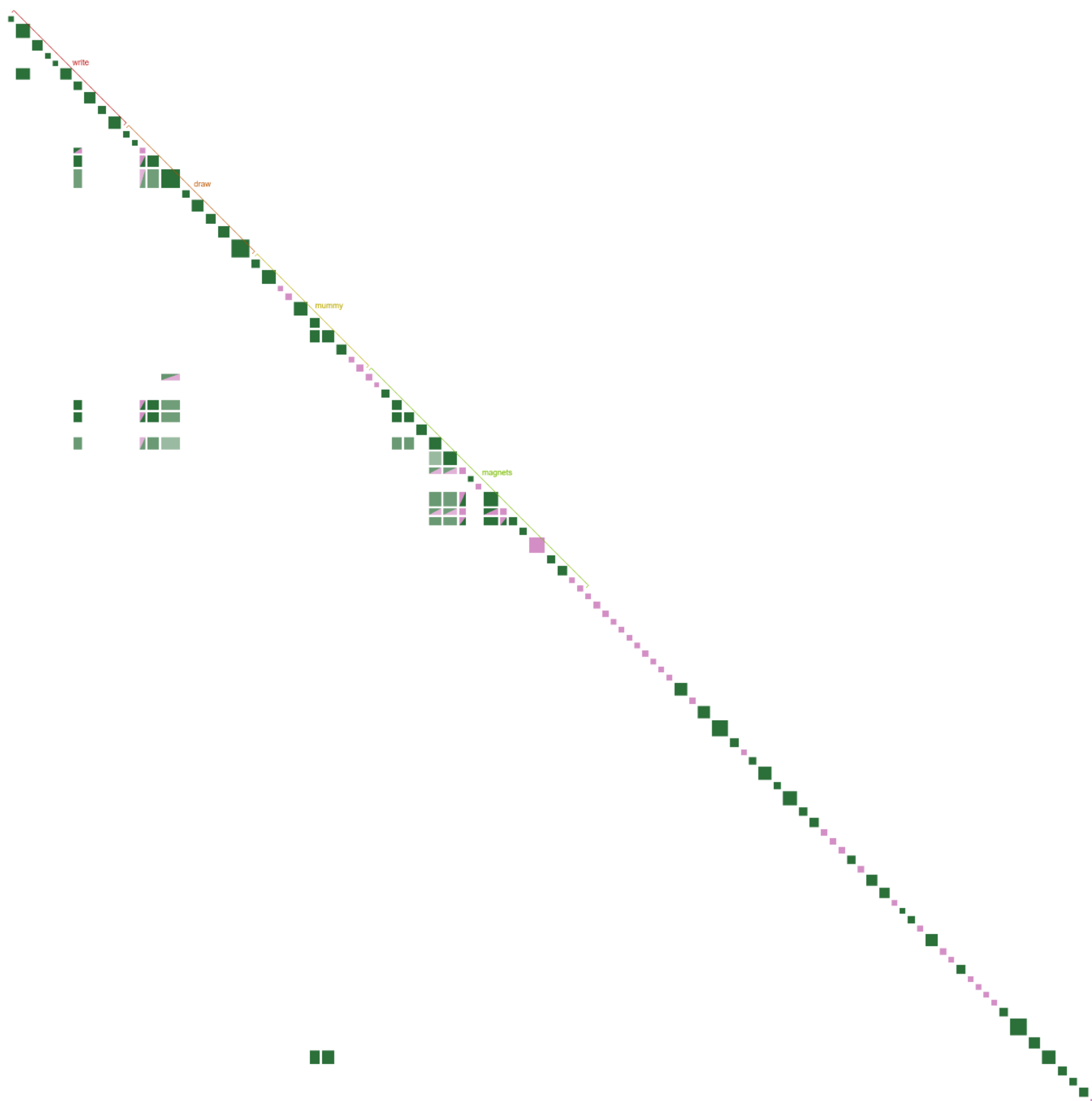


Figure B15

Discursis Temporally Sensitive Conversational Plot for Participant 7 – Symbolic play

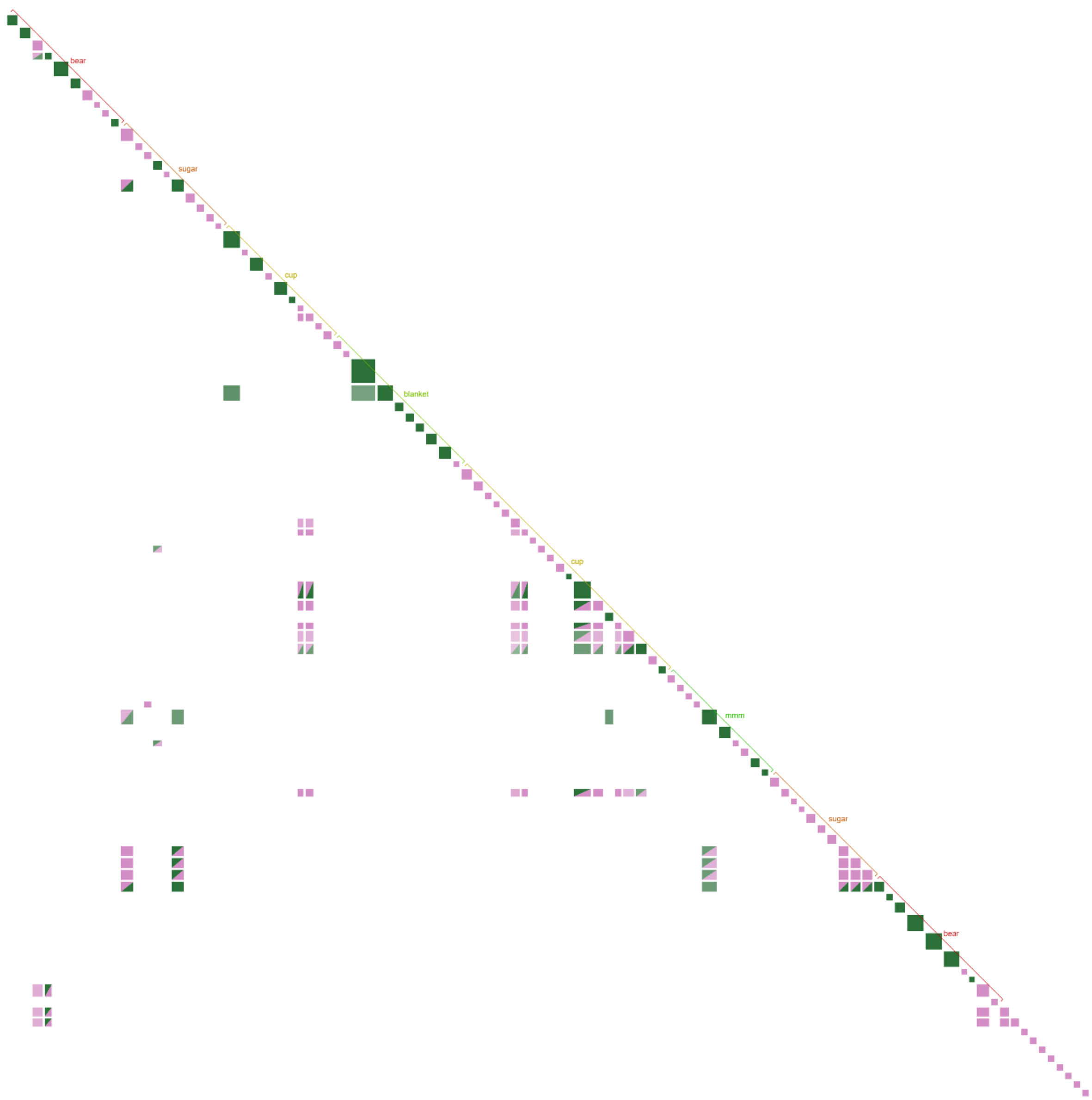


Figure B16

Discursis Temporally Sensitive Conversational Plot for Participant 7 – Functional play

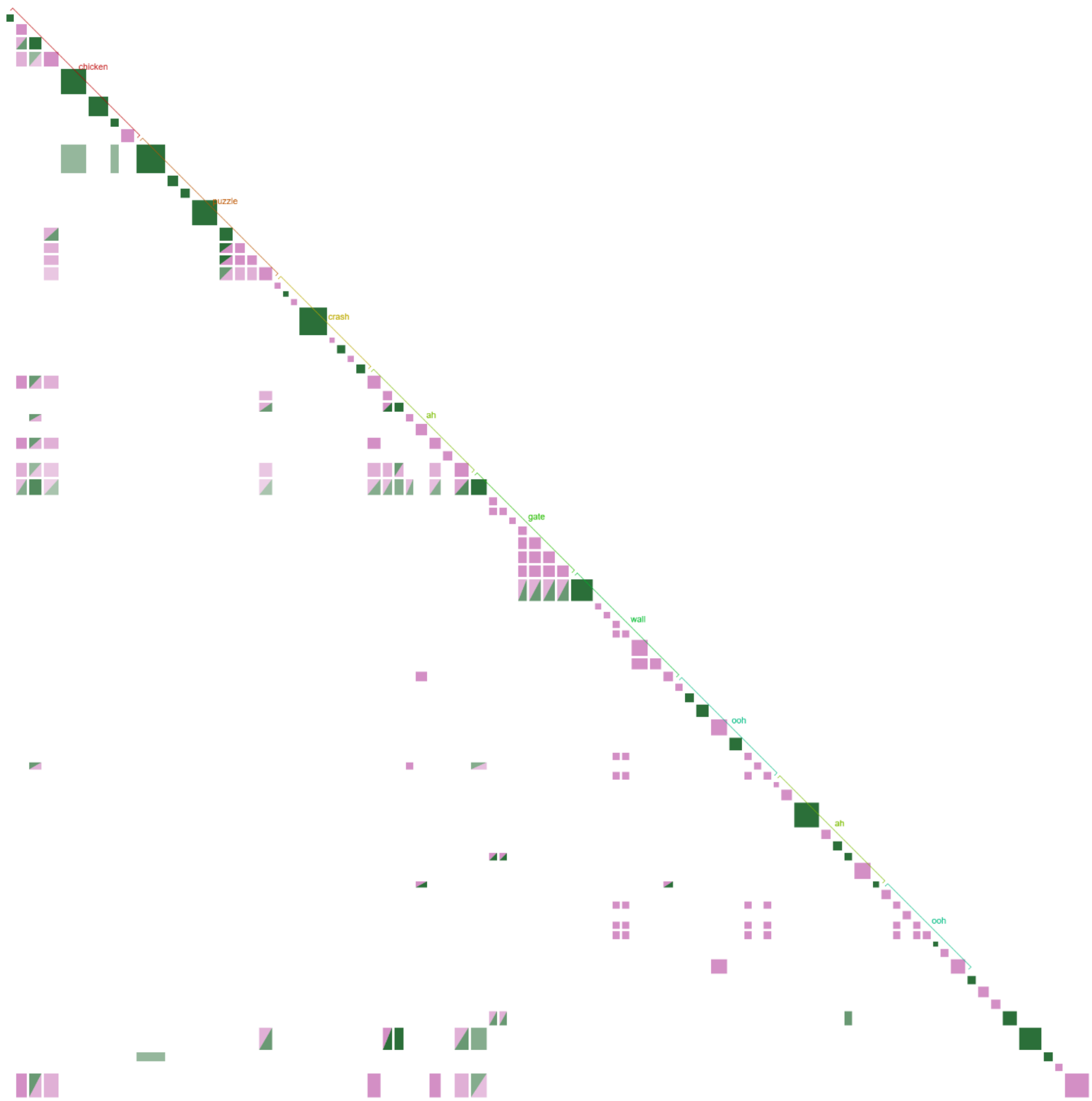


Figure B17

Discursis Temporally Sensitive Conversational Plot for Participant 8 – Symbolic play

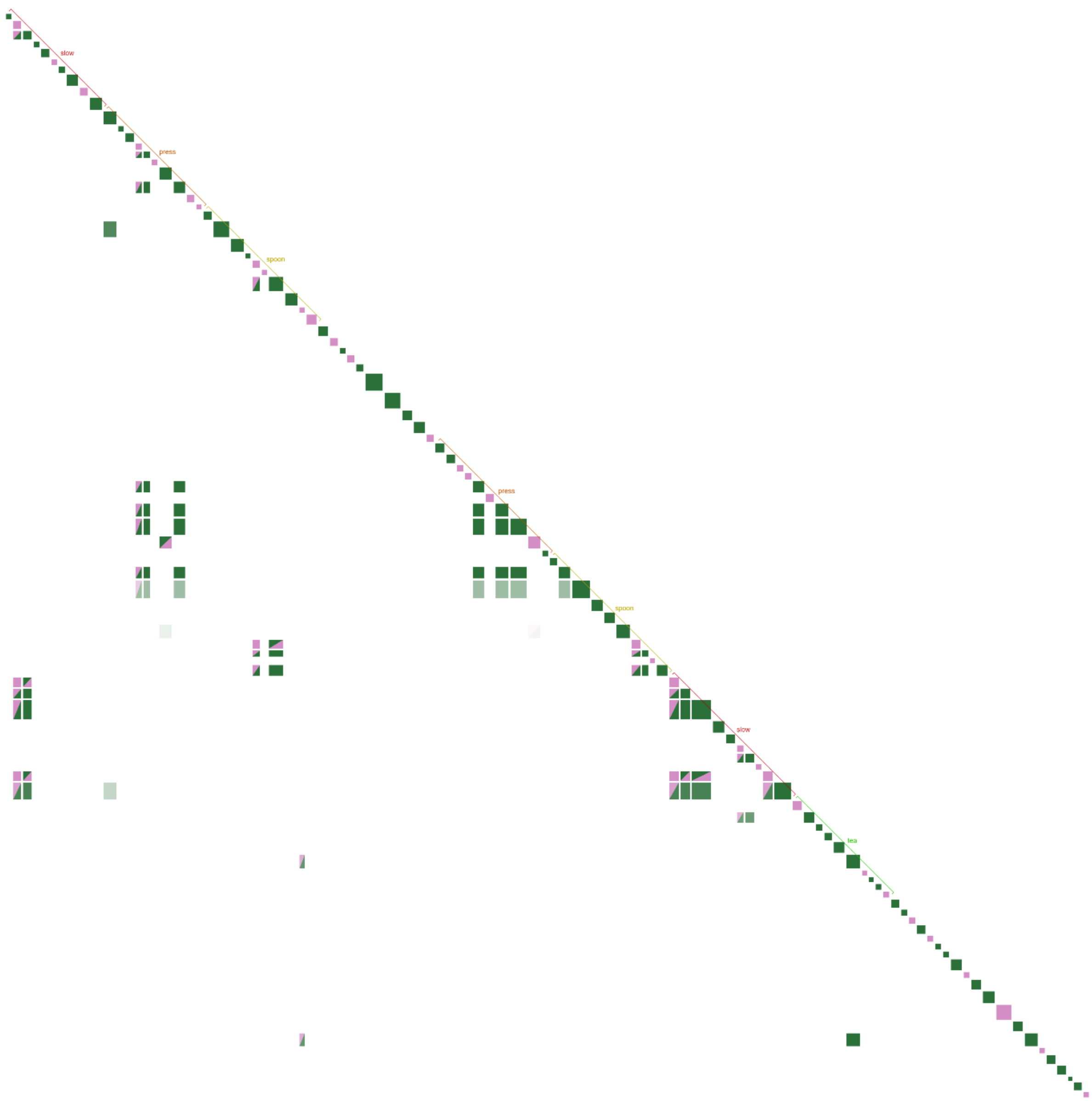


Figure B18

Discursis Temporally Sensitive Conversational Plot for Participant 8 – Functional play

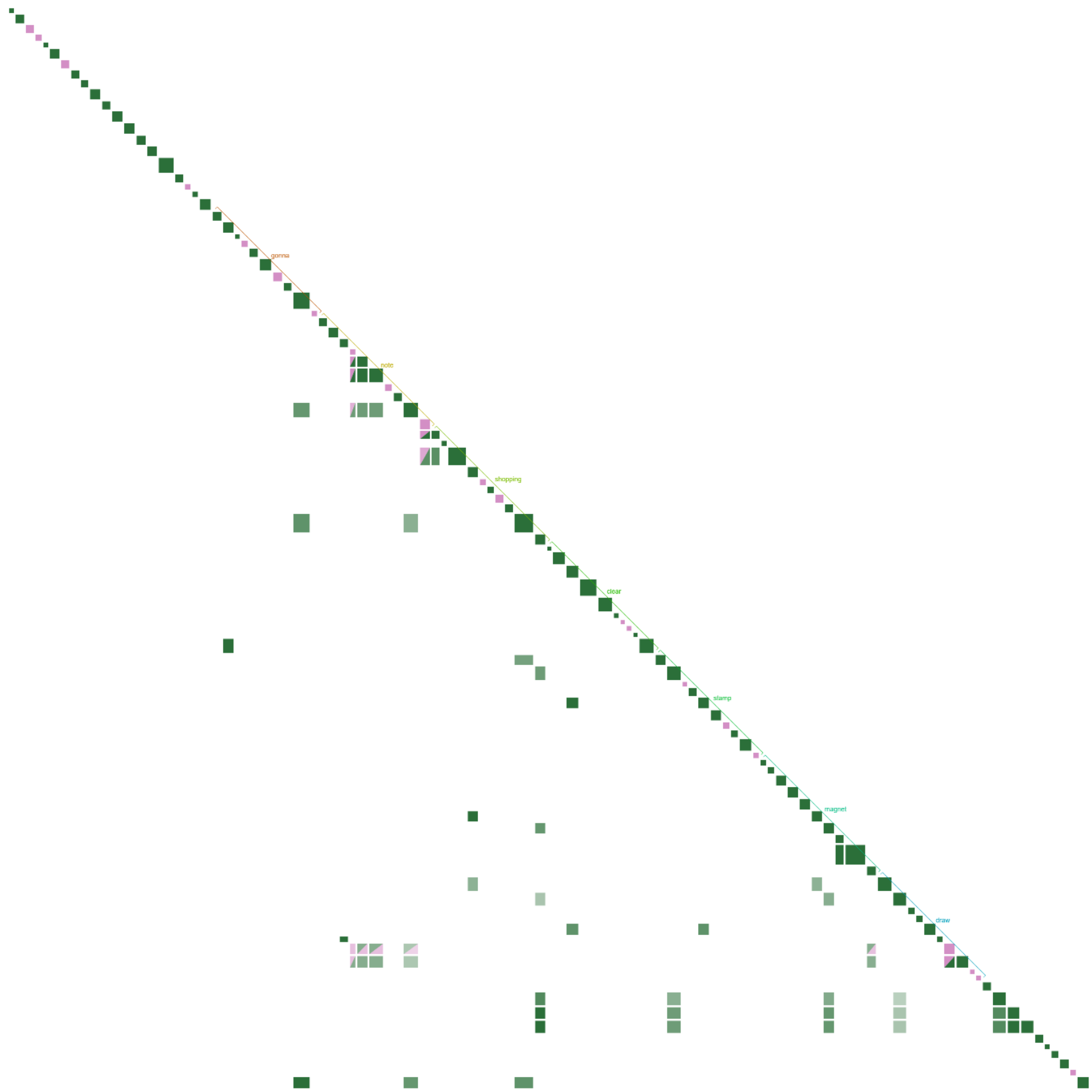


Figure B19

Discursis Temporally Sensitive Conversational Plot for Participant 9 – Symbolic play

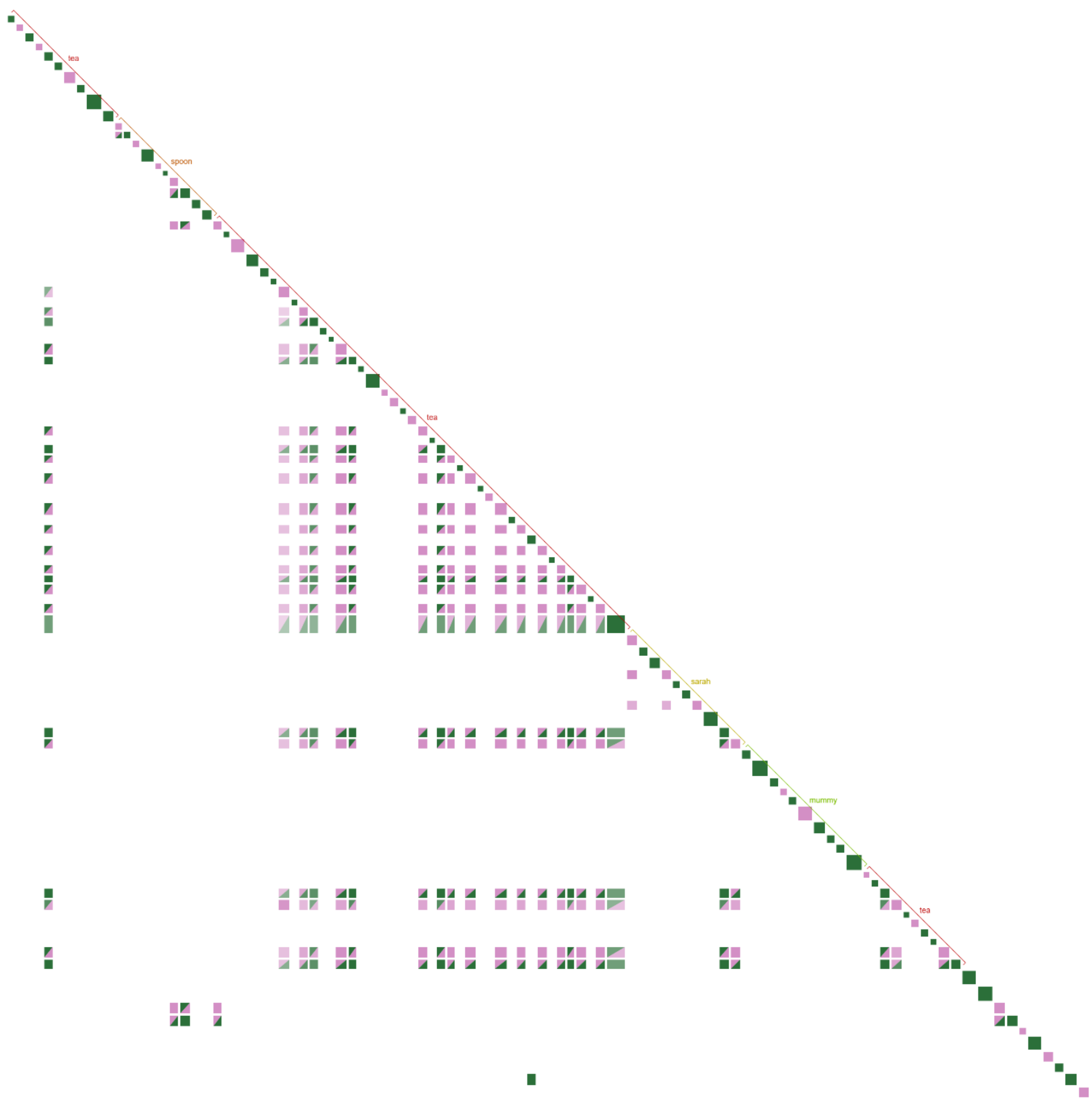


Figure B20

Discursis Temporally Sensitive Conversational Plot for Participant 9 – Functional play

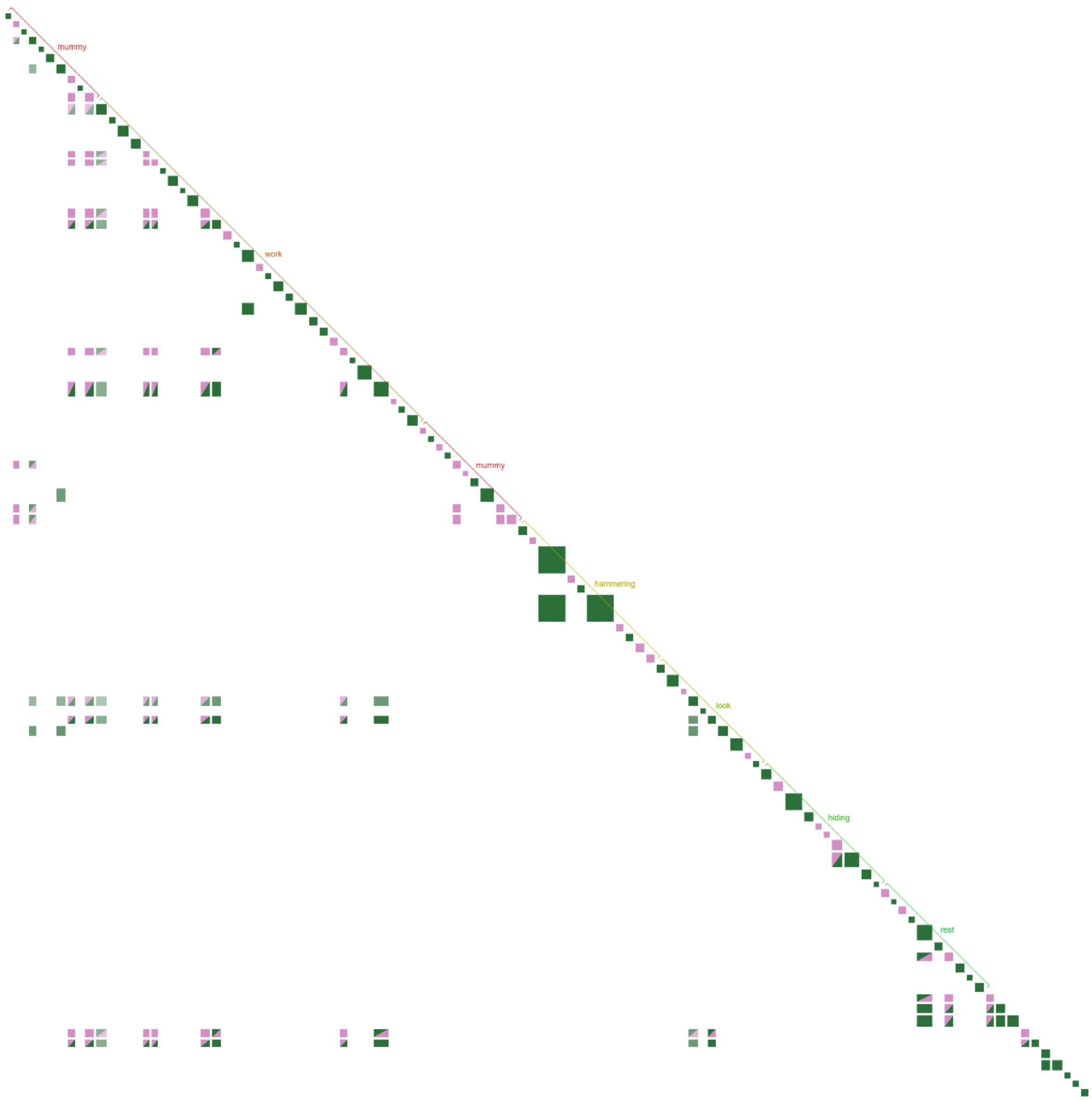


Figure B21

Discursis Temporally Sensitive Conversational Plot for Participant 10 – Symbolic play

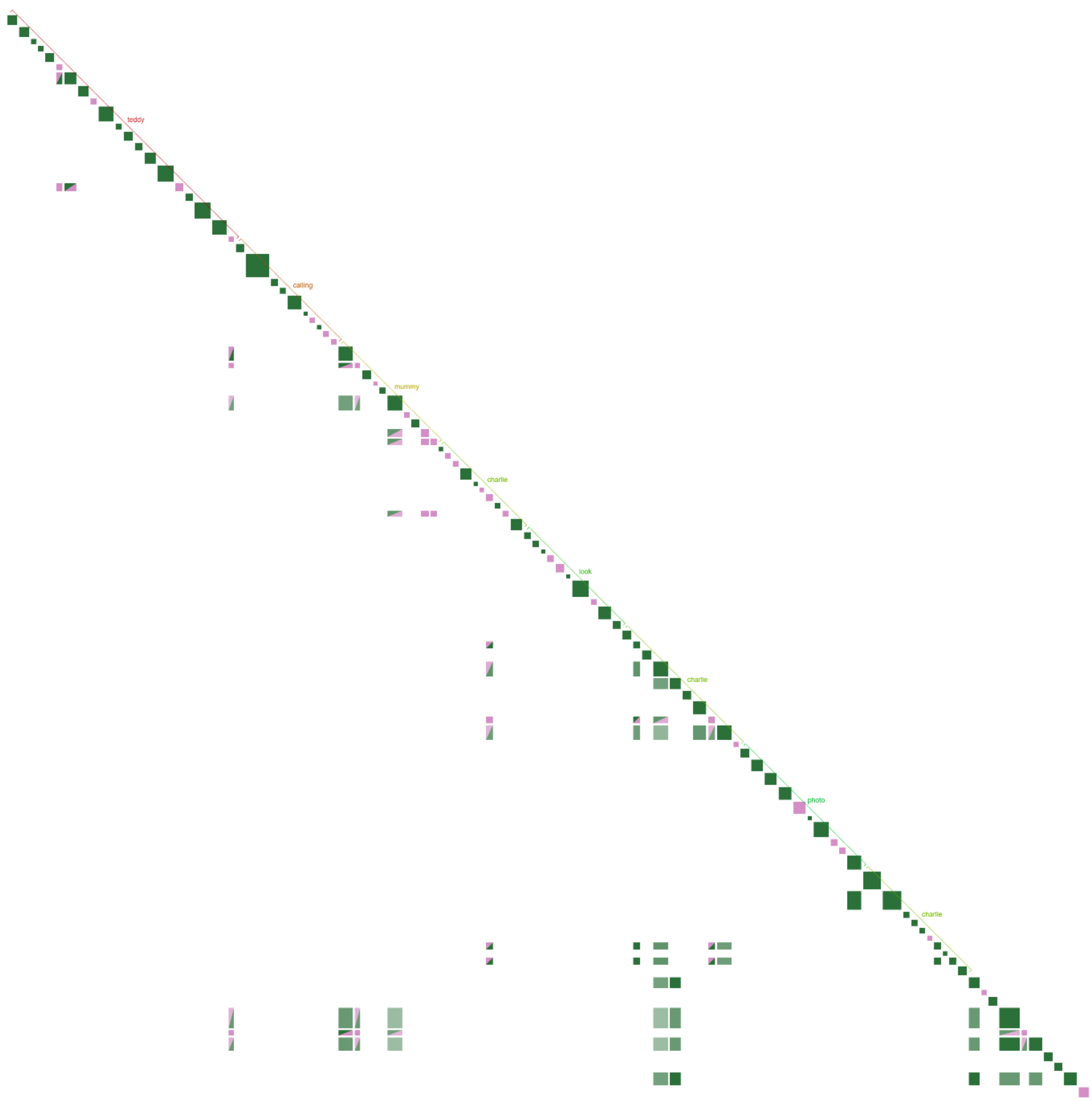


Figure B22

Discursis Temporally Sensitive Conversational Plot for Participant 10 – Functional play

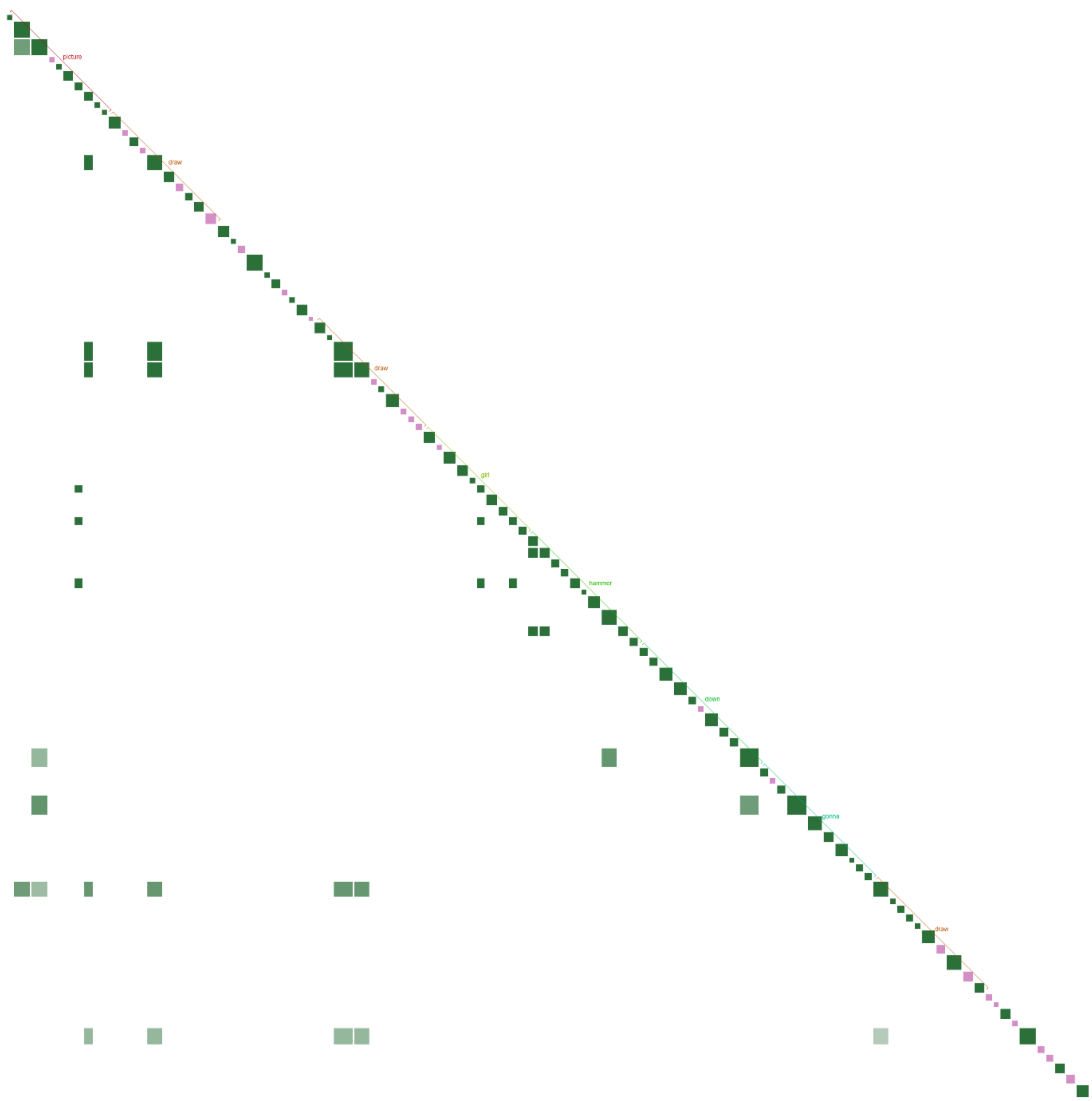


Figure B23

Discursis Temporally Sensitive Conversational Plot for Participant 11 – Symbolic play

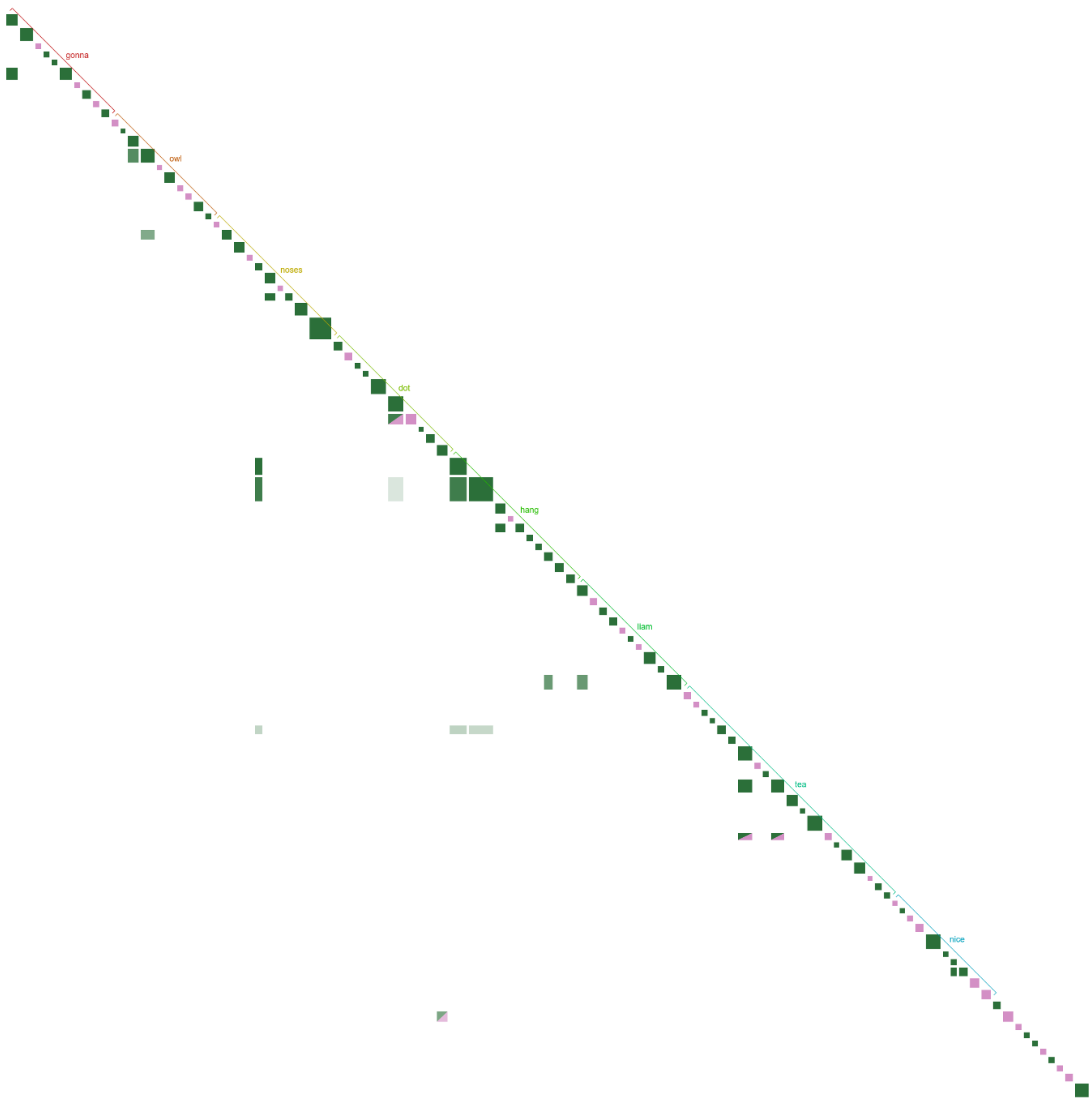


Figure B24

Discursis Temporally Sensitive Conversational Plot for Participant 11 – Functional play

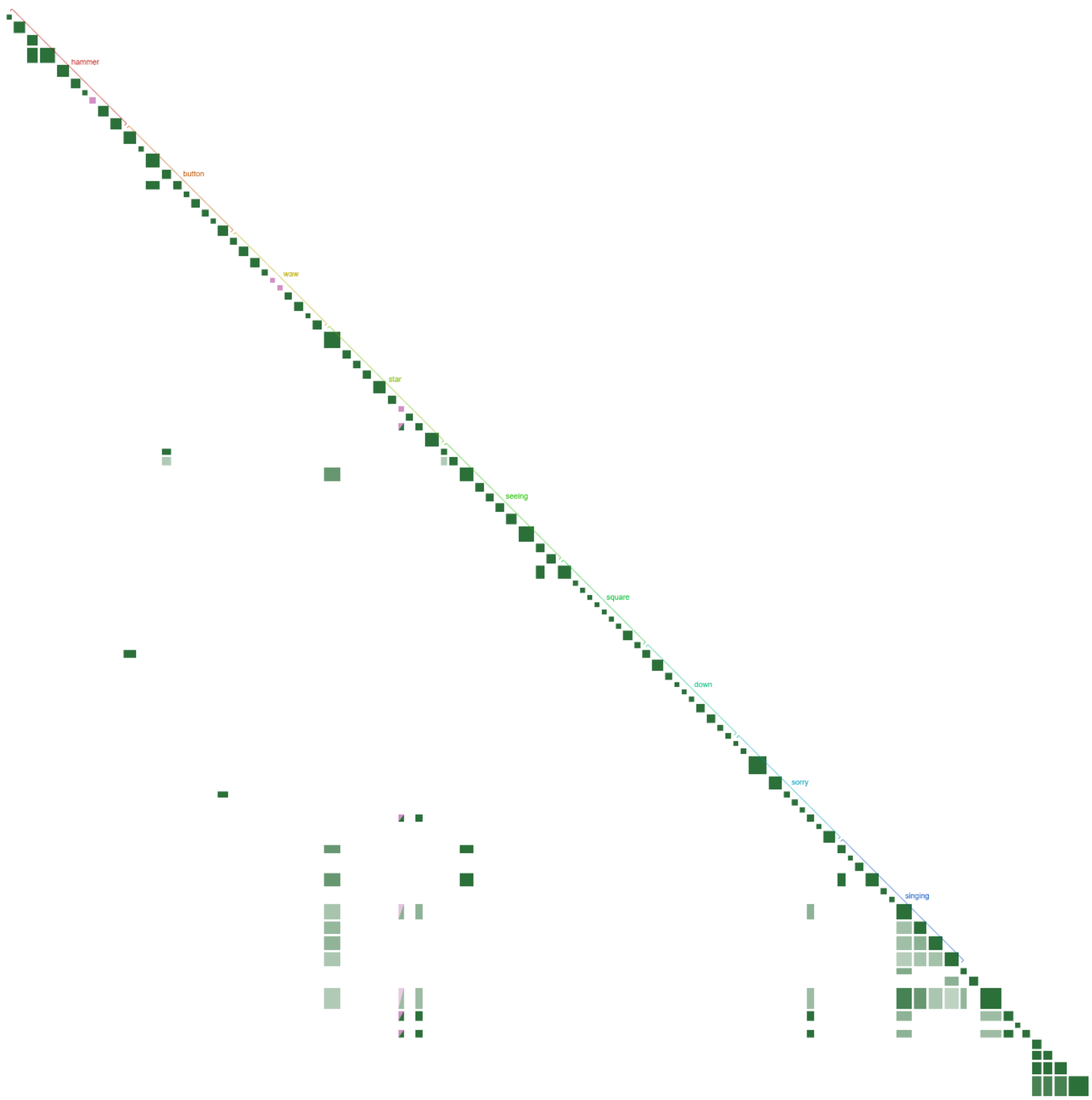


Figure B25

Discursis Temporally Sensitive Conversational Plot for Participant 12 – Symbolic play

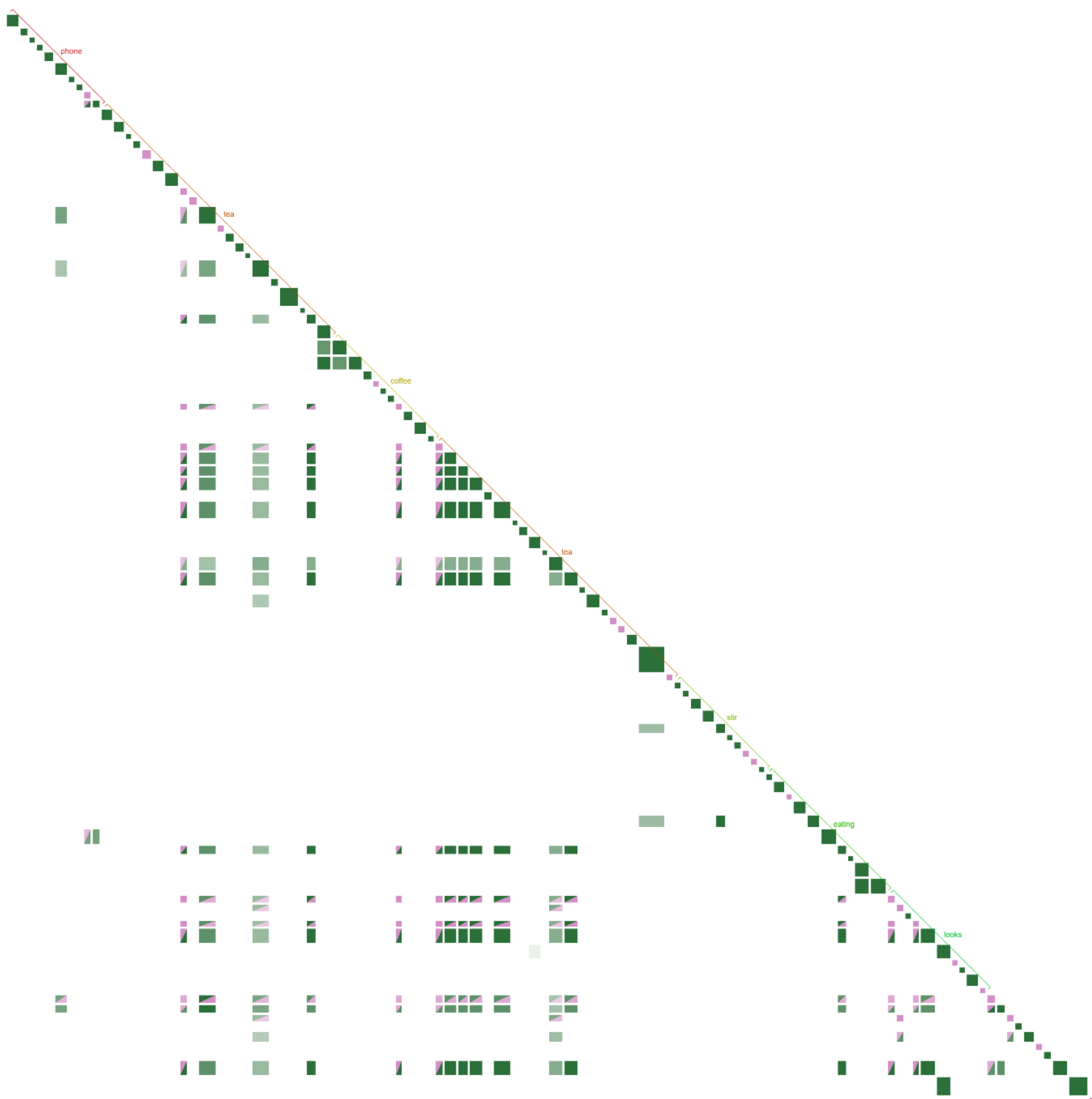


Figure B26

Discursis Temporally Sensitive Conversational Plot for Participant 12 – Functional play

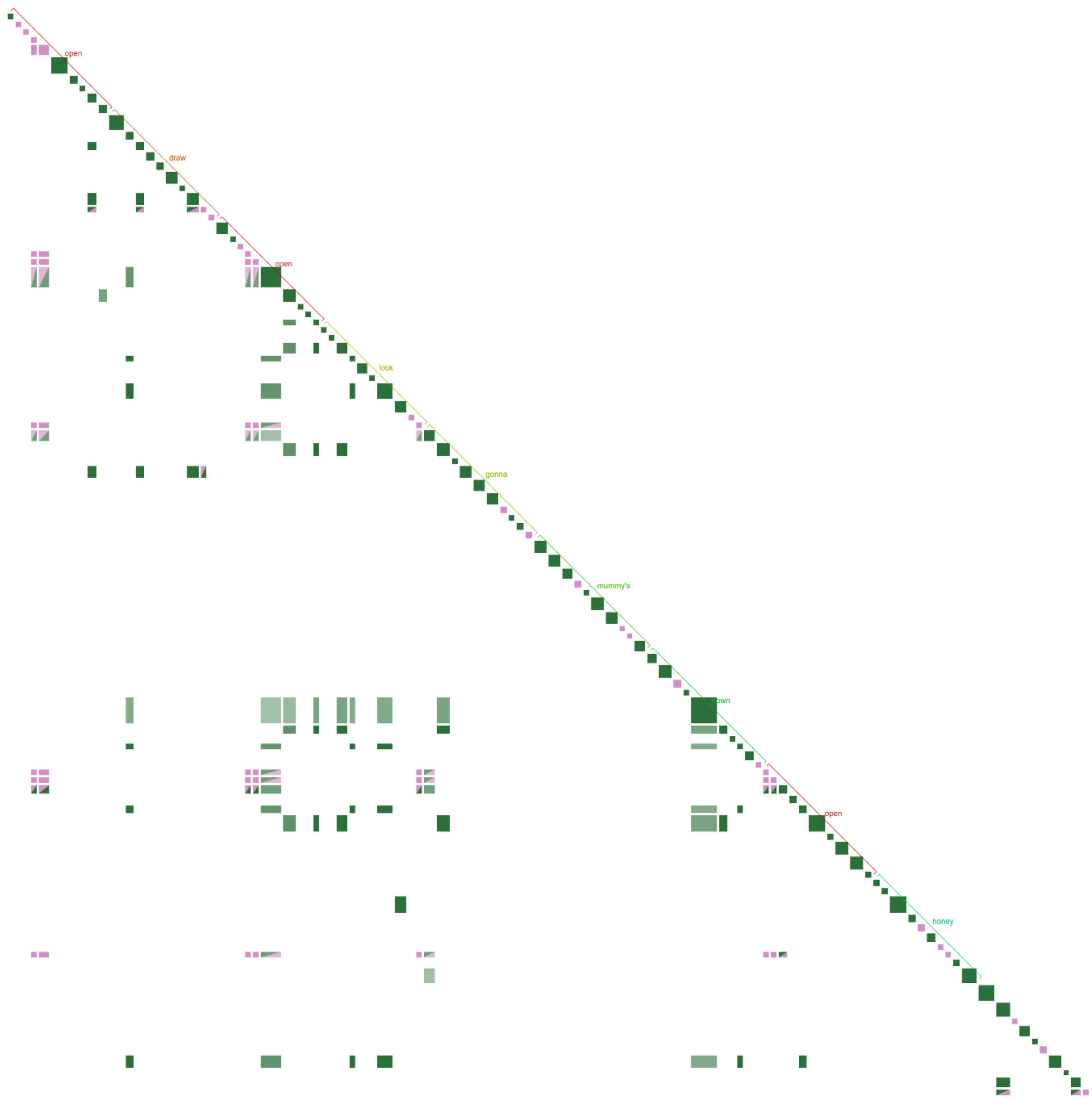


Figure B27

Discursis Temporally Sensitive Conversational Plot for Participant 13 – Symbolic play

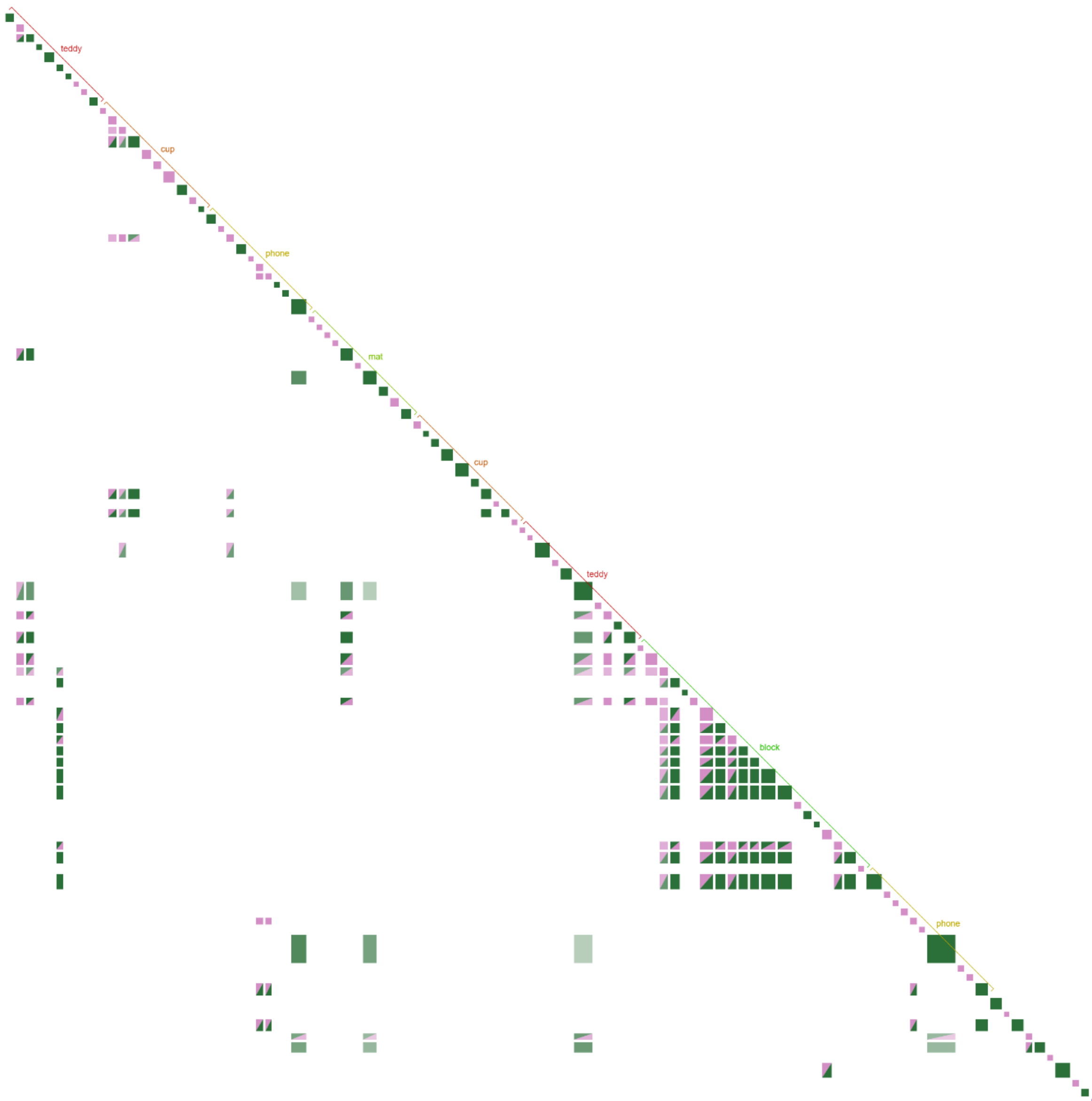


Figure B28

Discursis Temporally Sensitive Conversational Plot for Participant 13 – Functional play

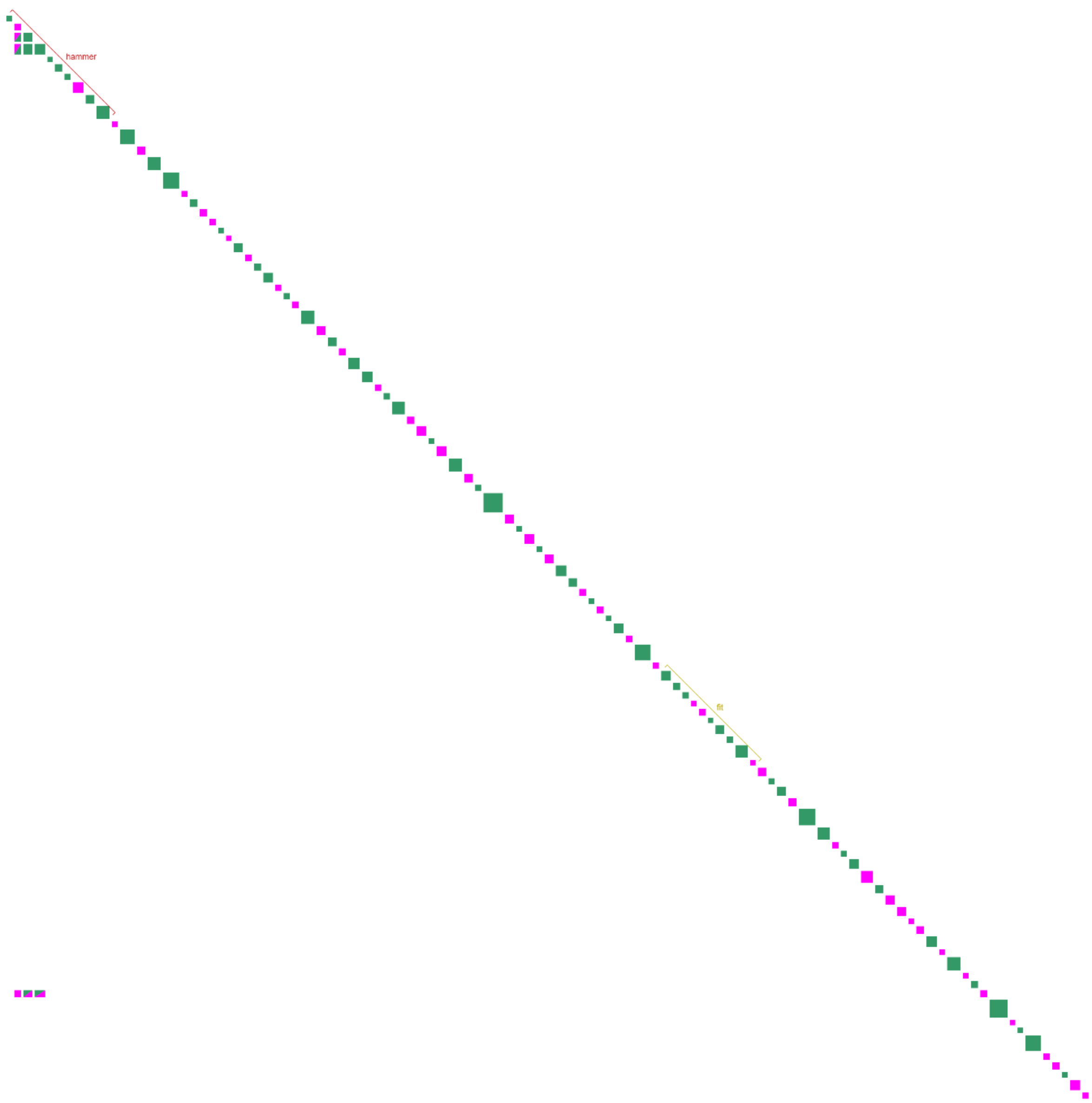


Figure B29

Discursis Temporally Sensitive Conversational Plot for Participant 14 – Symbolic play

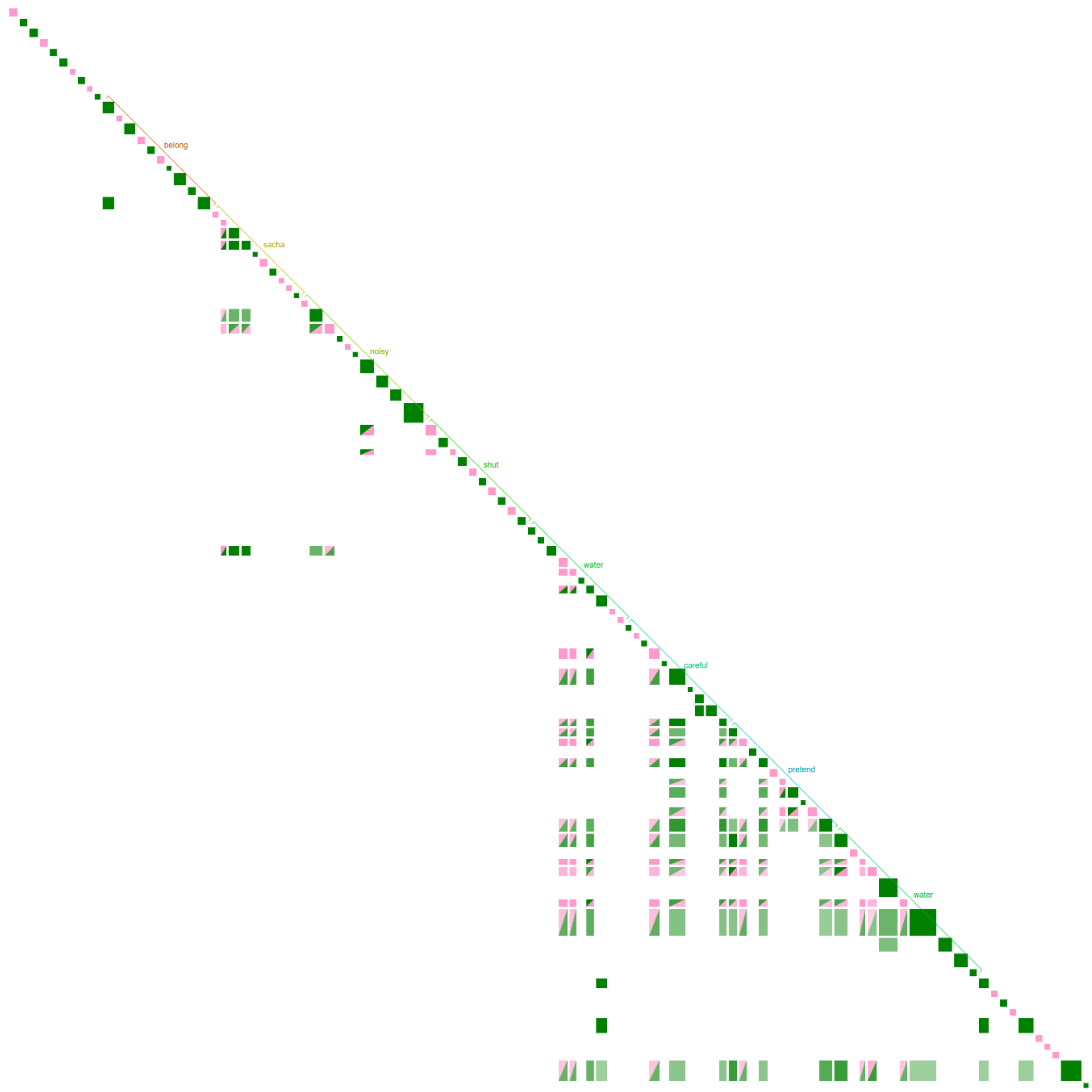


Figure B30

Discursis Temporally Sensitive Conversational Plot for Participant 14 – Functional play

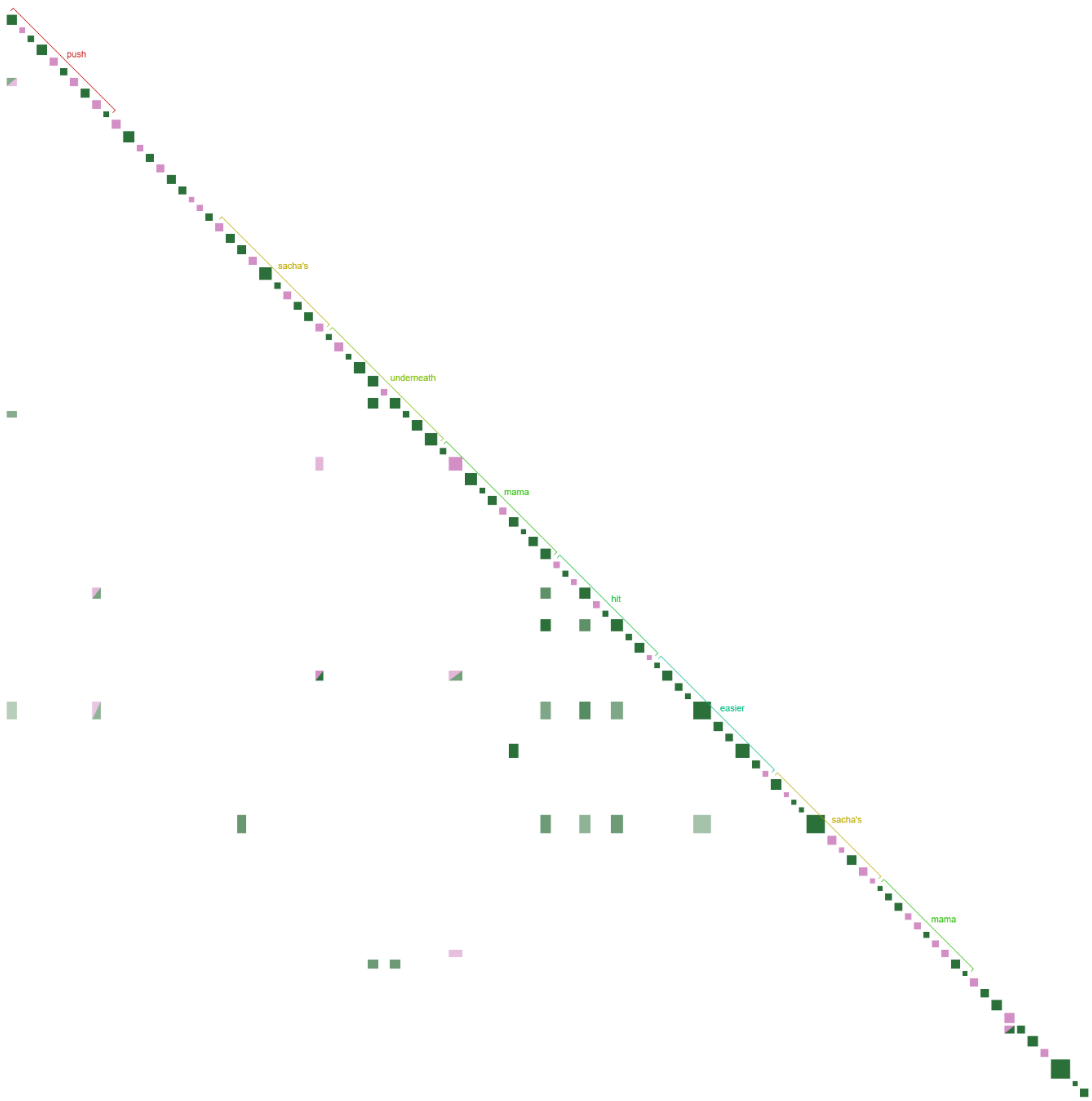


Figure B31

Discursis Temporally Sensitive Conversational Plot for Participant 15 – Symbolic play

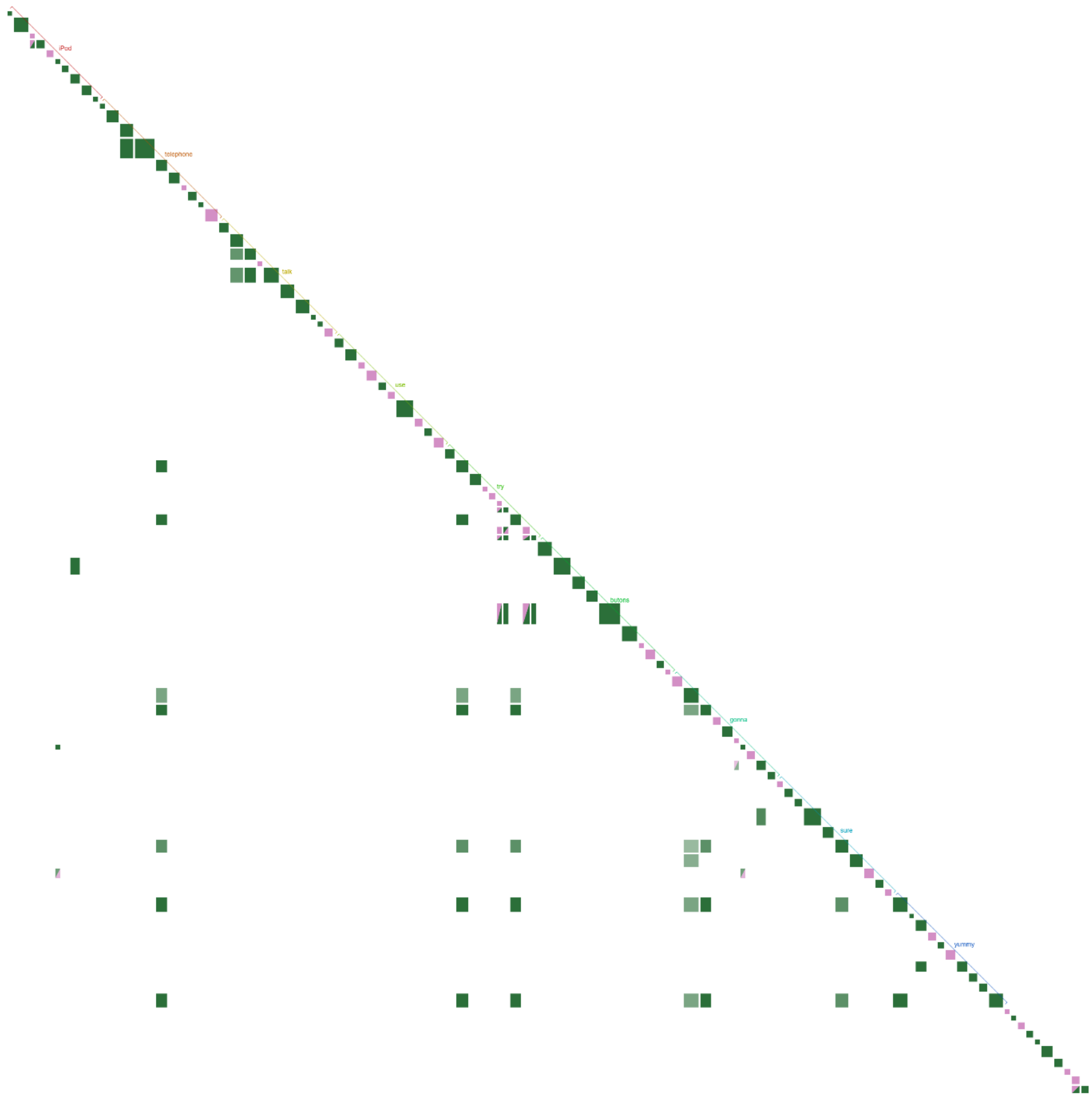


Figure B32

Discursis Temporally Sensitive Conversational Plot for Participant 15 – Functional play

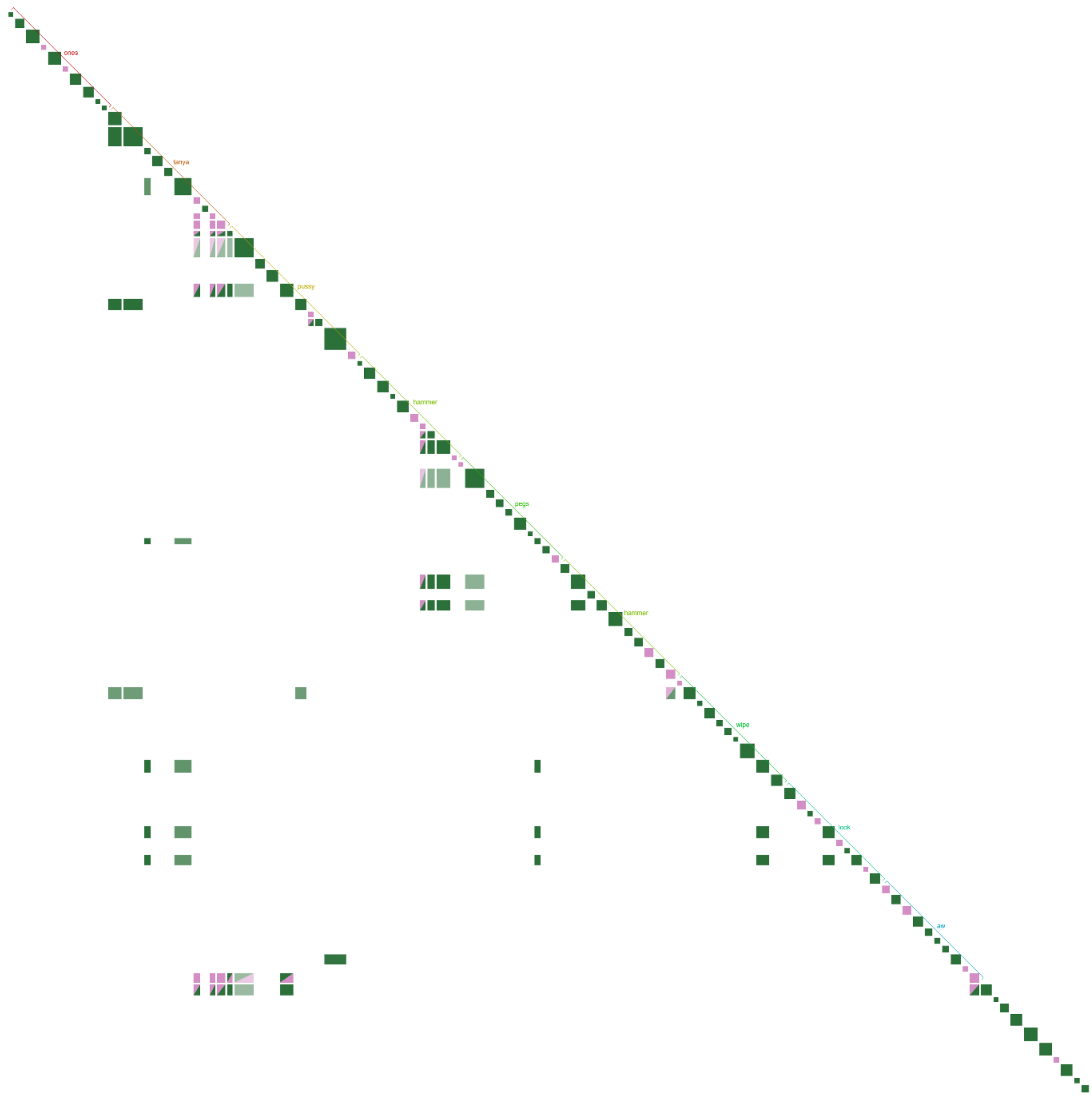


Figure B33

Discursis Temporally Sensitive Conversational Plot for Participant 16 – Symbolic play

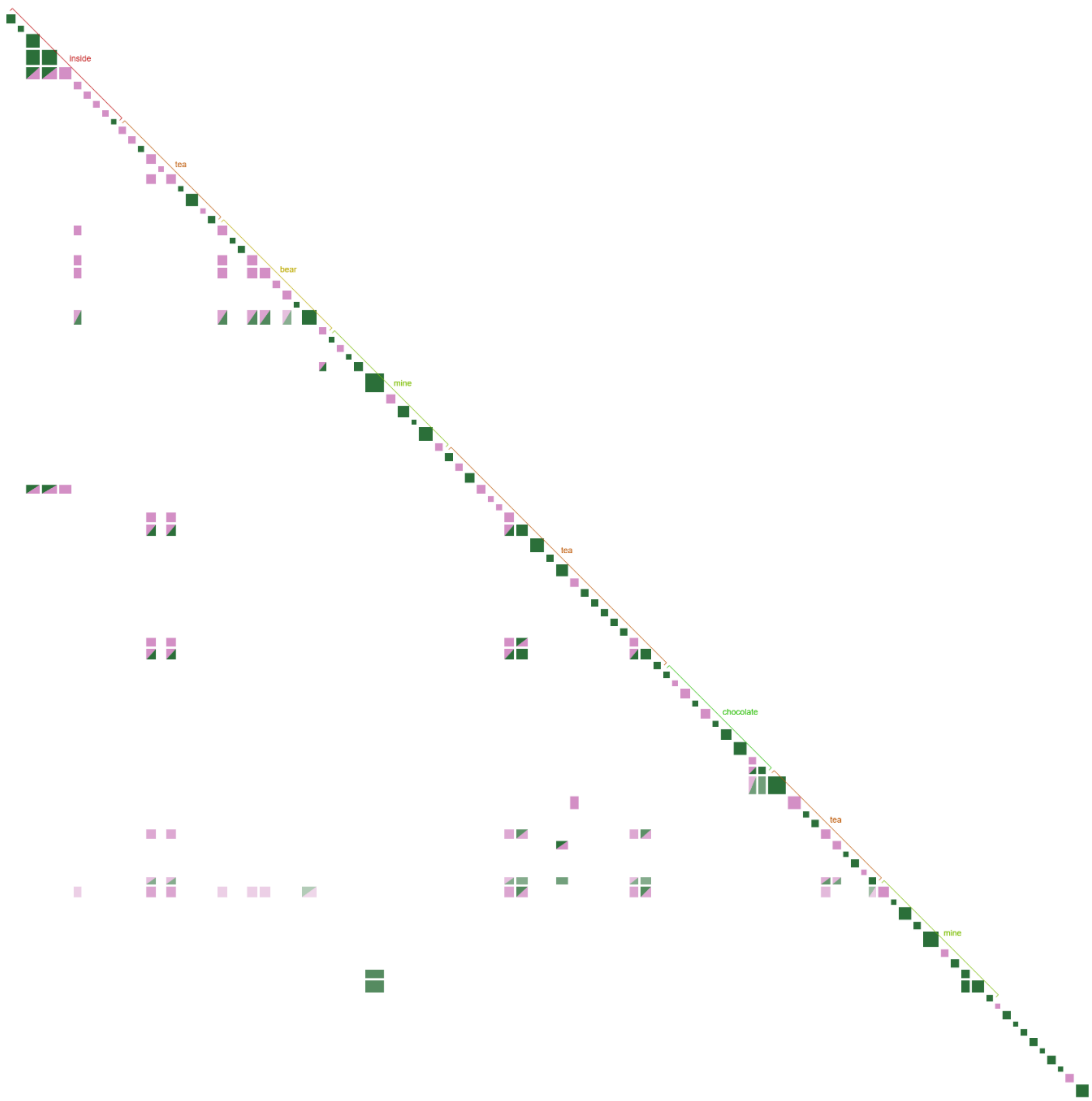


Figure B34

Discursis Temporally Sensitive Conversational Plot for Participant 16 – Functional play

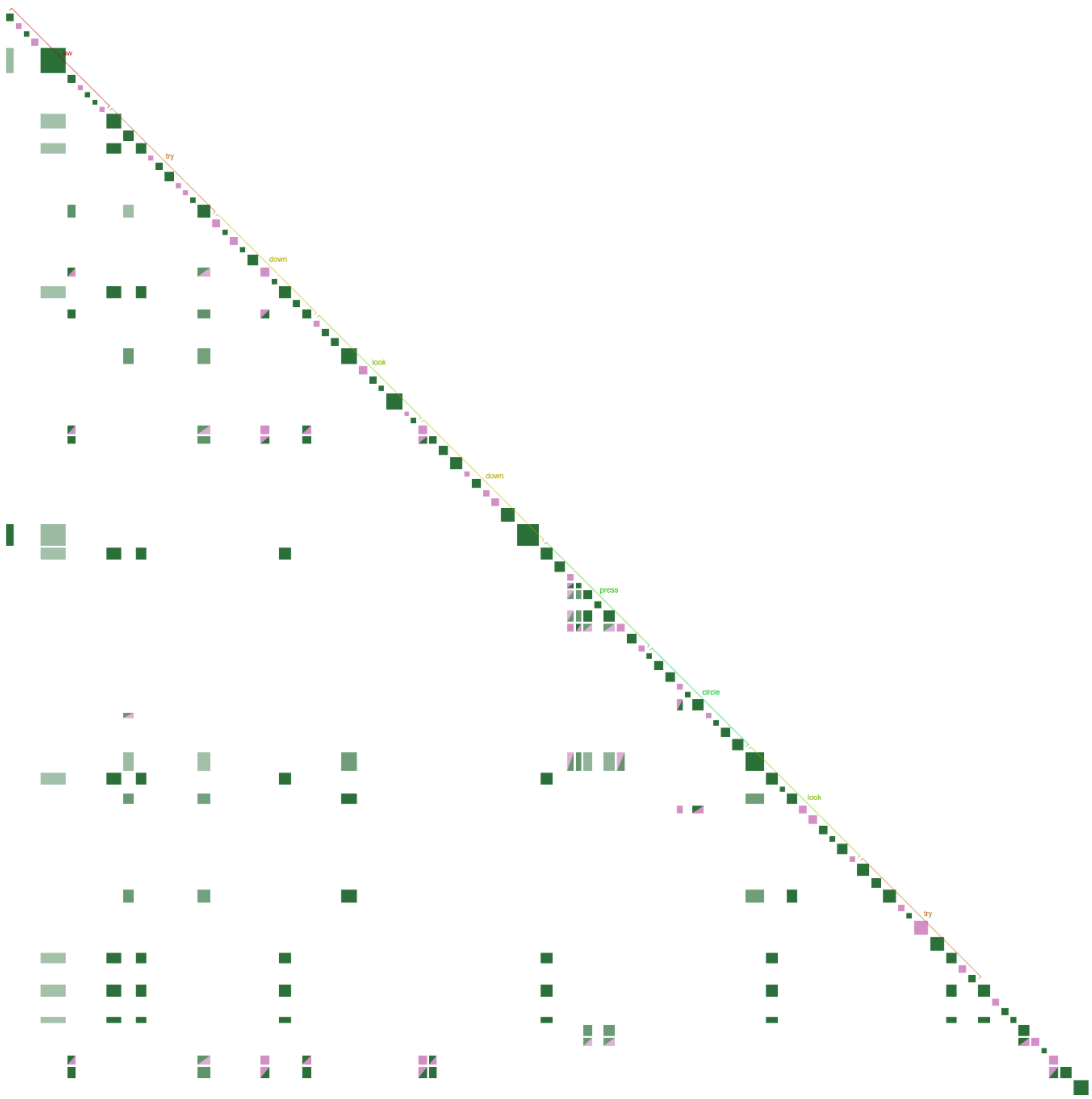


Figure B35

Discursis Temporally Sensitive Conversational Plot for Participant 17 – Symbolic play

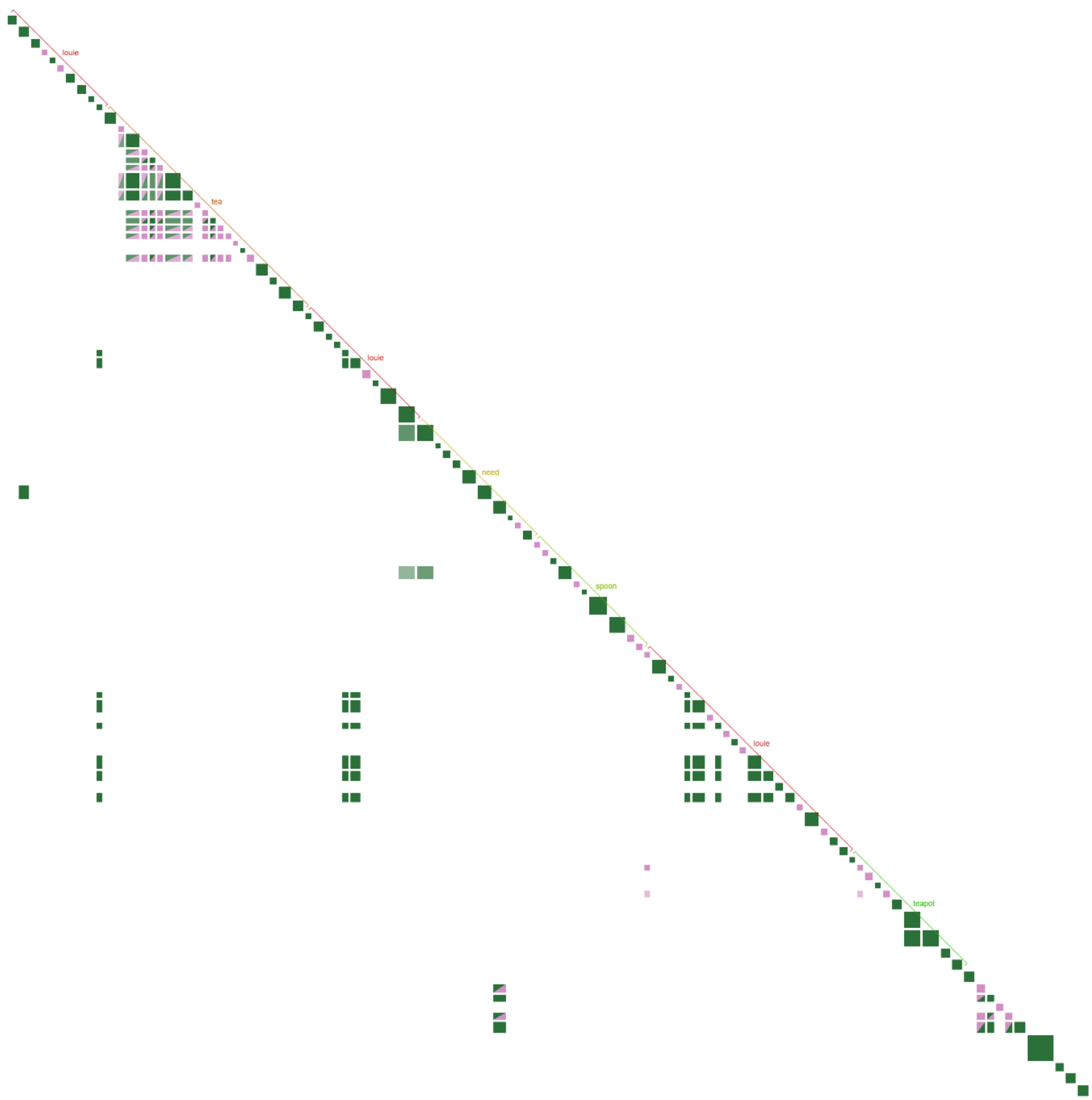


Figure B36

Discursis Temporally Sensitive Conversational Plot for Participant 17 – Functional play

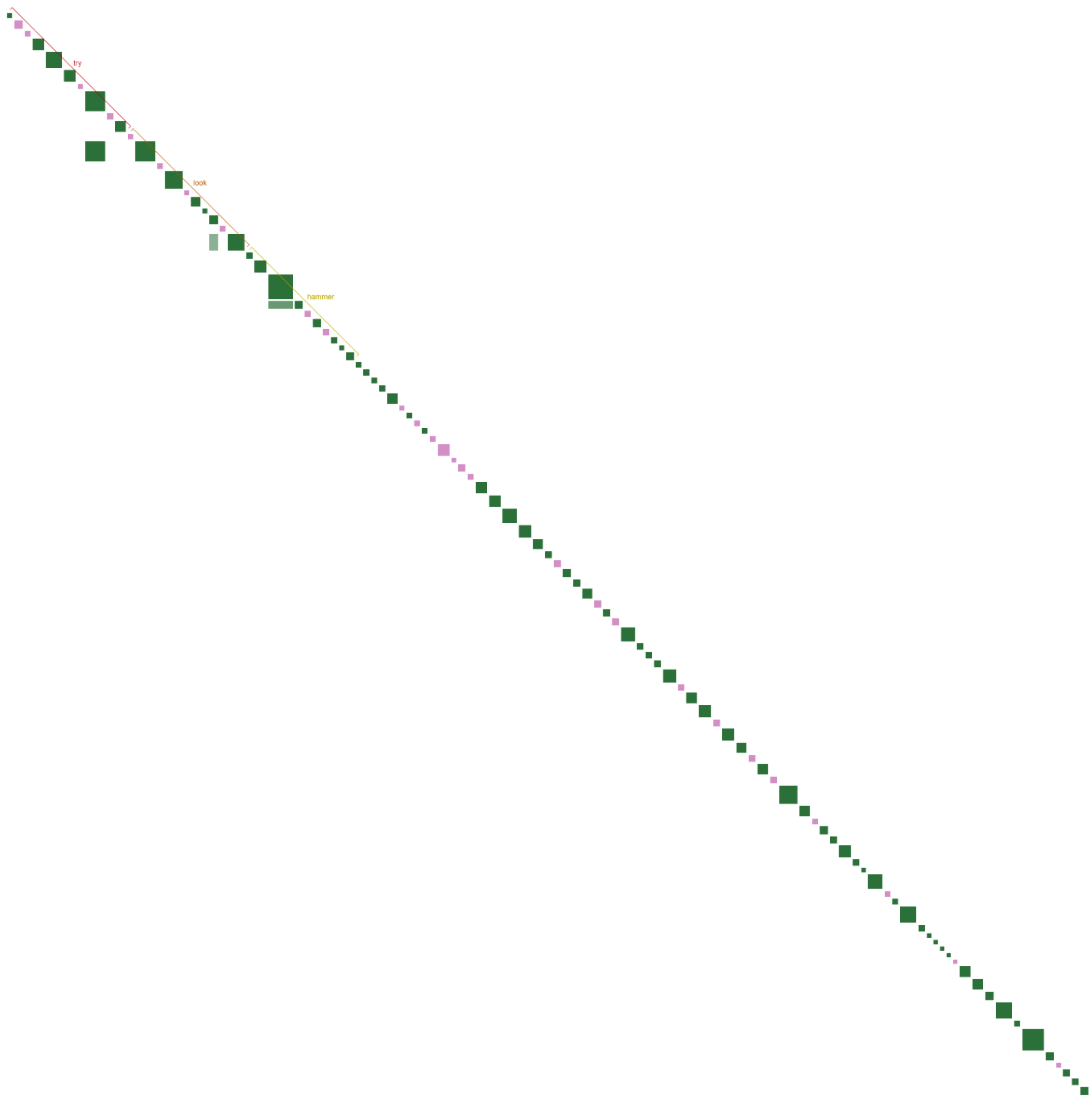


Figure B37

Discursis Temporally Sensitive Conversational Plot for Participant 18 – Symbolic play

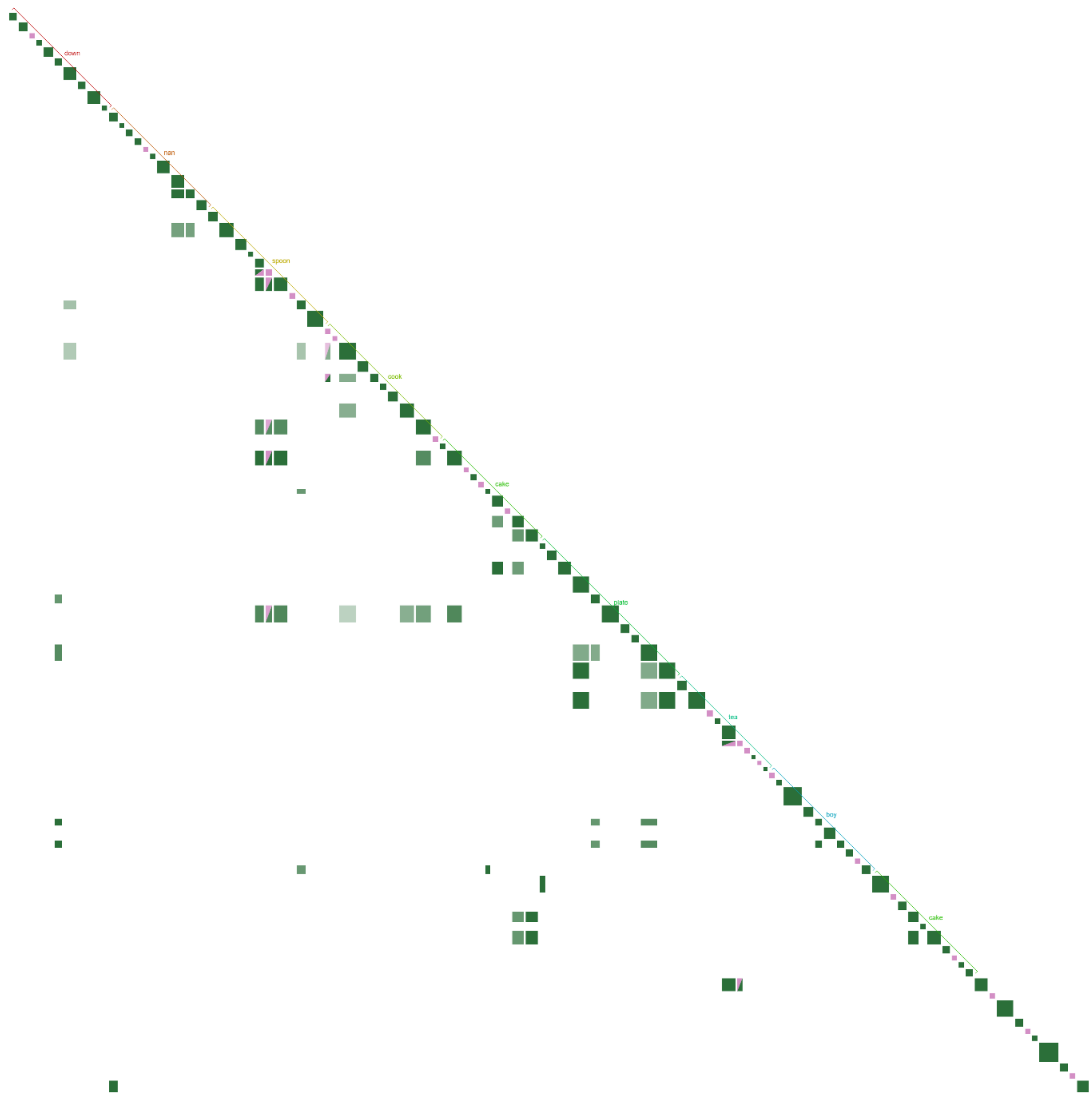


Figure B38

Discursis Temporally Sensitive Conversational Plot for Participant 18 – Functional play

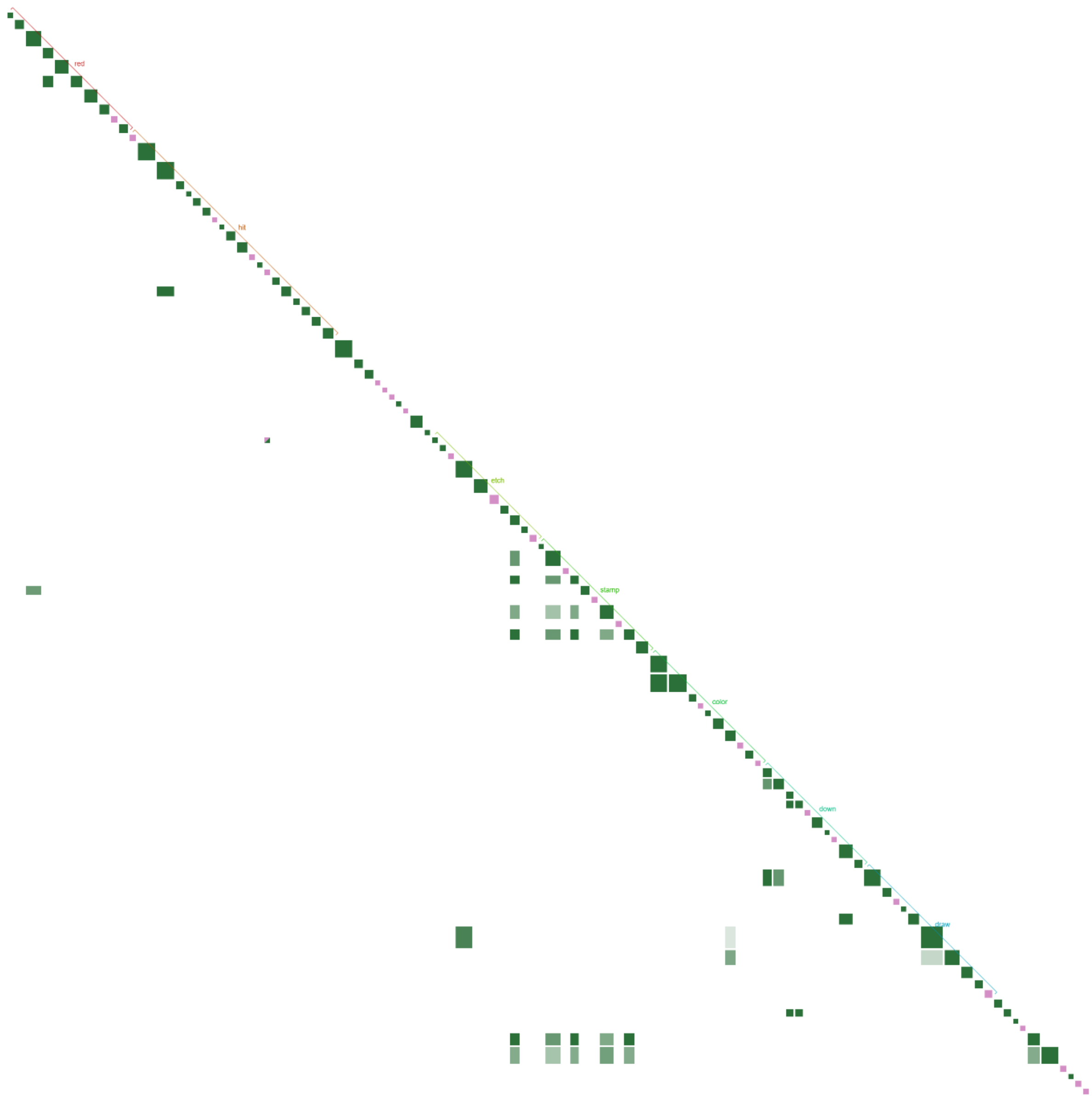


Figure B39

Discursis Temporally Sensitive Conversational Plot for Participant 19 – Symbolic play

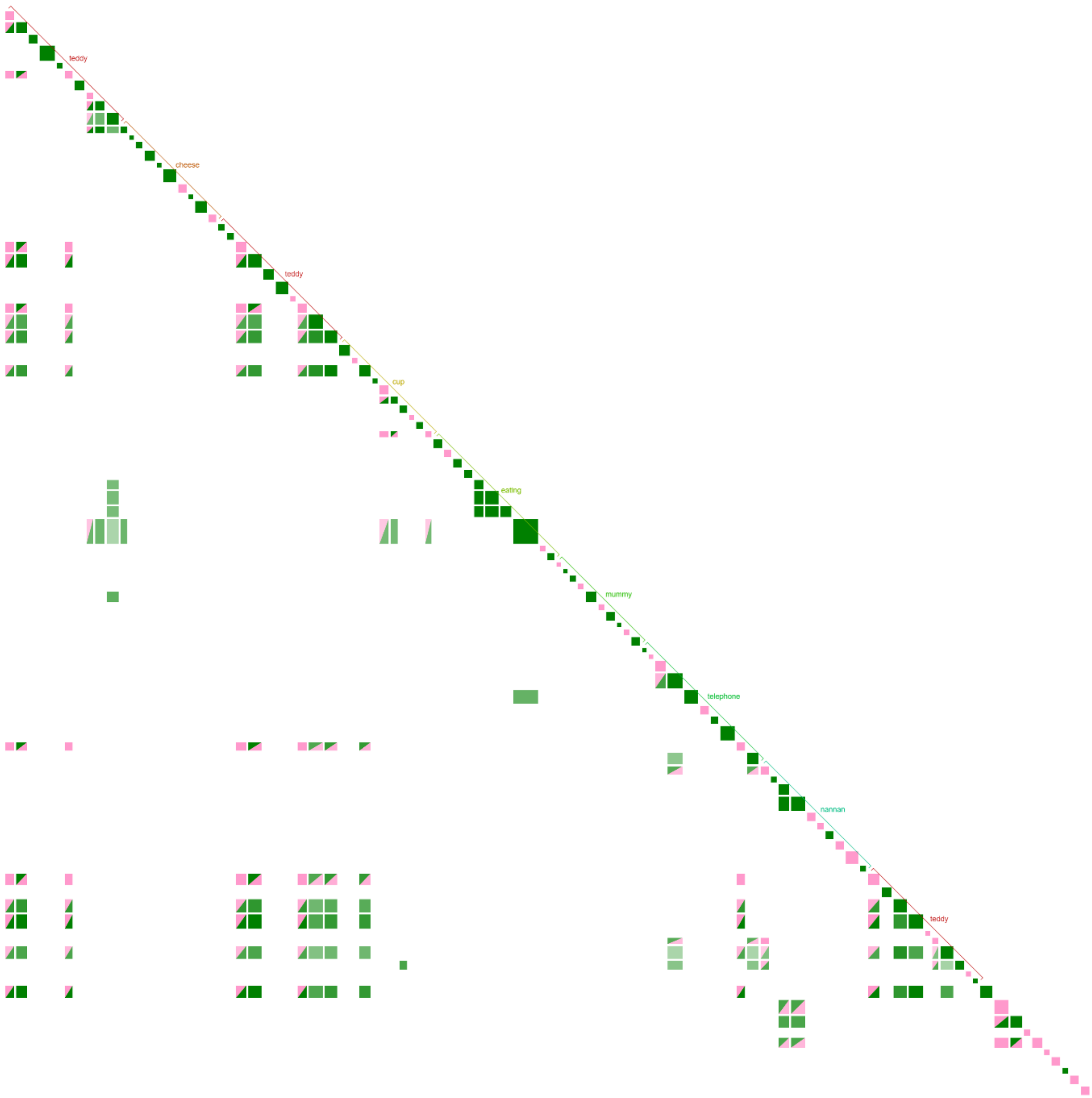


Figure B40

Discursis Temporally Sensitive Conversational Plot for Participant 19 – Functional play

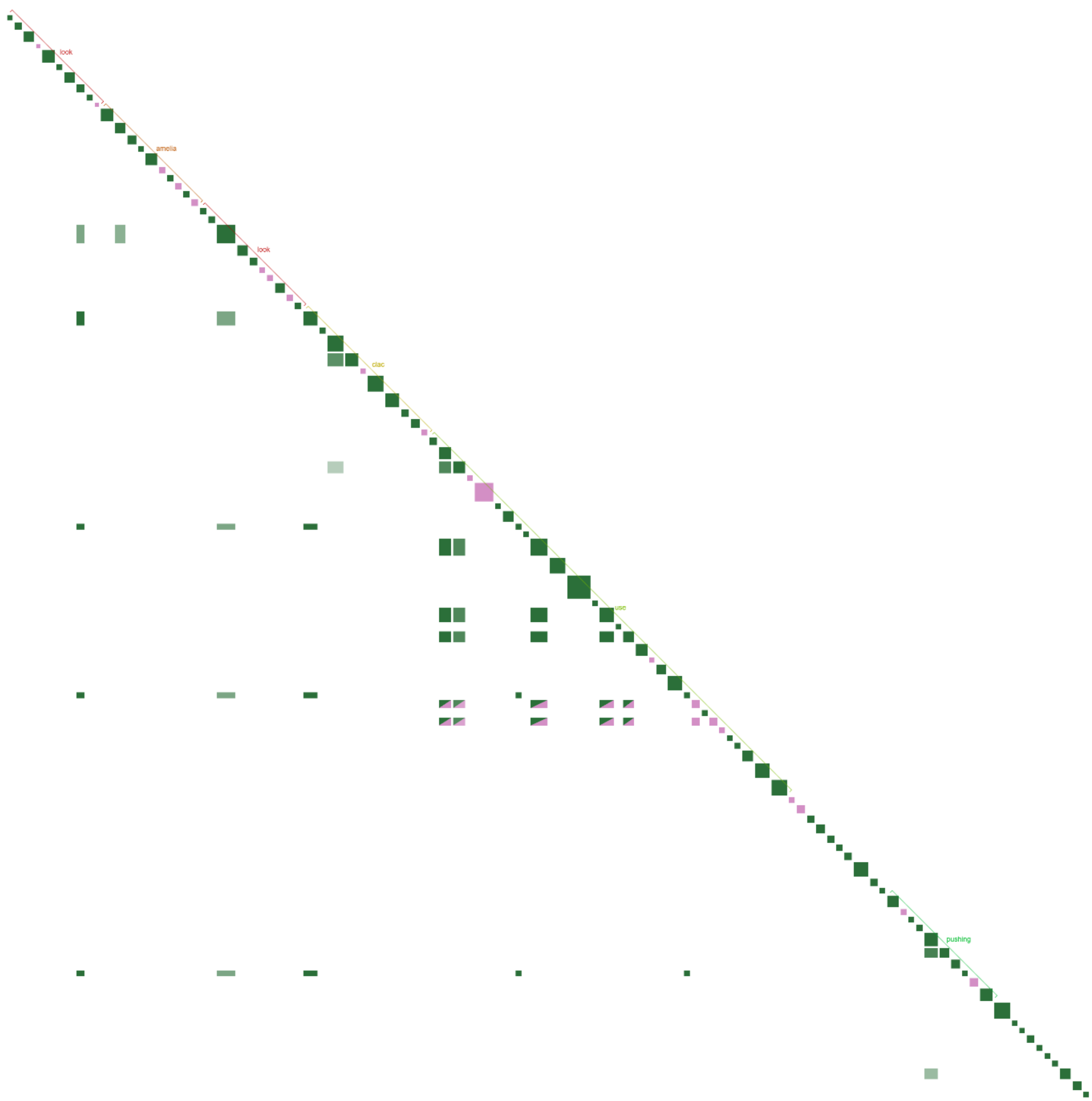


Figure B41

Discursis Temporally Sensitive Conversational Plot for Participant 20 – Symbolic play

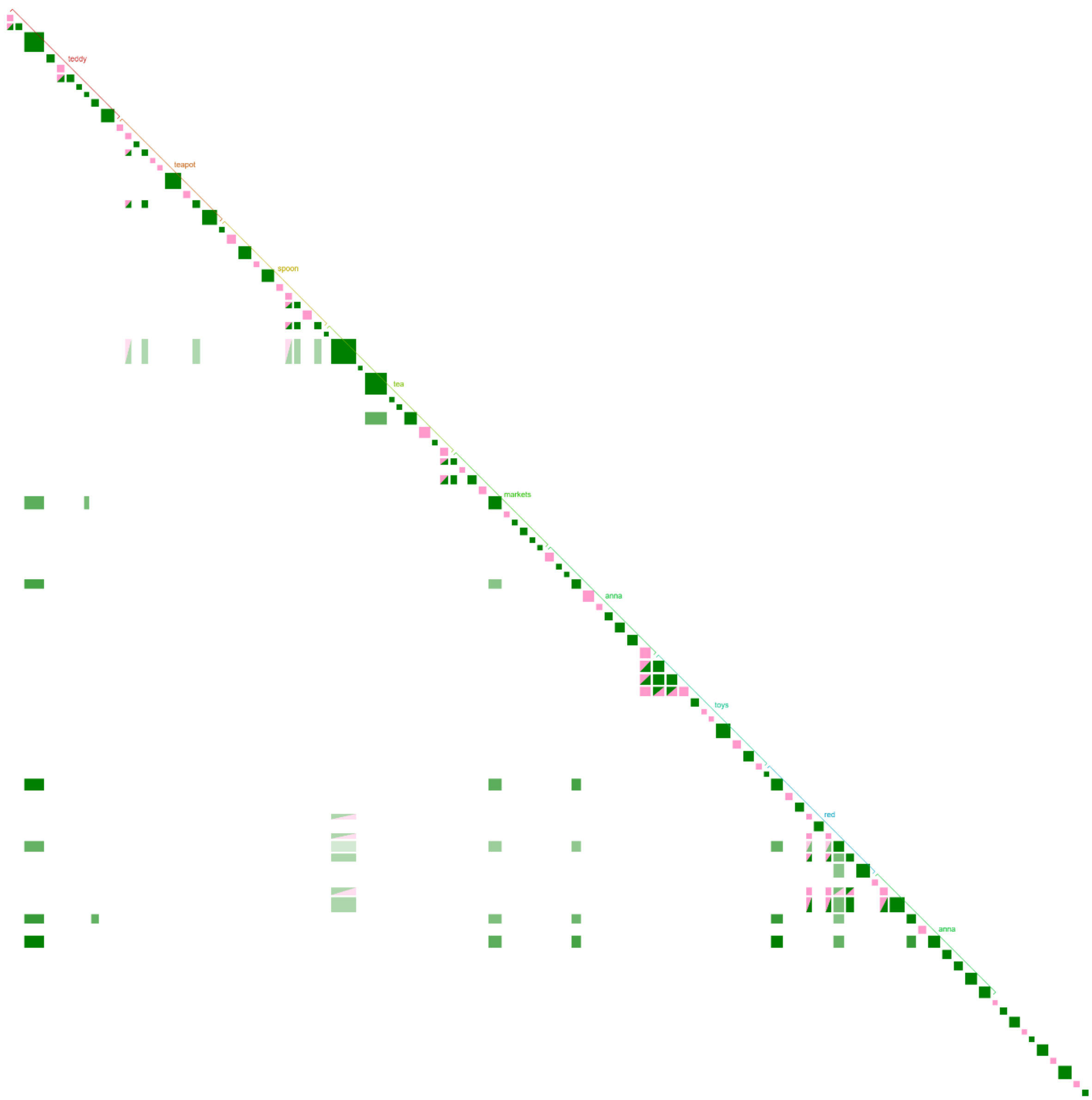


Figure B42

Discursis Temporally Sensitive Conversational Plot for Participant 20 – Functional play

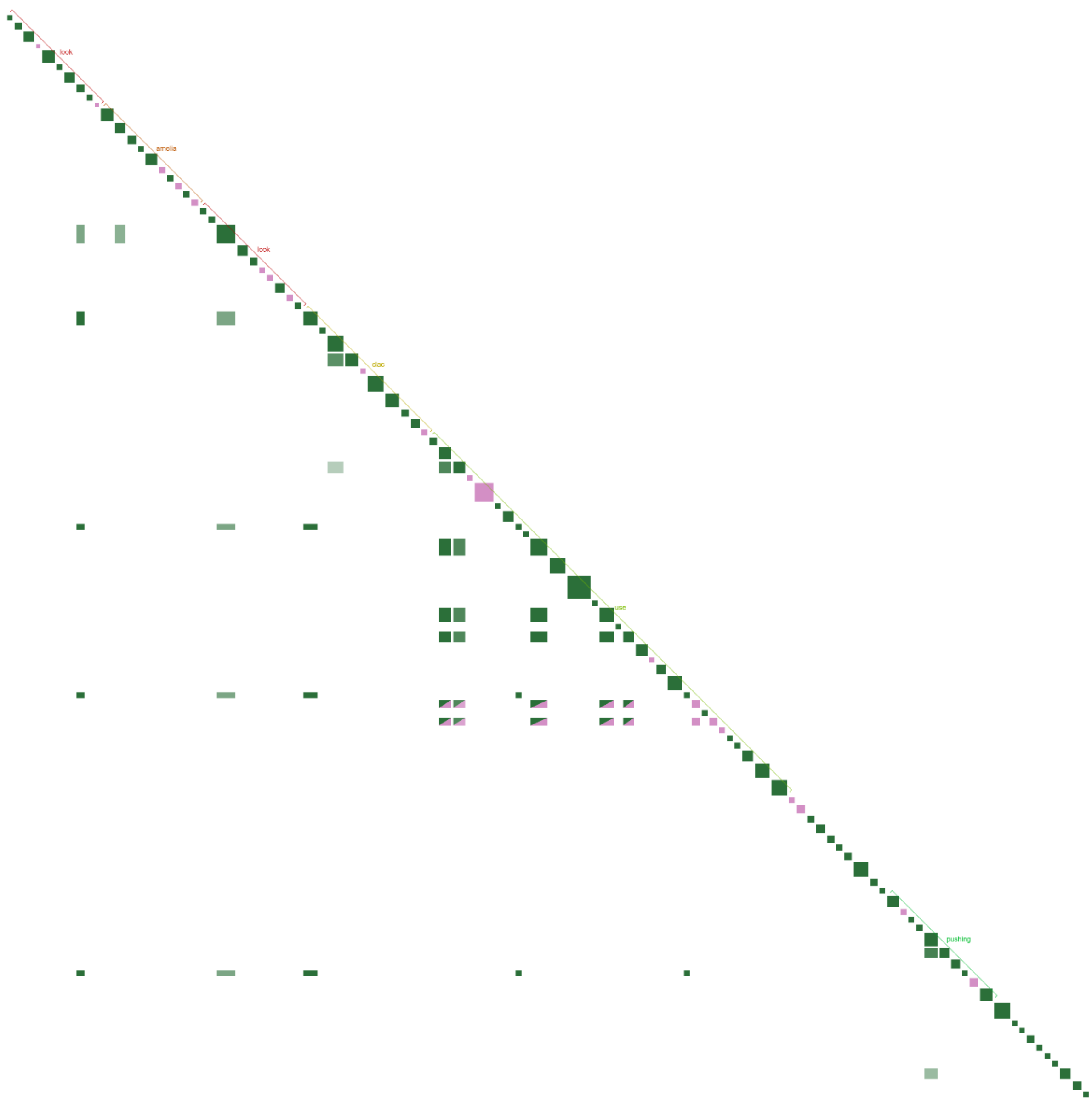


Figure B43

Discursis Temporally Sensitive Conversational Plot for Participant 21 – Symbolic play

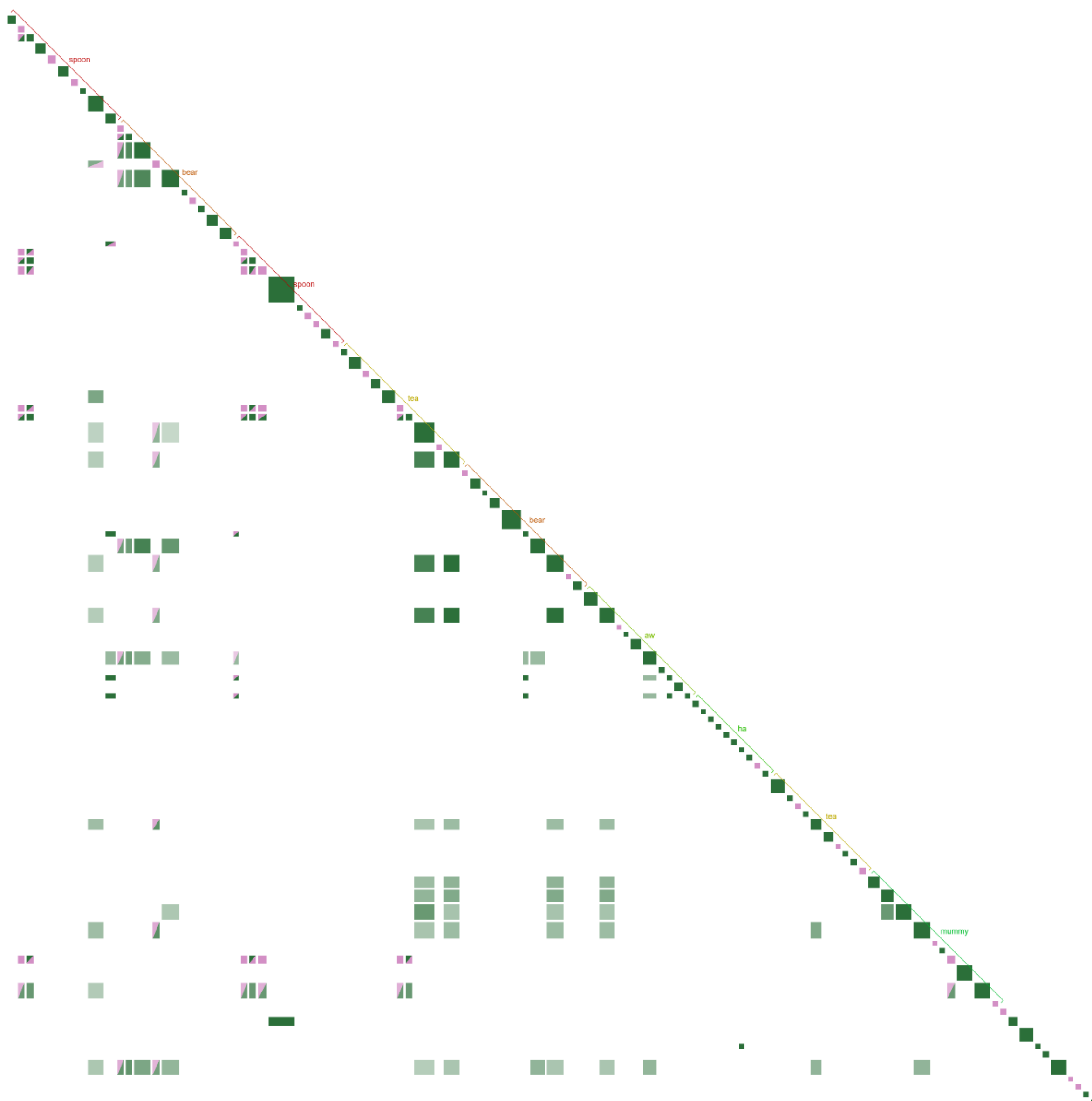


Figure B44

Discursis Temporally Sensitive Conversational Plot for Participant 21 – Functional play

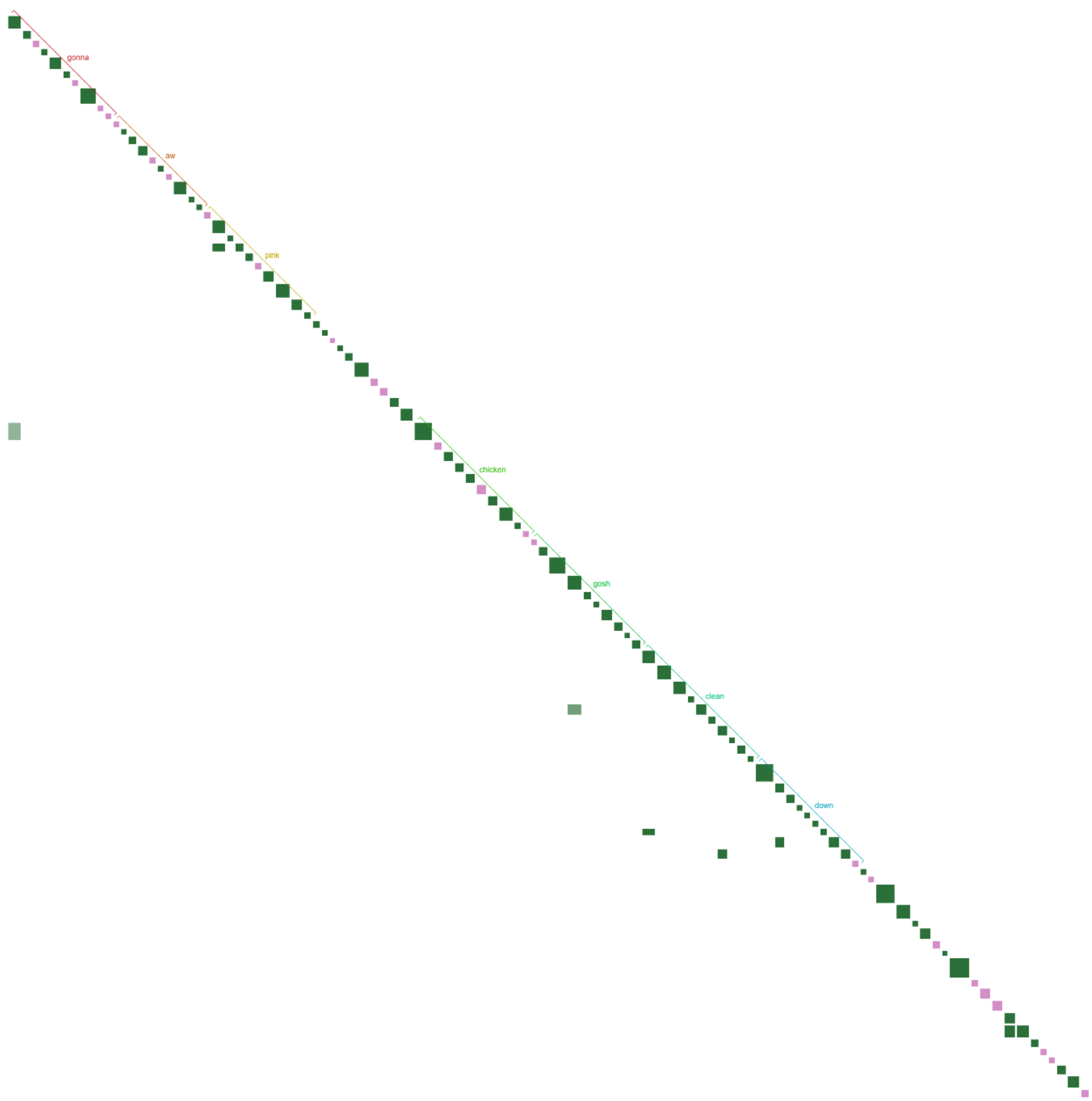


Figure B45

Discursis Temporally Sensitive Conversational Plot for Participant 22 – Symbolic play

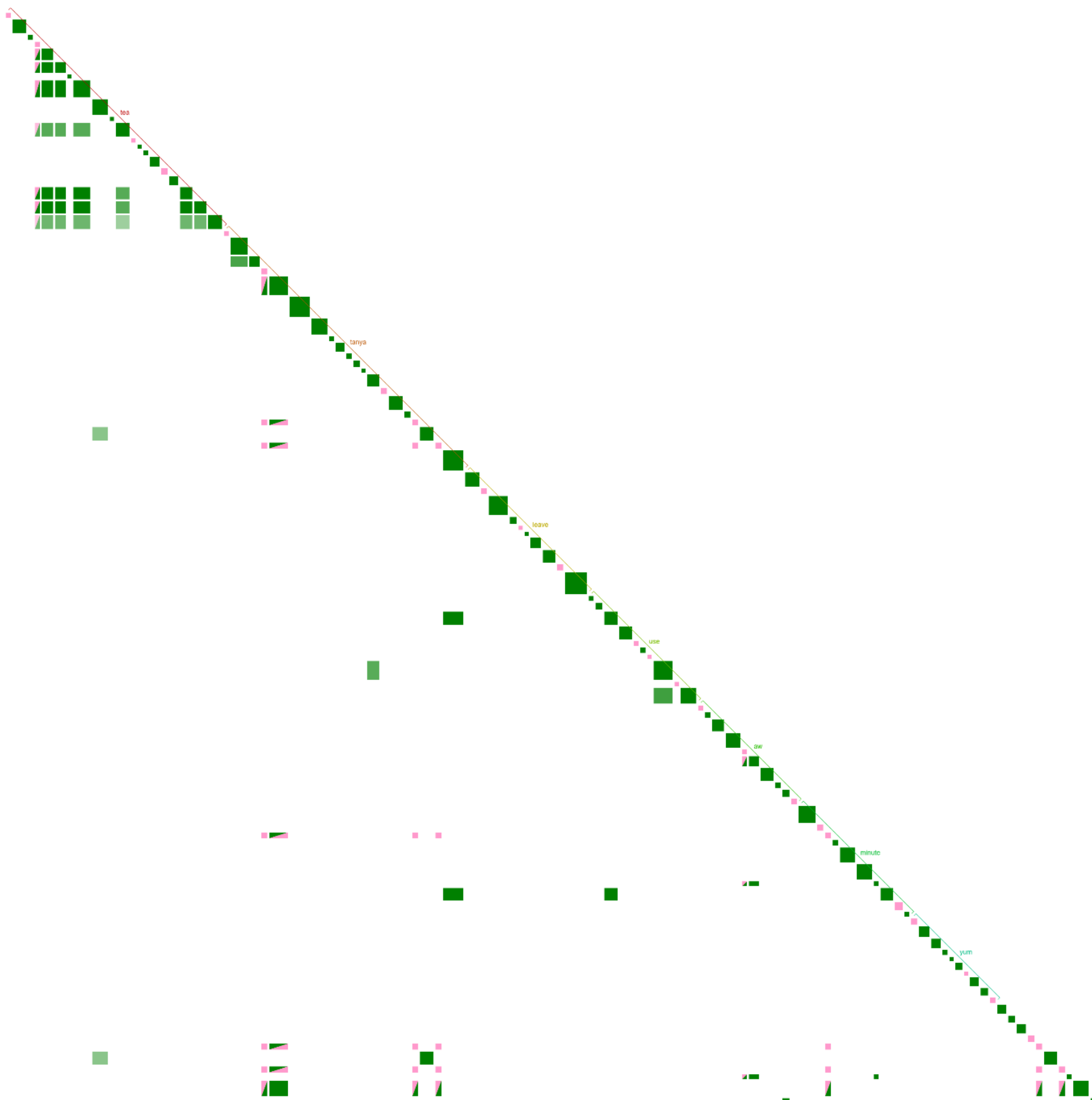


Figure B46

Discursis Temporally Sensitive Conversational Plot for Participant 22 – Functional play

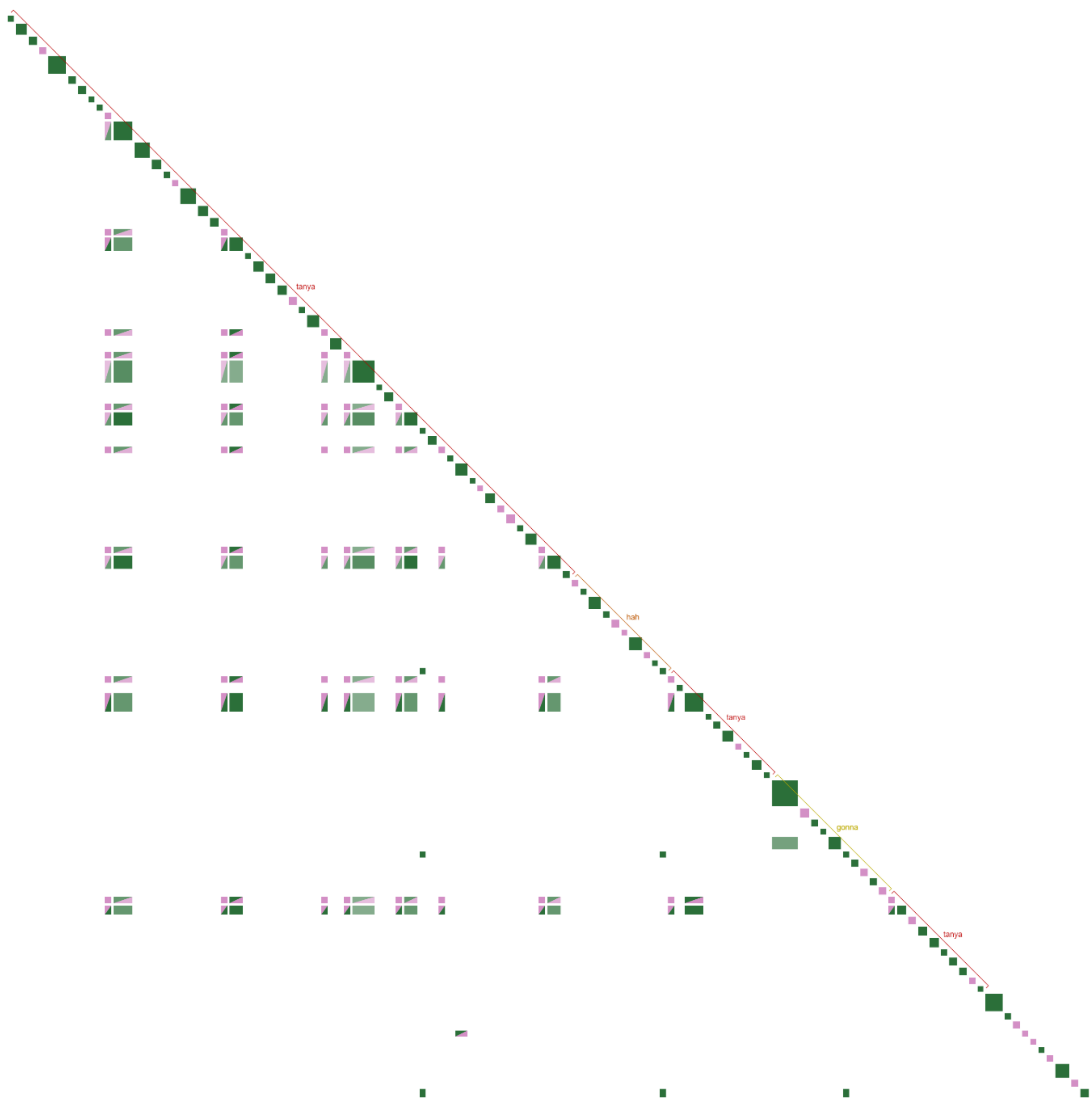


Figure B47

Discursis Temporally Sensitive Conversational Plot for Participant 23 – Symbolic play

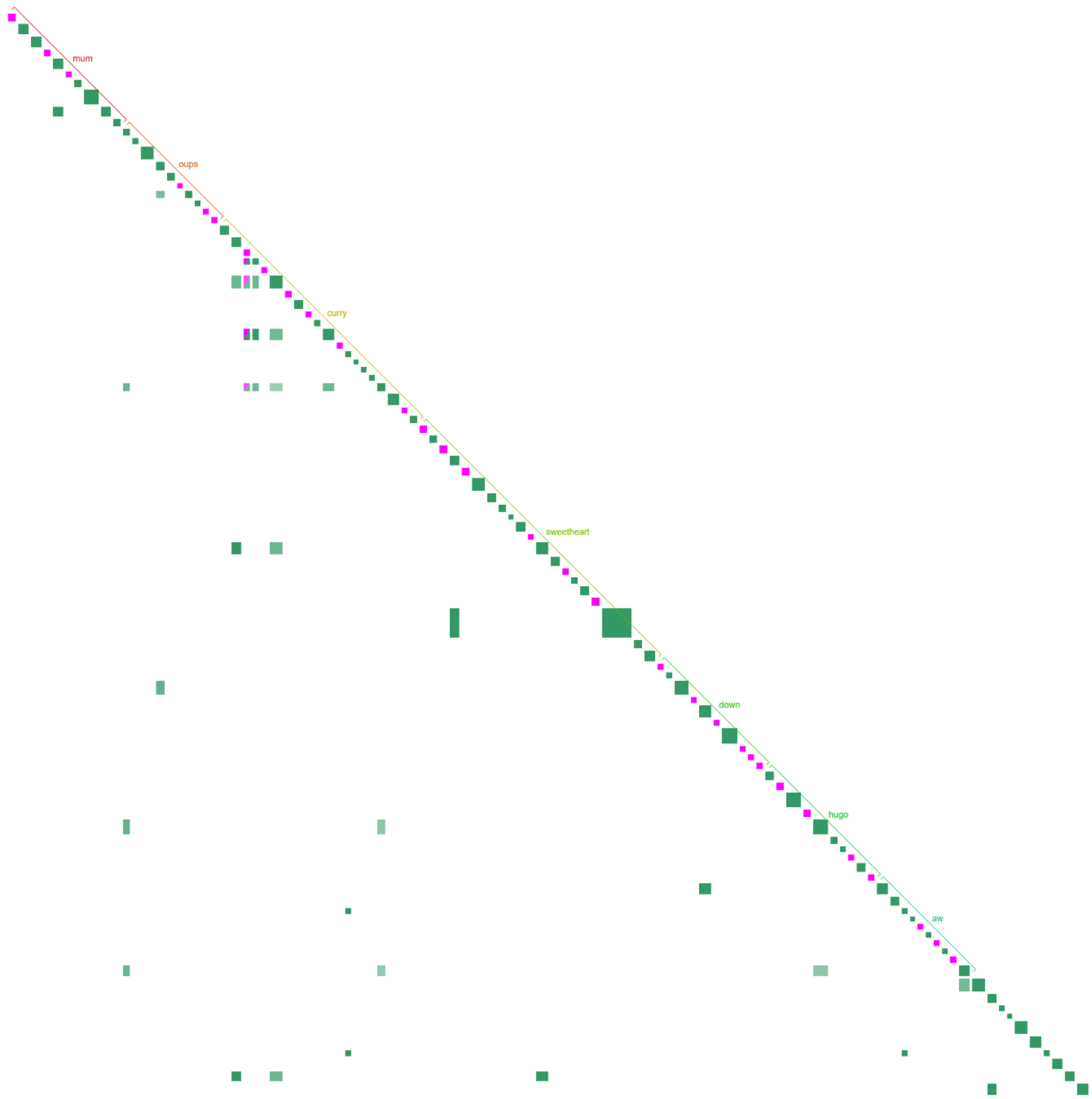


Figure B48

Discursis Temporally Sensitive Conversational Plot for Participant 23 – Functional play

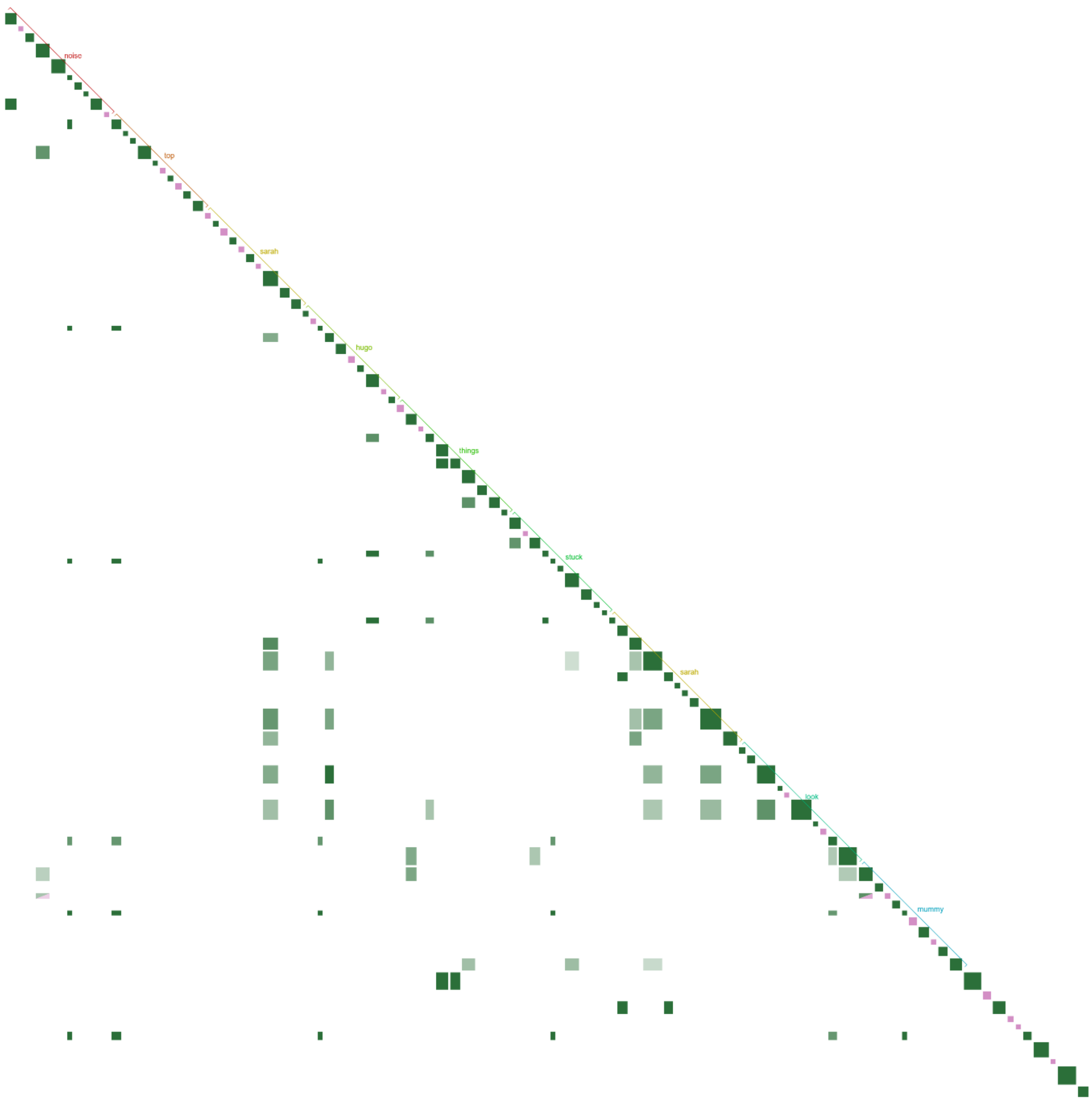


Figure B49

Discursis Temporally Sensitive Conversational Plot for Participant 24 – Symbolic play

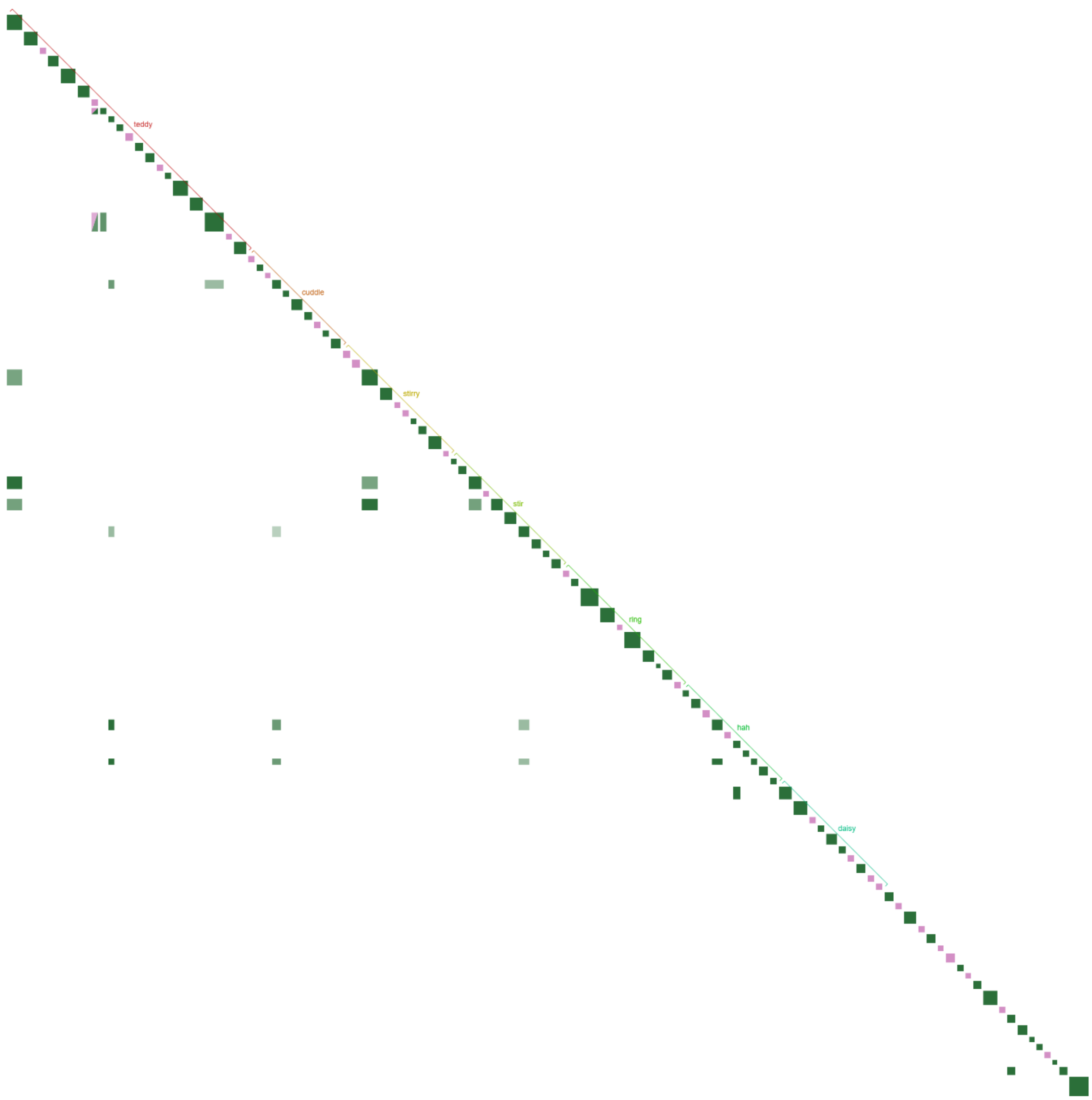


Figure B50

Discursis Temporally Sensitive Conversational Plot for Participant 24 – Functional play

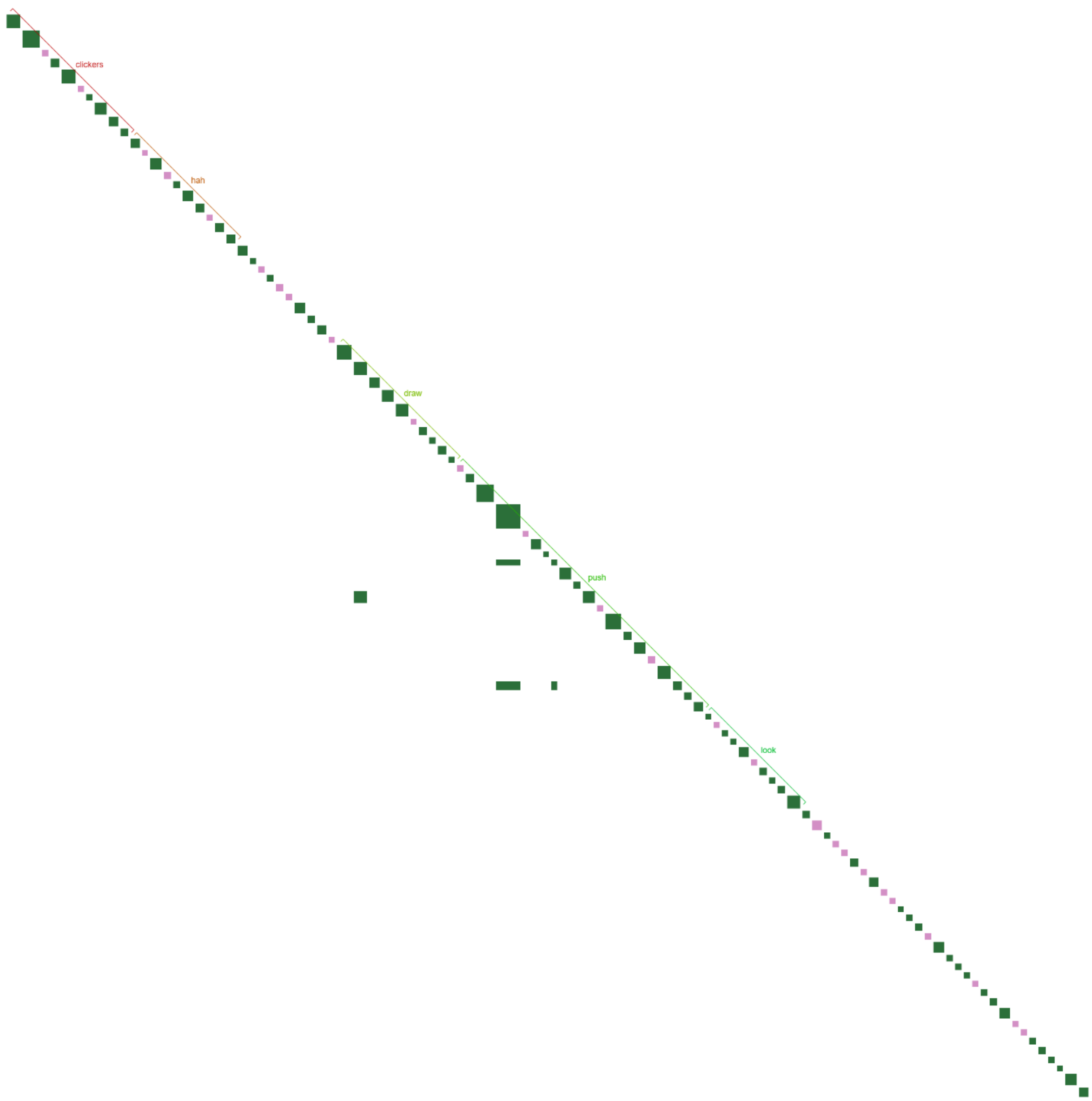


Figure B51

Discursis Temporally Sensitive Conversational Plot for Participant 25 – Symbolic play

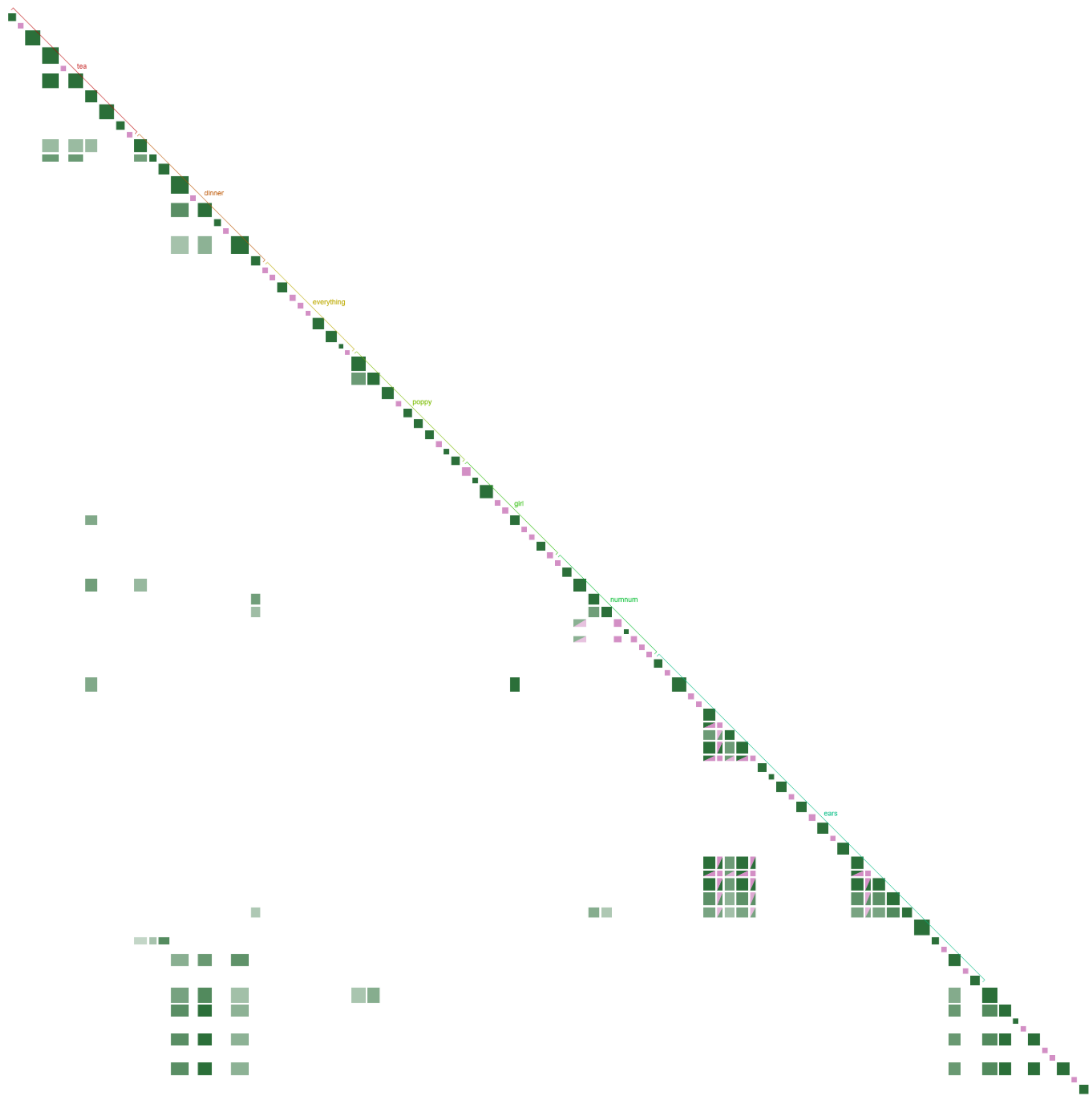


Figure B52

Discursis Temporally Sensitive Conversational Plot for Participant 25 – Functional play

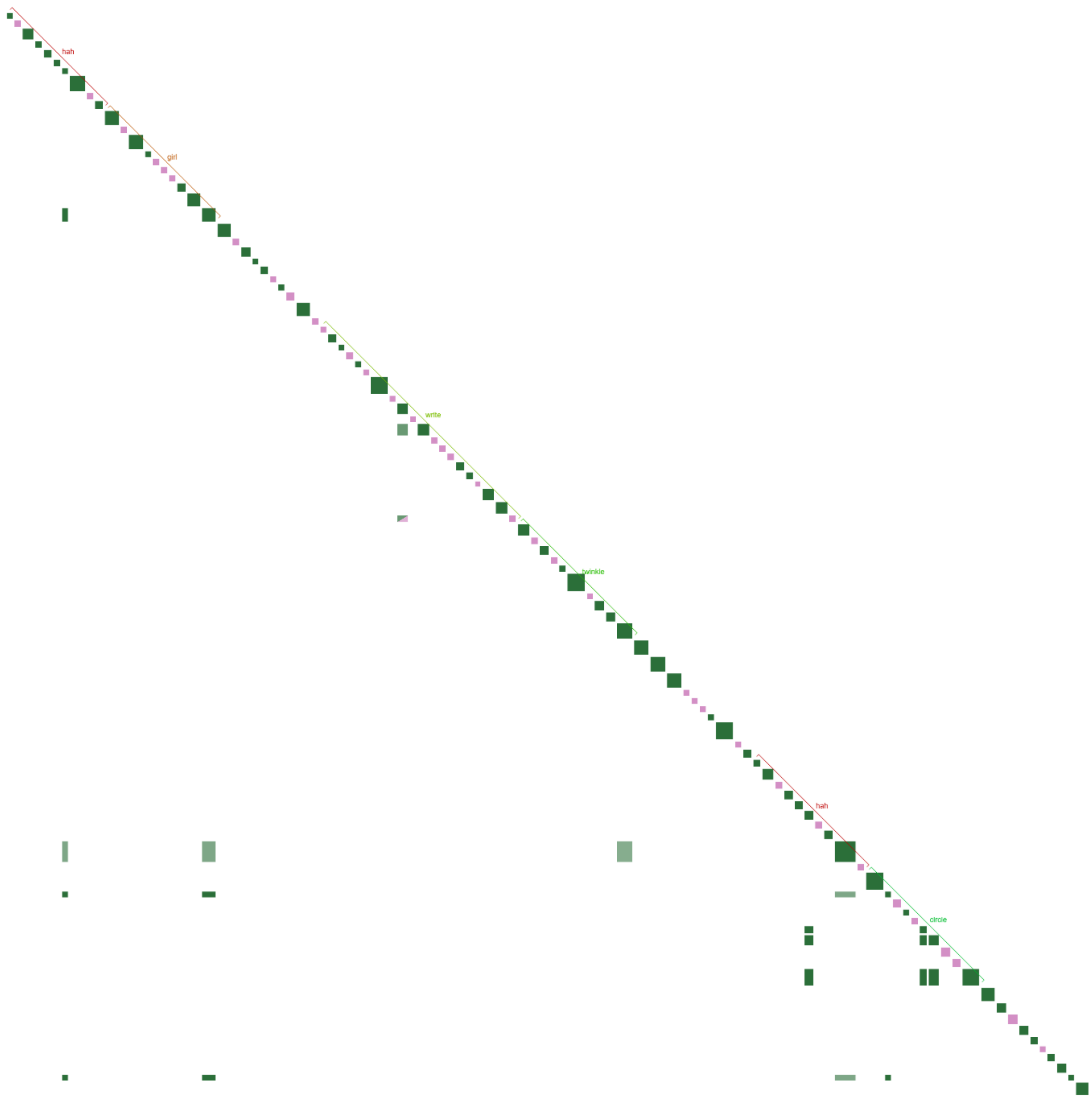


Figure B53

Discursis Temporally Sensitive Conversational Plot for Participant 26 – Symbolic play

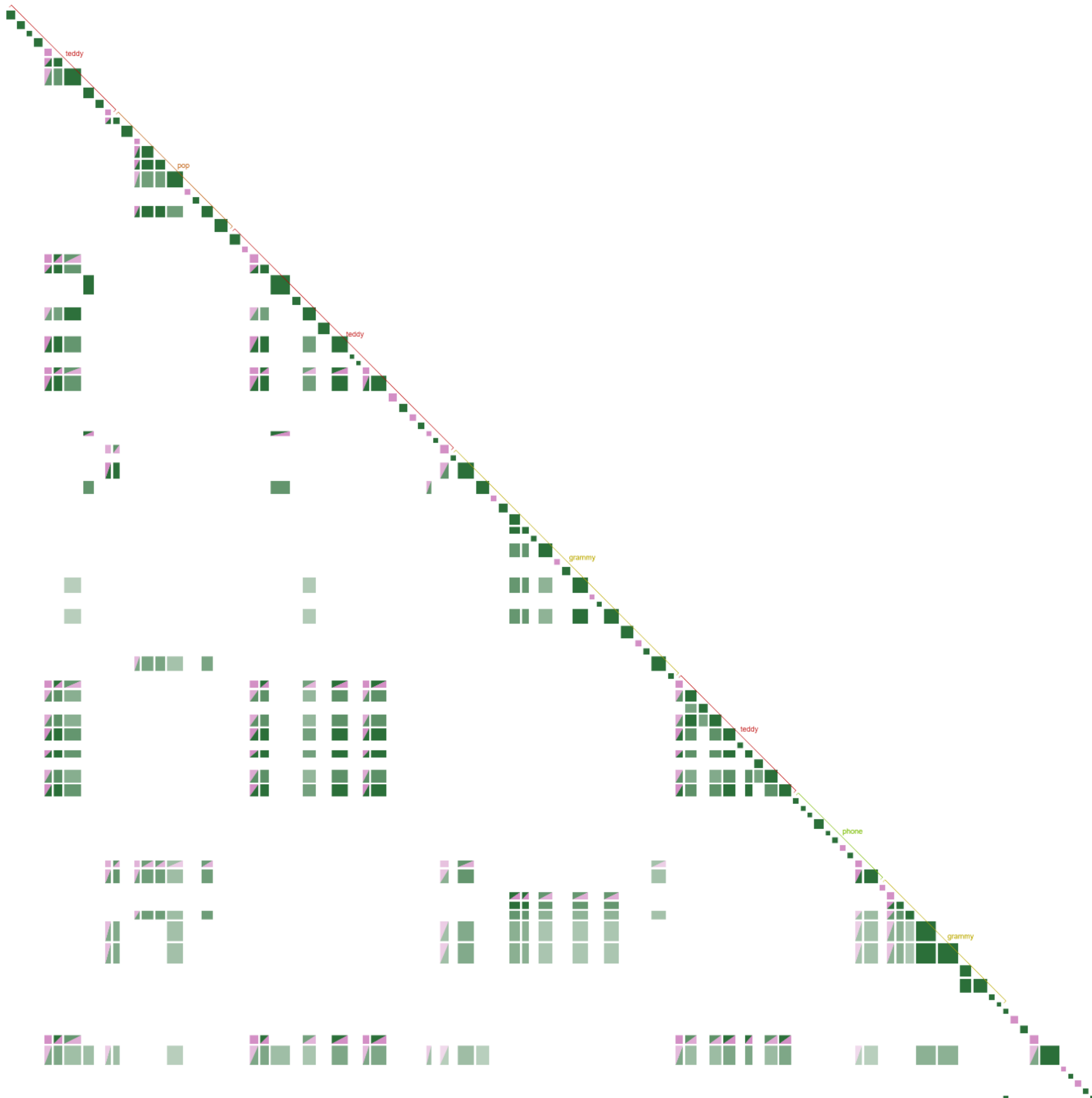


Figure B54

Discursis Temporally Sensitive Conversational Plot for Participant 26 – Functional play

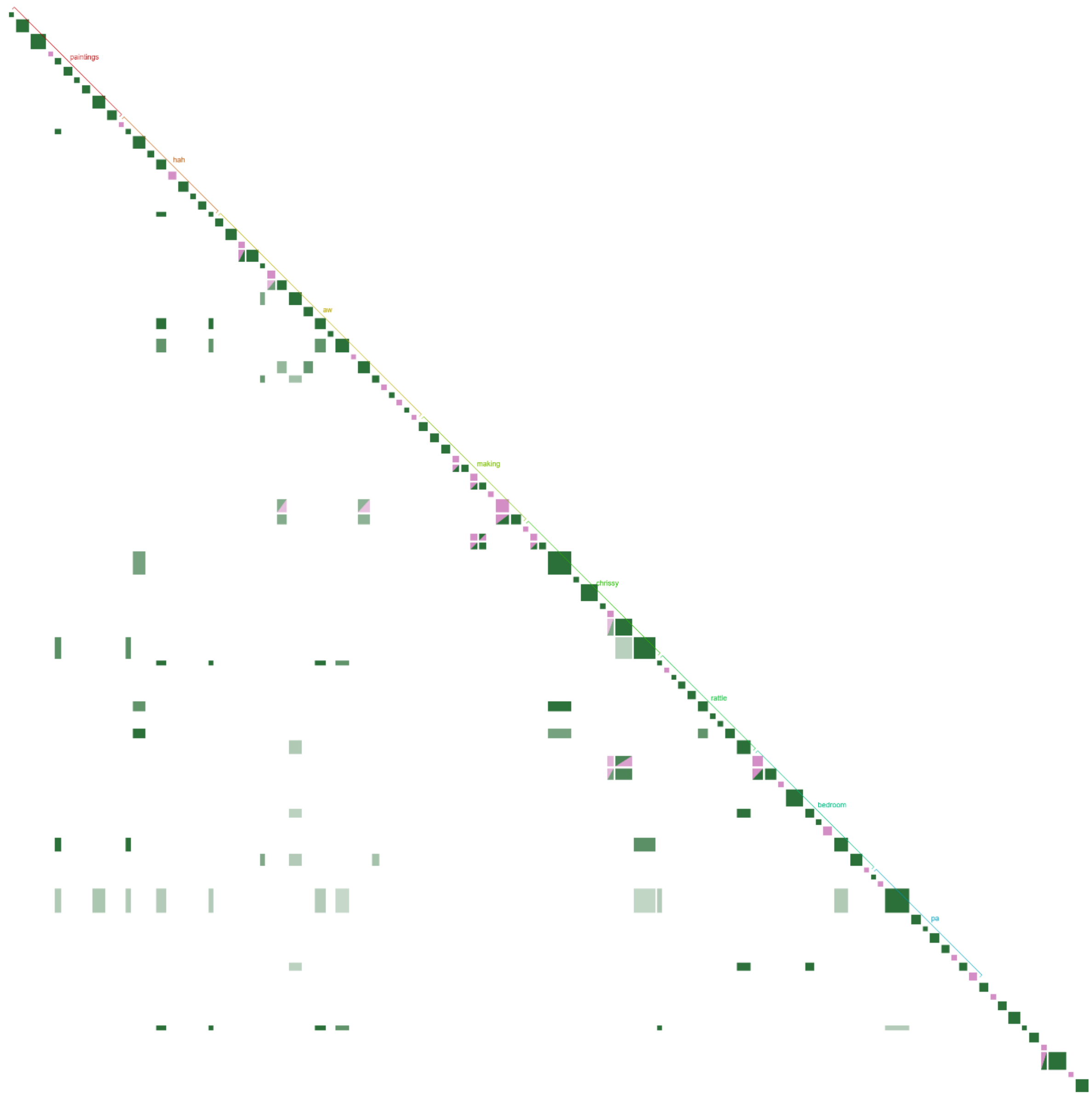


Figure B55

Discursis Temporally Sensitive Conversational Plot for Participant 27 – Symbolic play

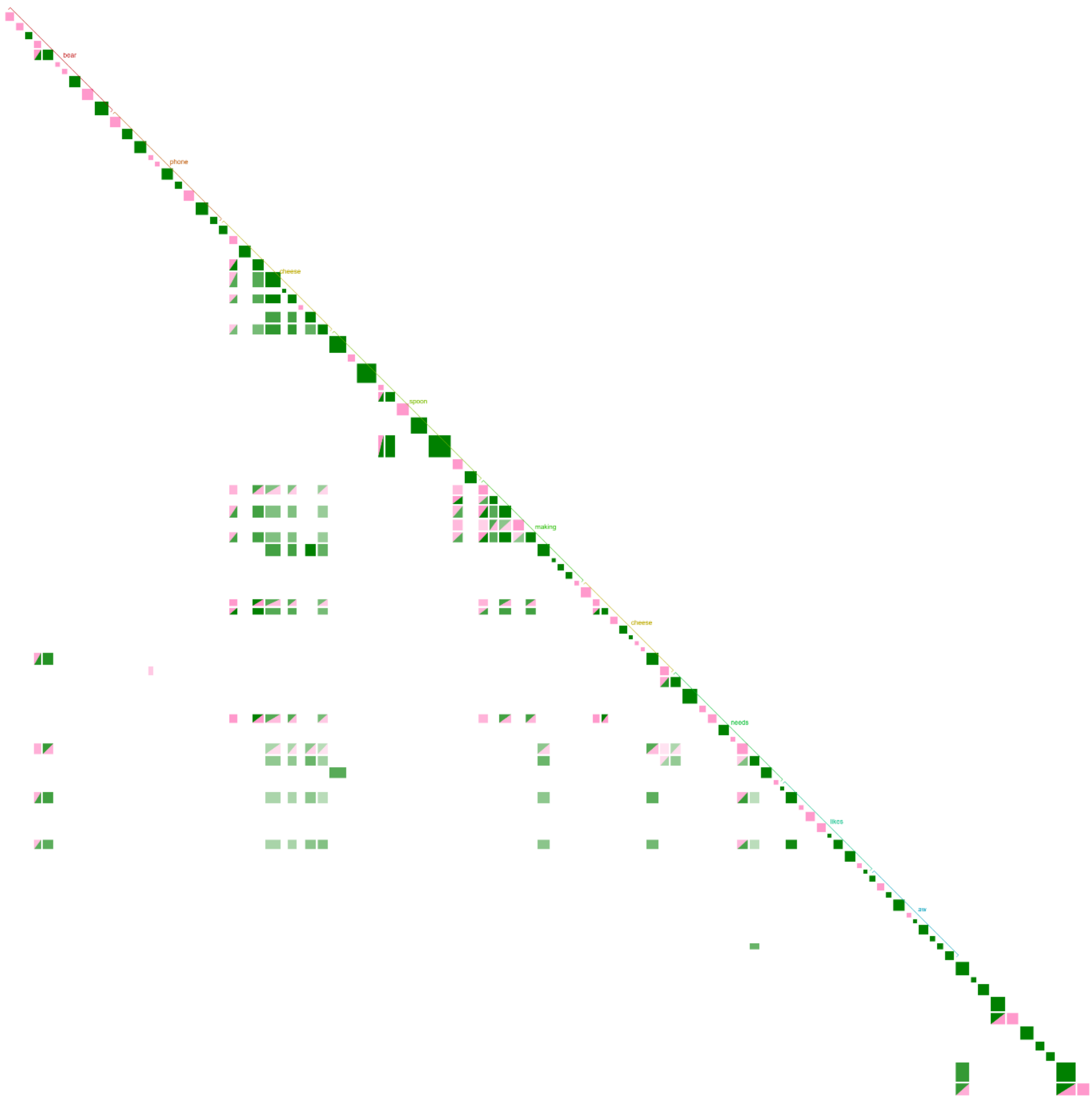


Figure B56

Discursis Temporally Sensitive Conversational Plot for Participant 27 – Functional play

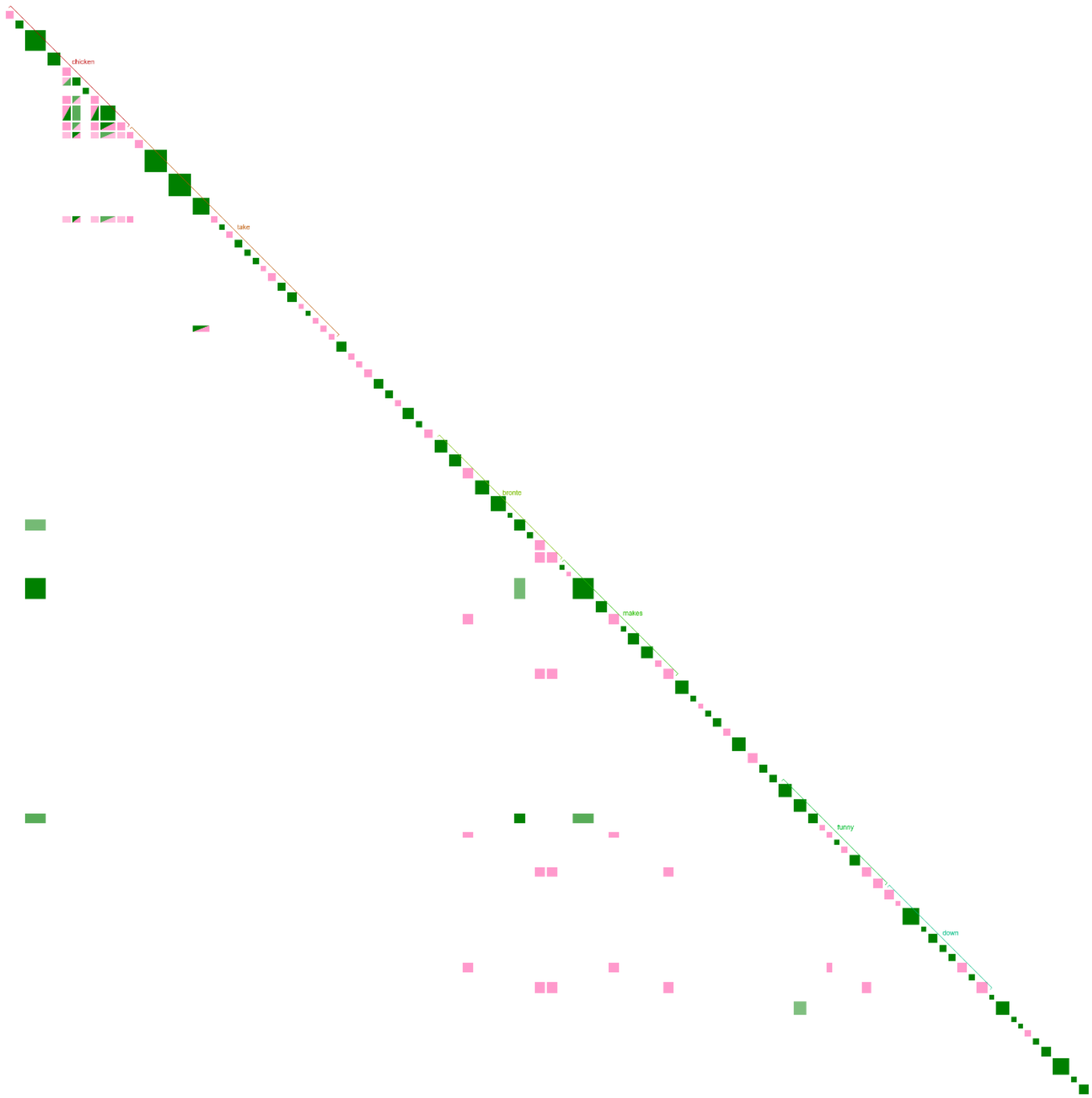


Figure B57

Discursis Temporally Sensitive Conversational Plot for Participant 28 – Symbolic play

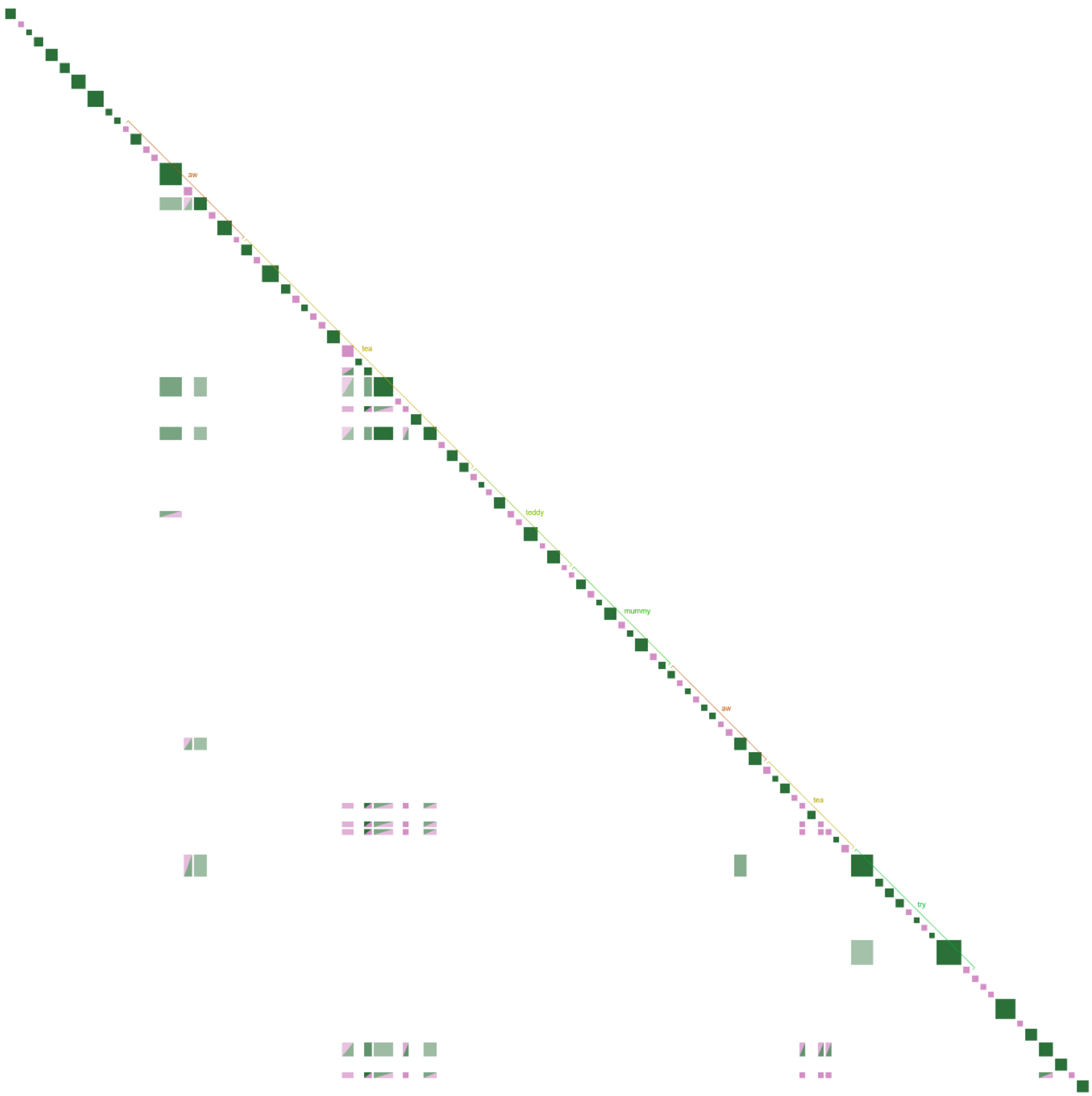


Figure B58

Discursis Temporally Sensitive Conversational Plot for Participant 28 – Functional play

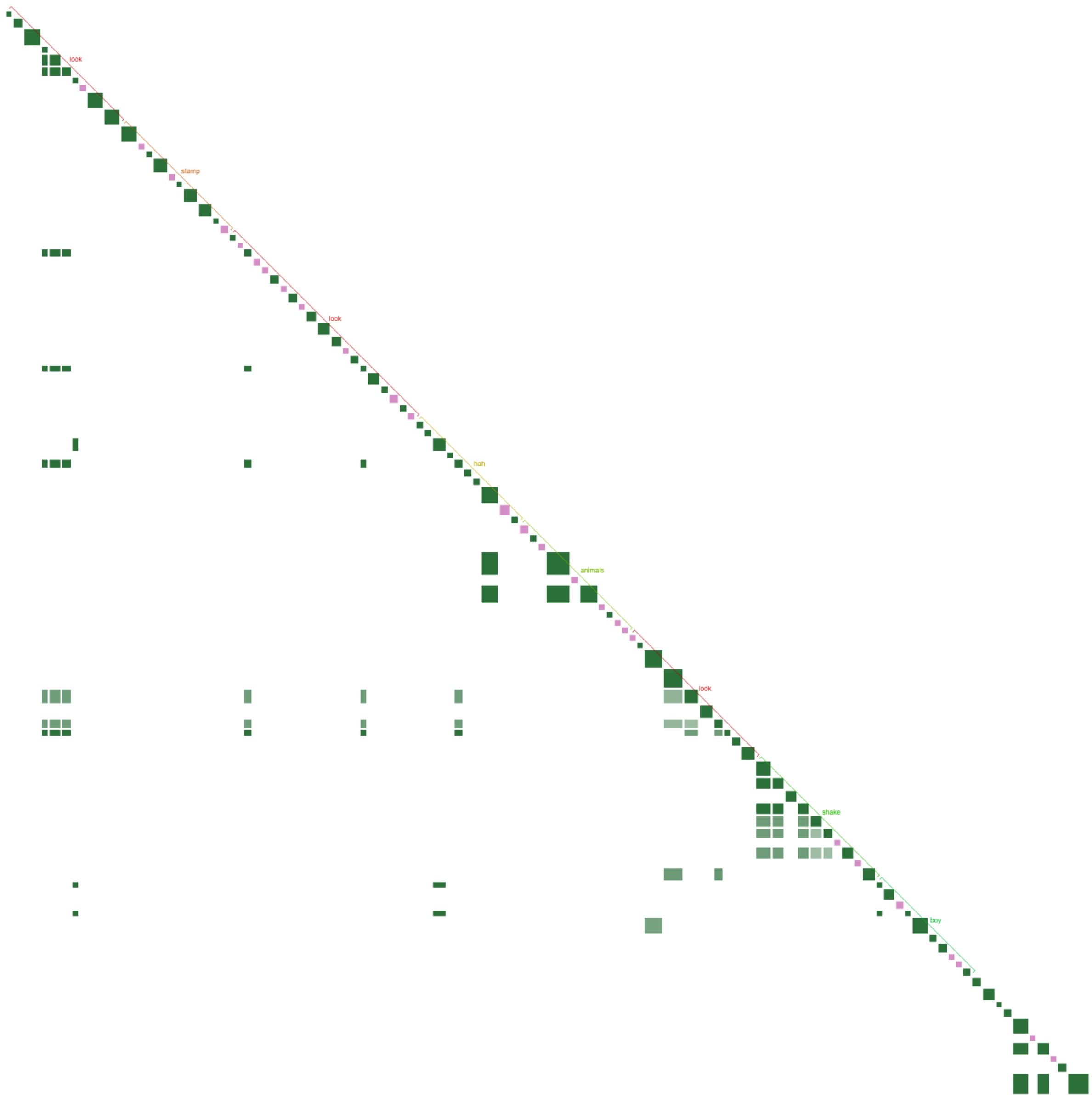


Figure B59

Discursis Temporally Sensitive Conversational Plot for Participant 29 – Symbolic play

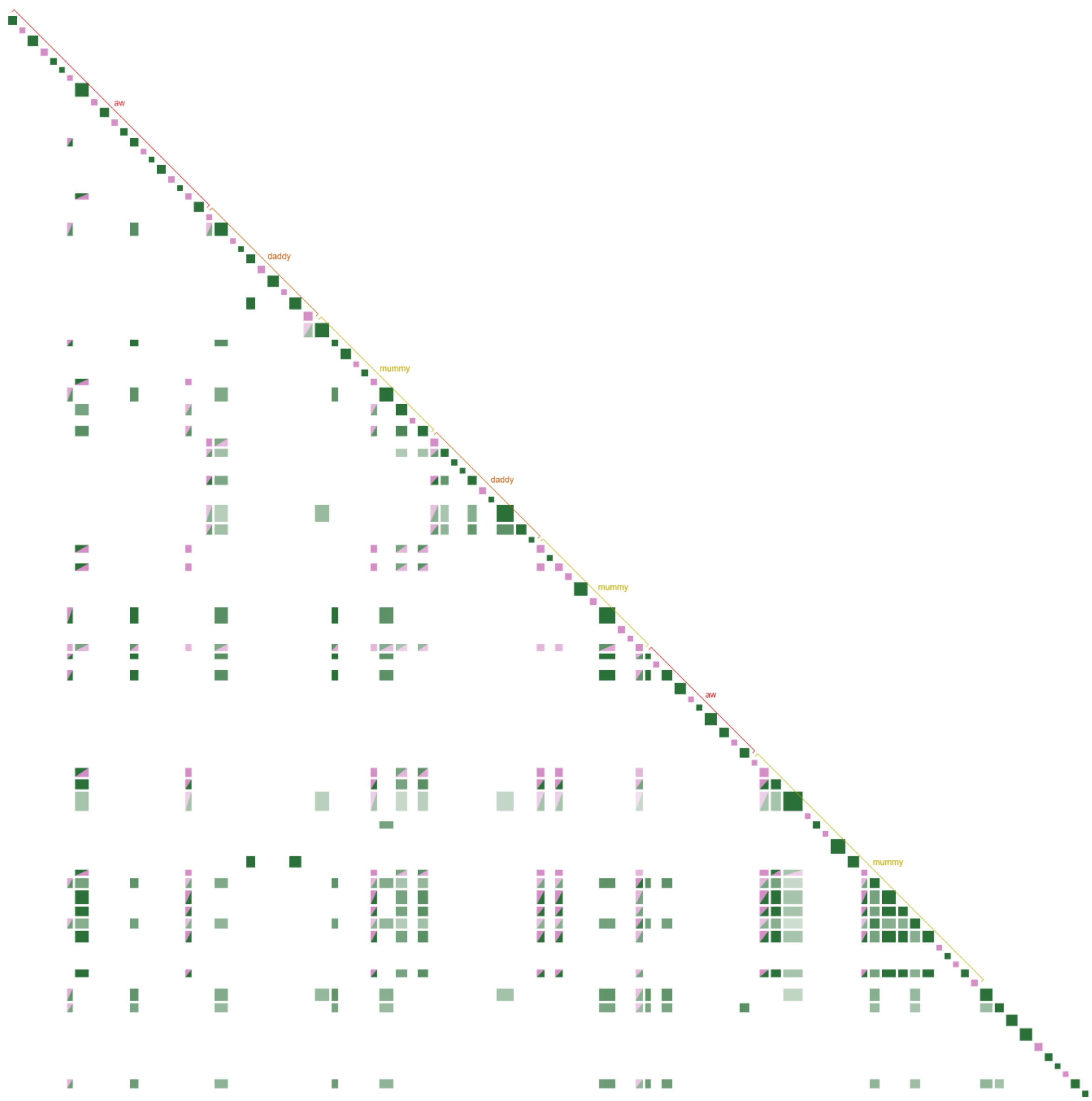


Figure B60

Discursis Temporally Sensitive Conversational Plot for Participant 29 – Functional play

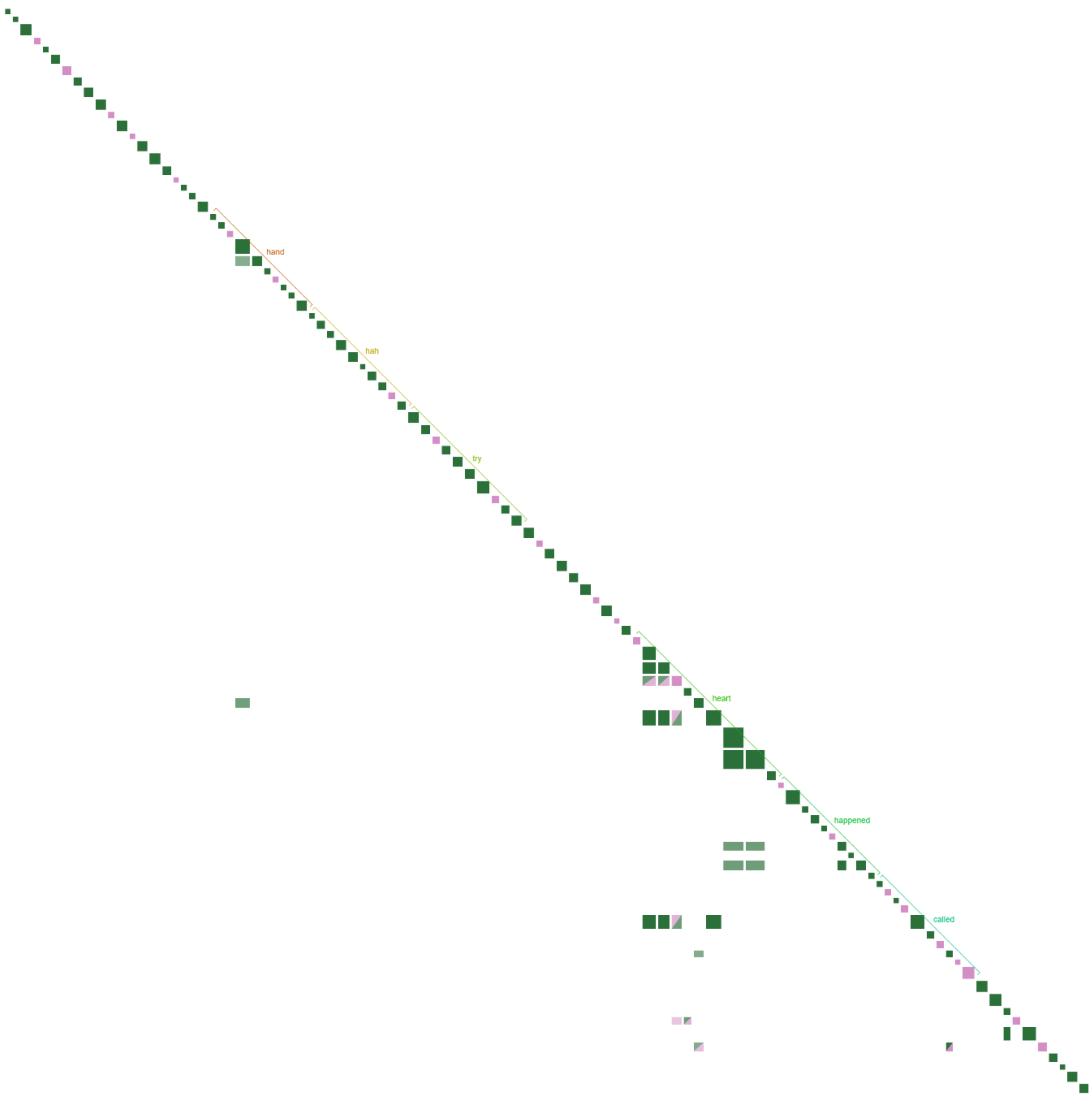


Figure B61

Discursis Temporally Sensitive Conversational Plot for Participant 30 – Symbolic play

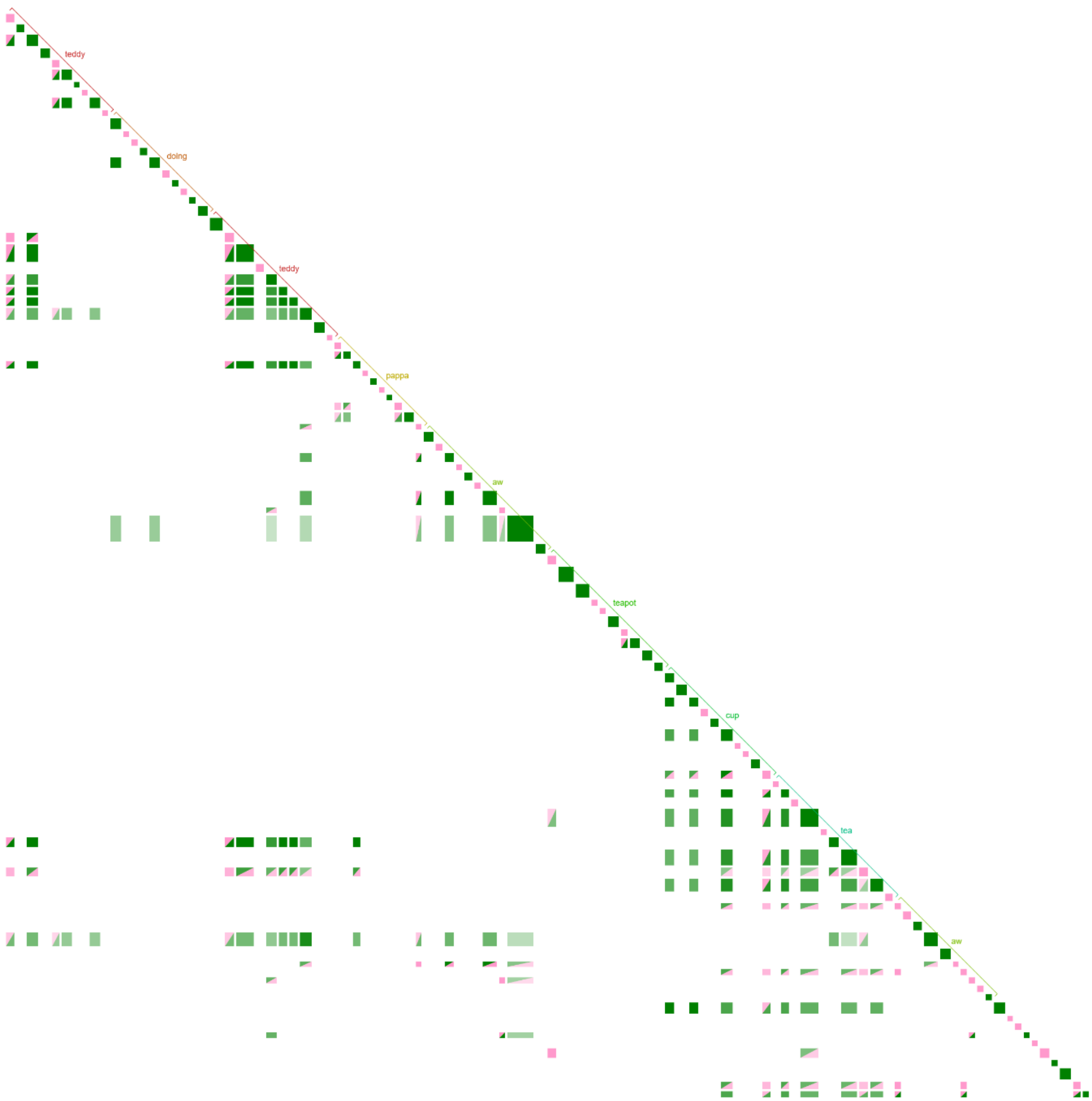


Figure B62

Discursis Temporally Sensitive Conversational Plot for Participant 30 – Functional play

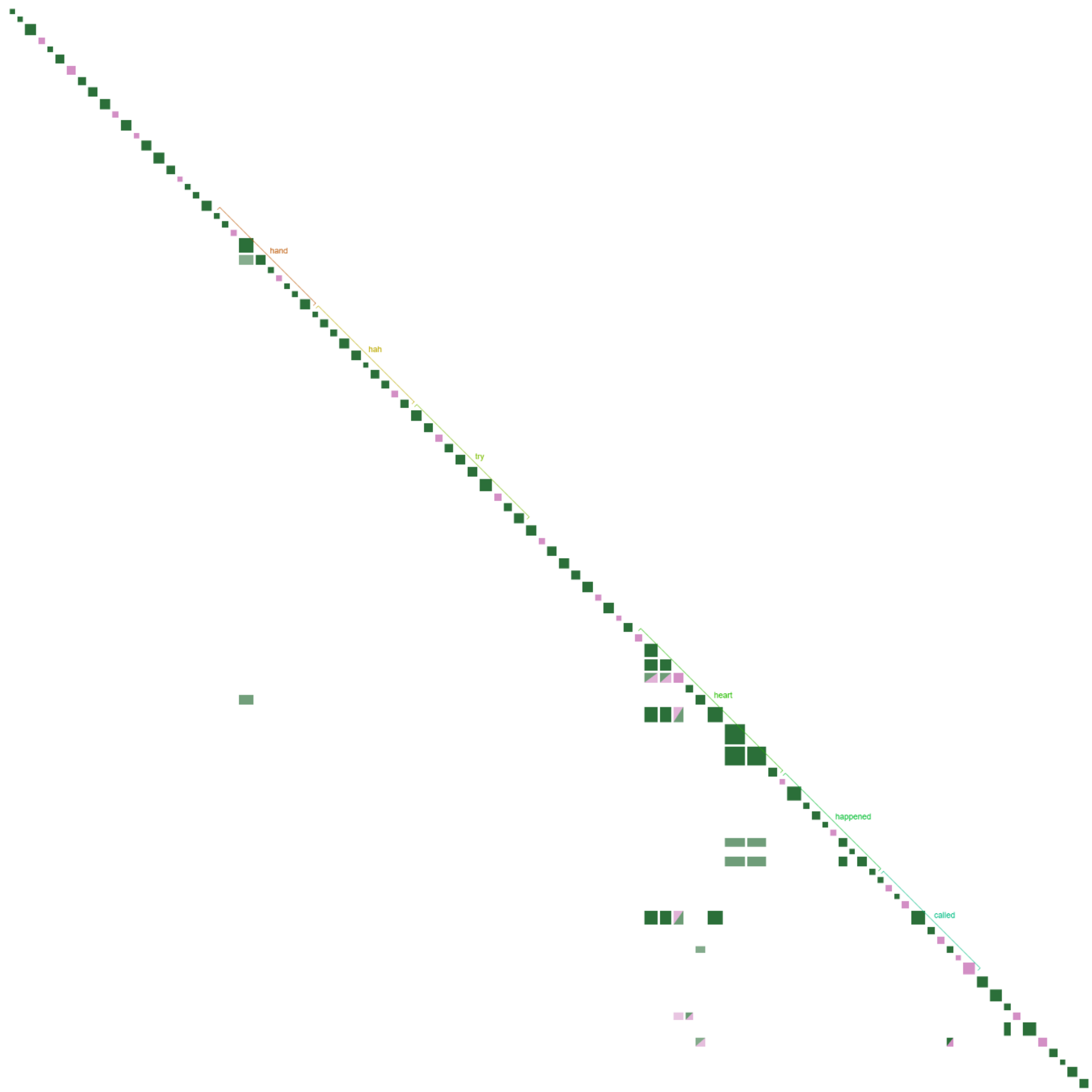


Figure B63

Discursis Temporally Sensitive Conversational Plot for Participant 31 – Symbolic play

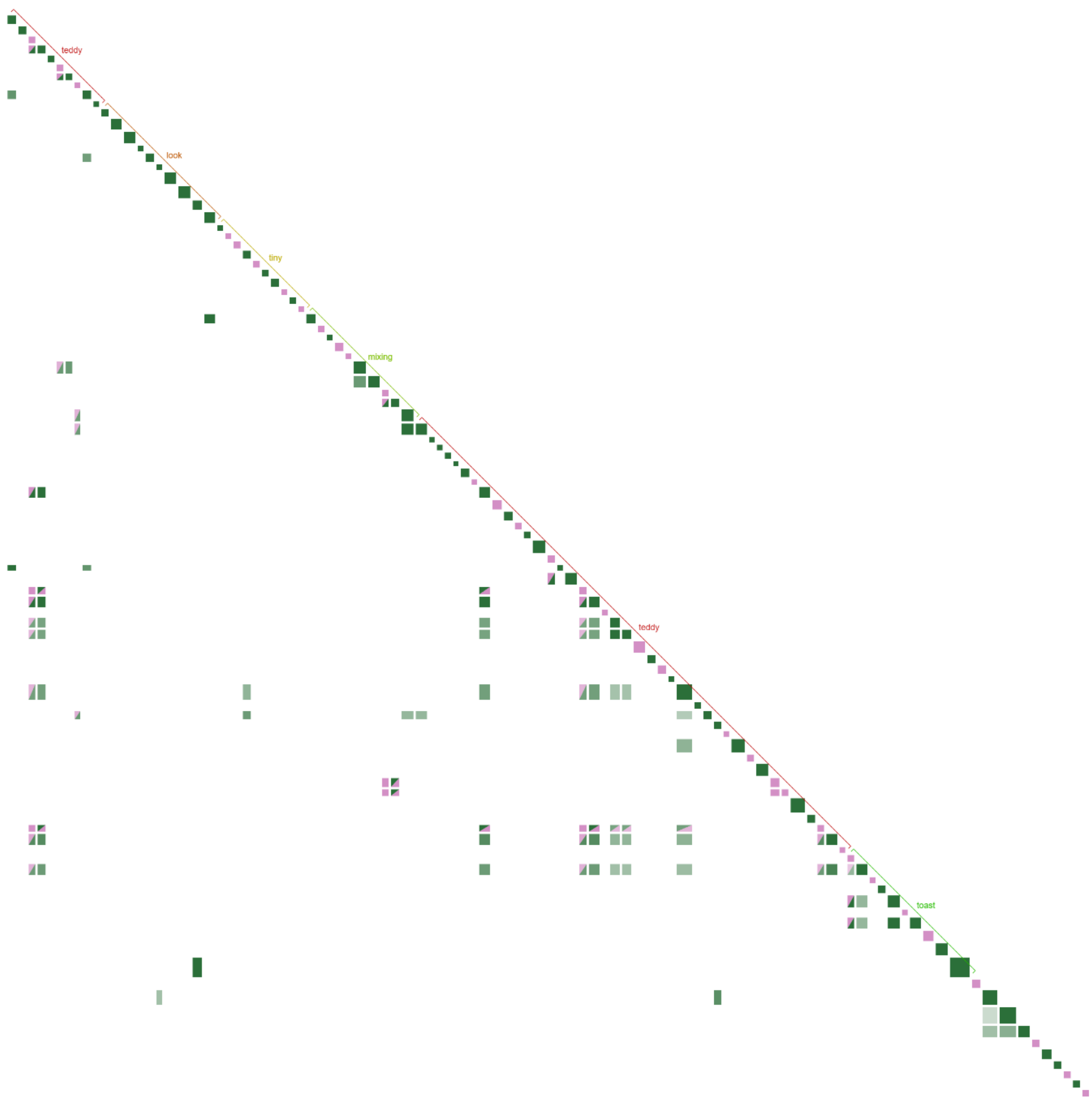


Figure B64

Discursis Temporally Sensitive Conversational Plot for Participant 31 – Functional play

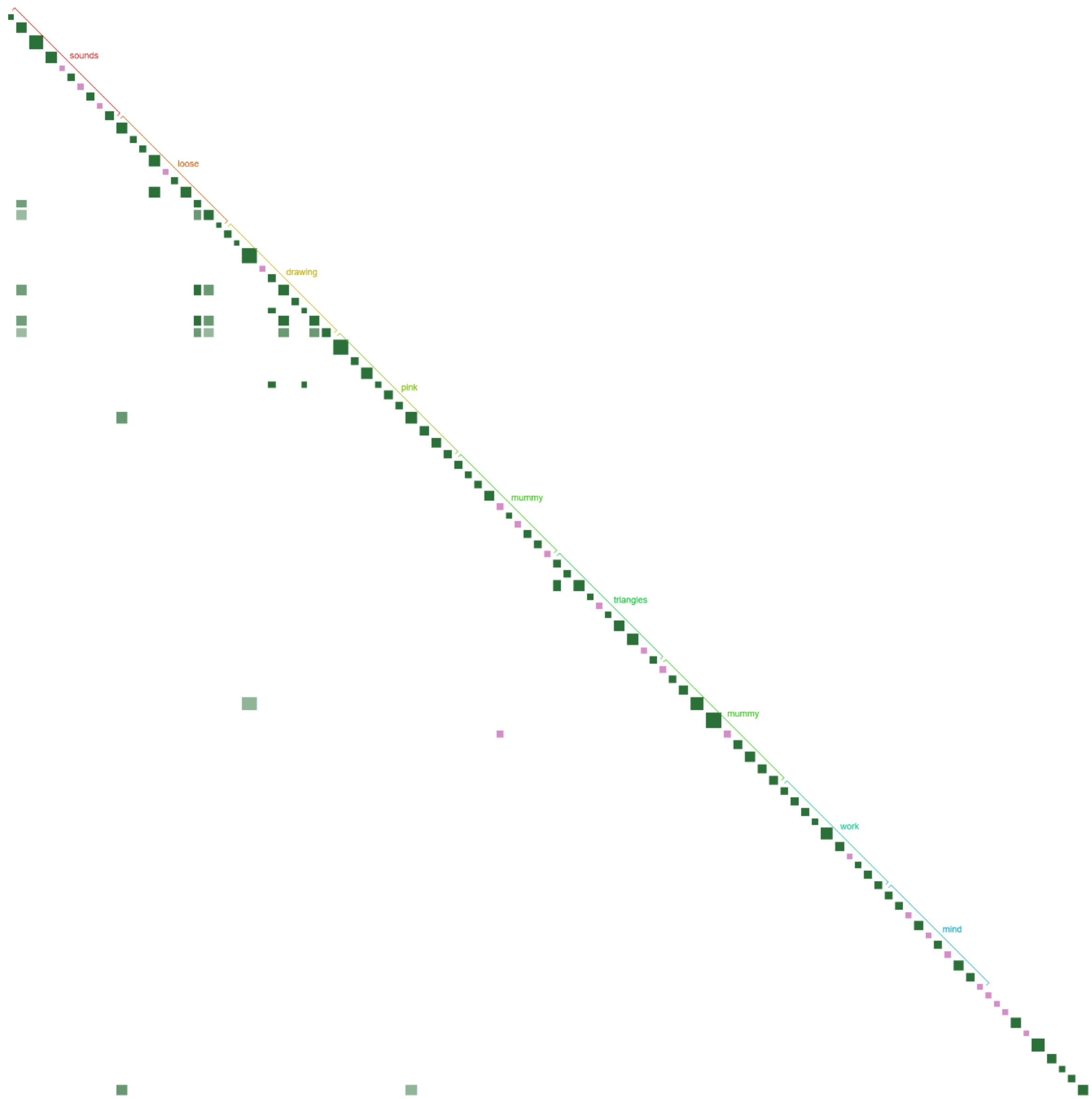


Figure B65

Discursis Temporally Sensitive Conversational Plot for Participant 32 – Symbolic play

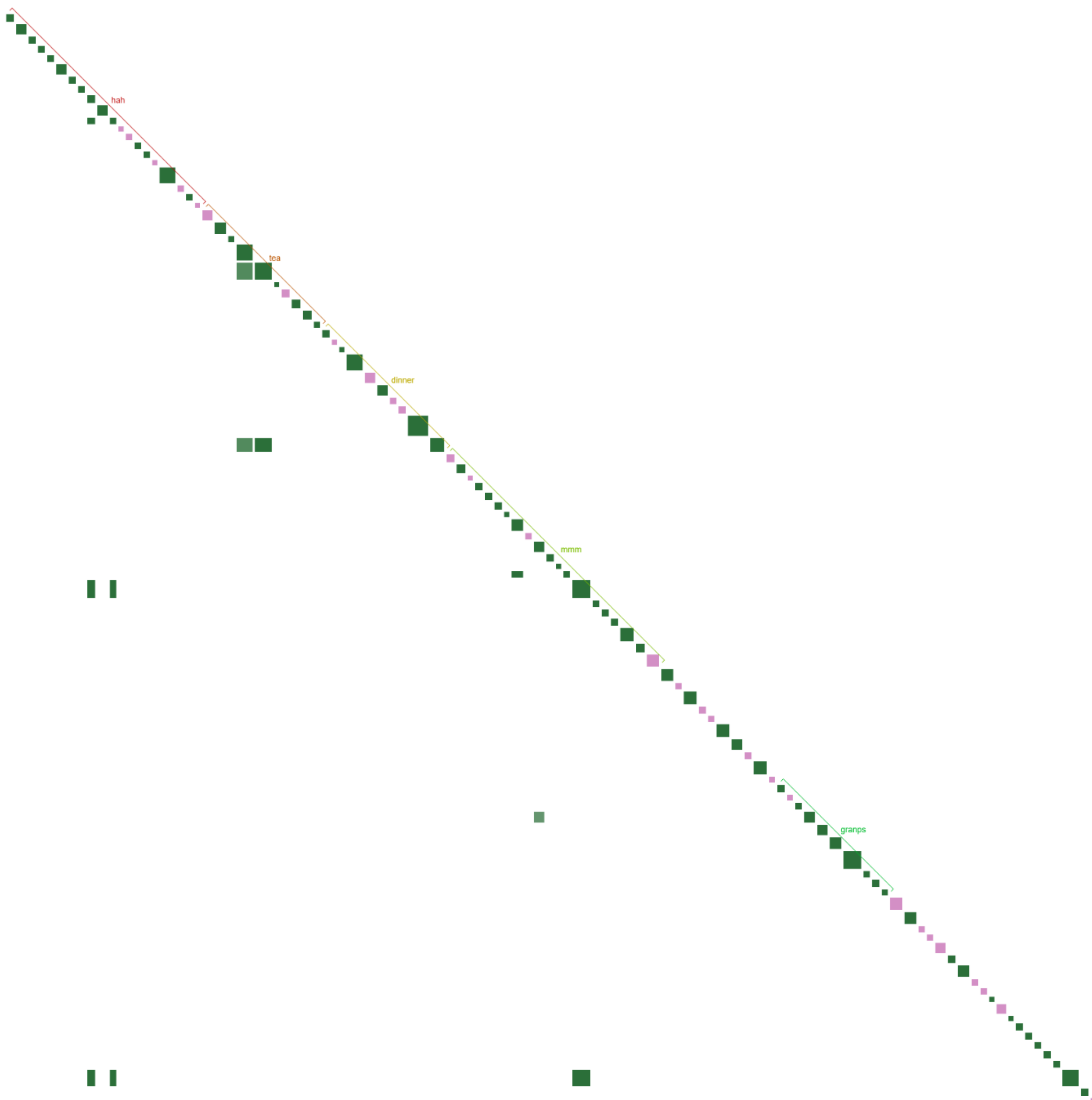


Figure B66

Discursis Temporally Sensitive Conversational Plot for Participant 32 – Functional play

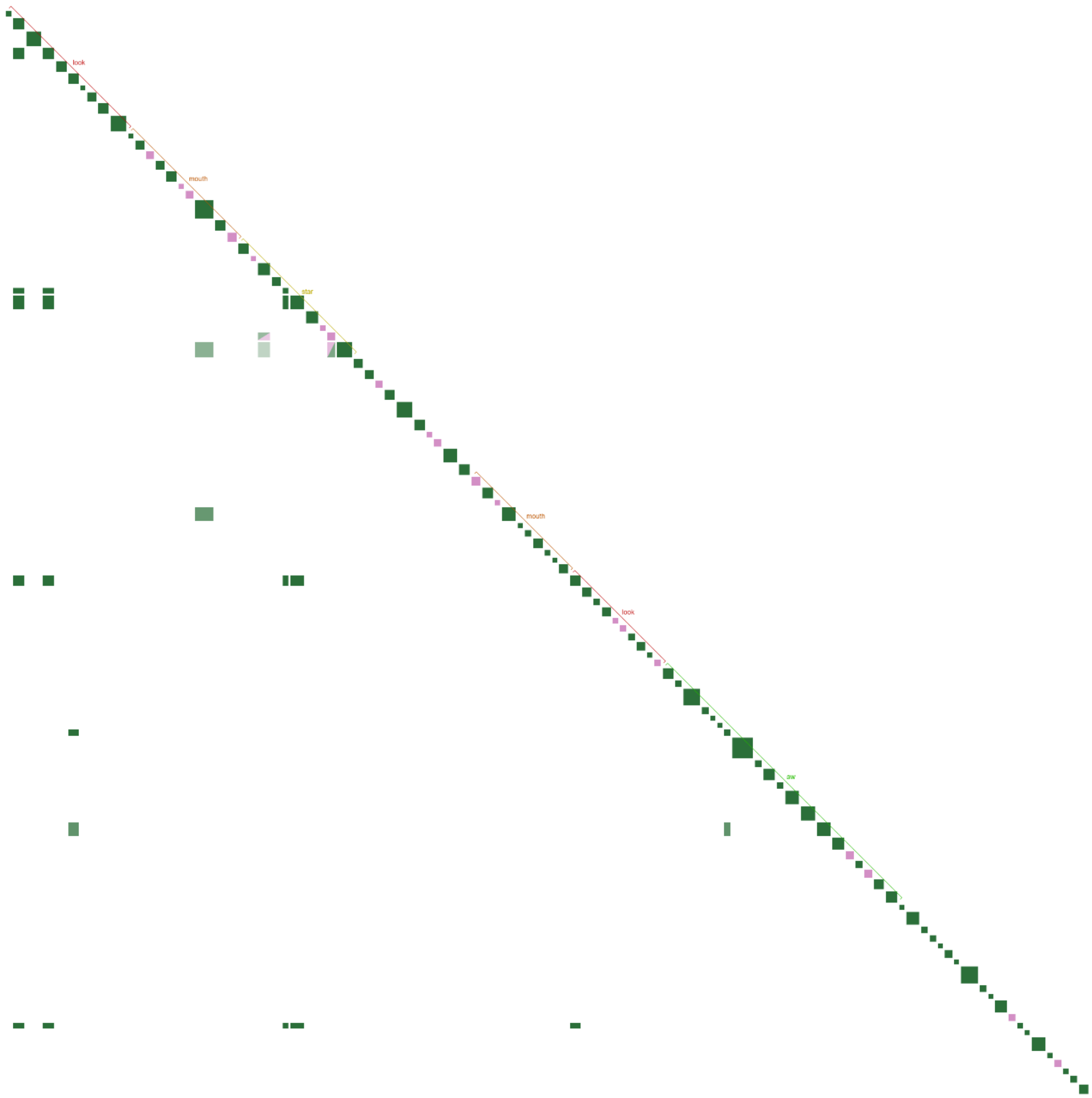


Figure B67

Discursis Temporally Sensitive Conversational Plot for Participant 33 – Symbolic play

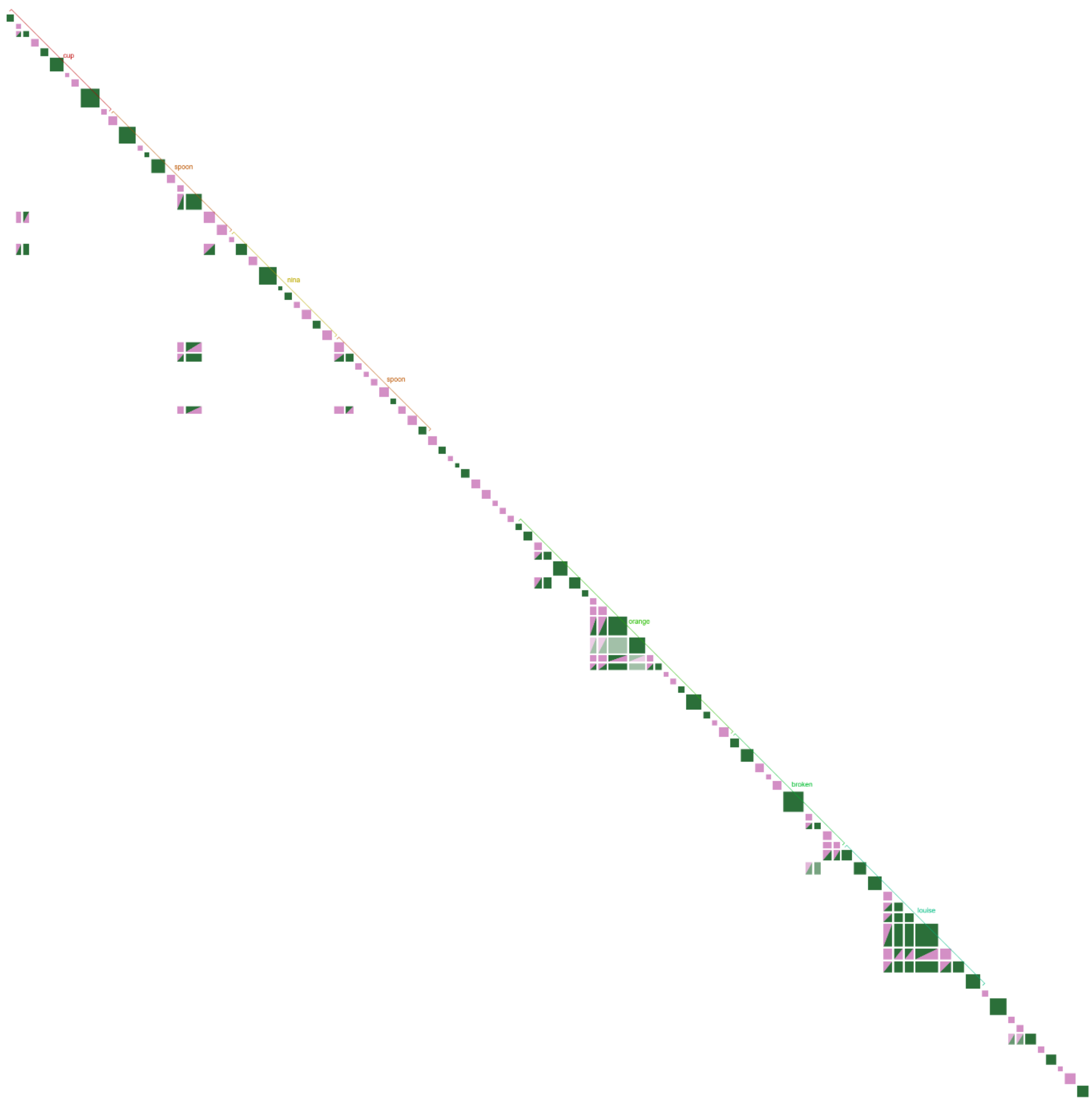


Figure B68

Discursis Temporally Sensitive Conversational Plot for Participant 33 – Functional play

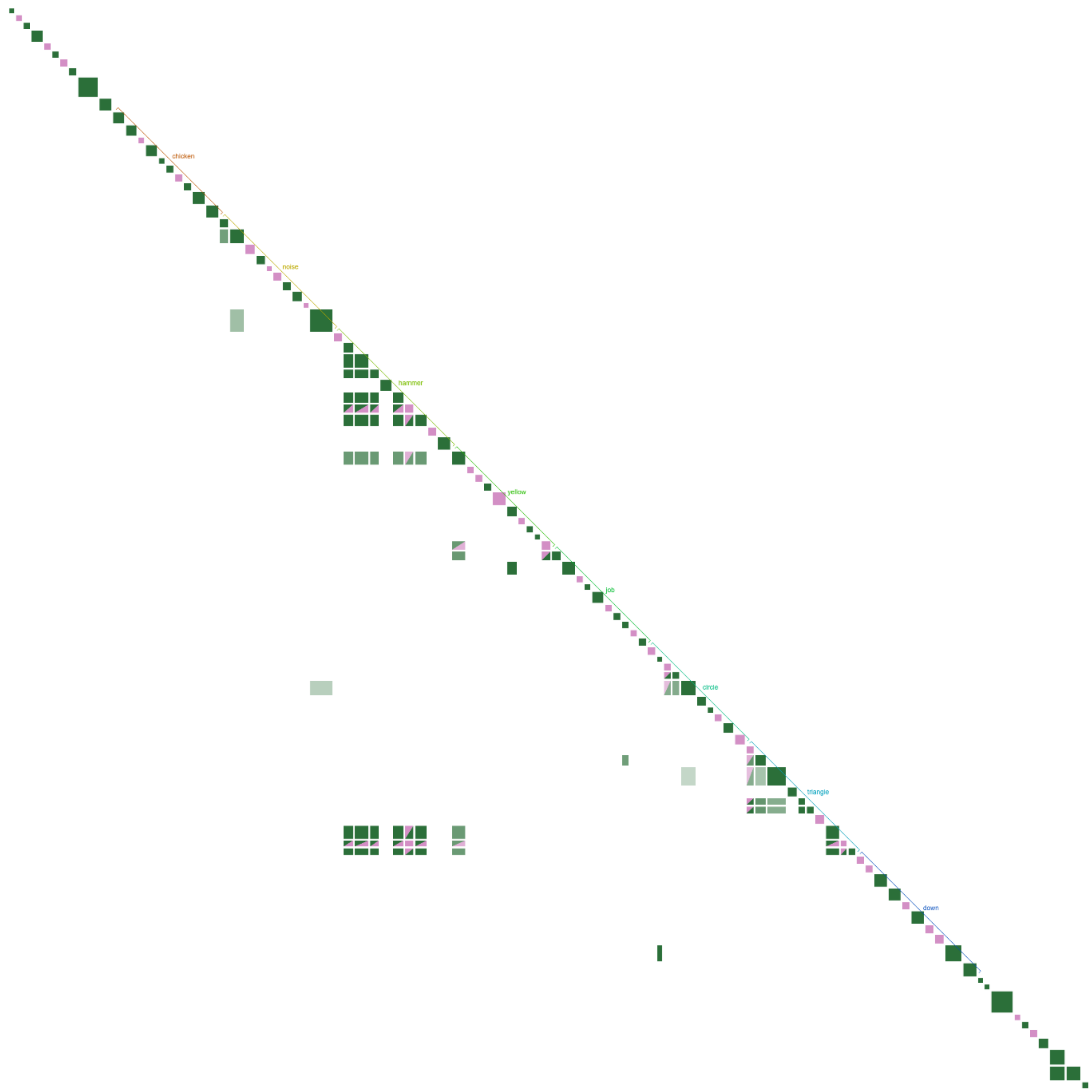


Figure B69

Discursis Temporally Sensitive Conversational Plot for Participant 34 – Symbolic play

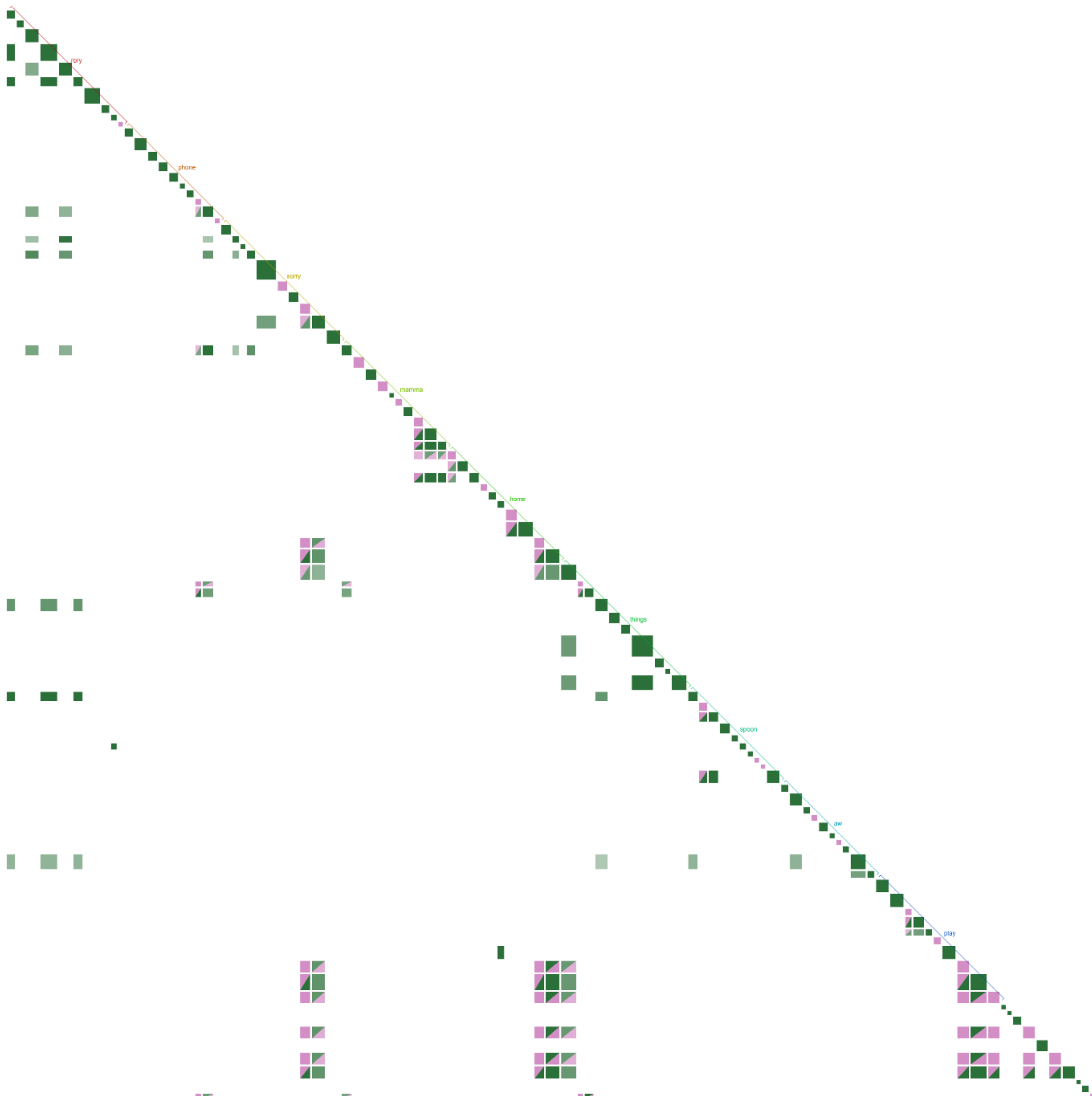


Figure B70

Discursis Temporally Sensitive Conversational Plot for Participant 34 – Functional play

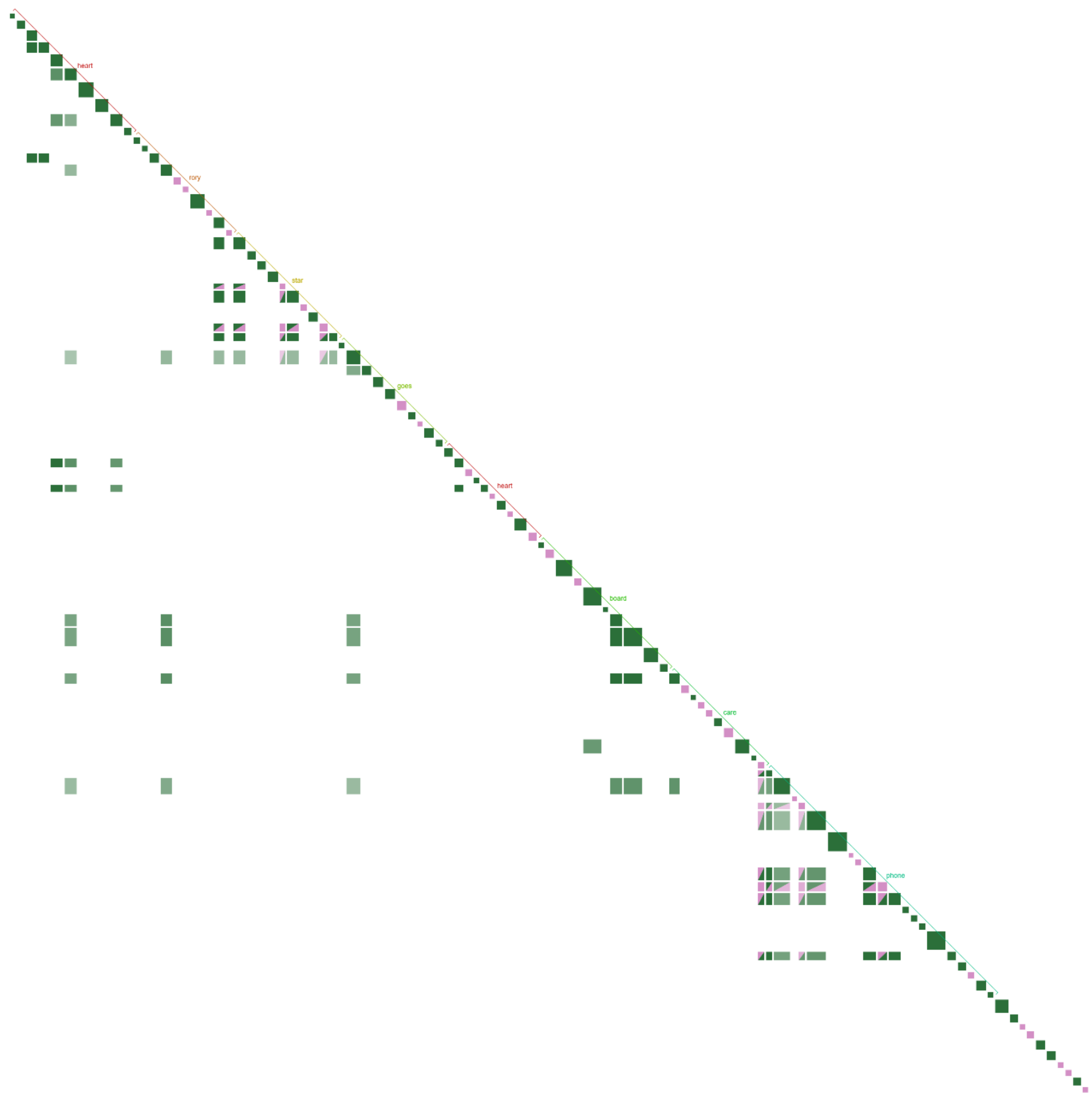


Figure B71

Discursis Temporally Sensitive Conversational Plot for Participant 35 – Symbolic play

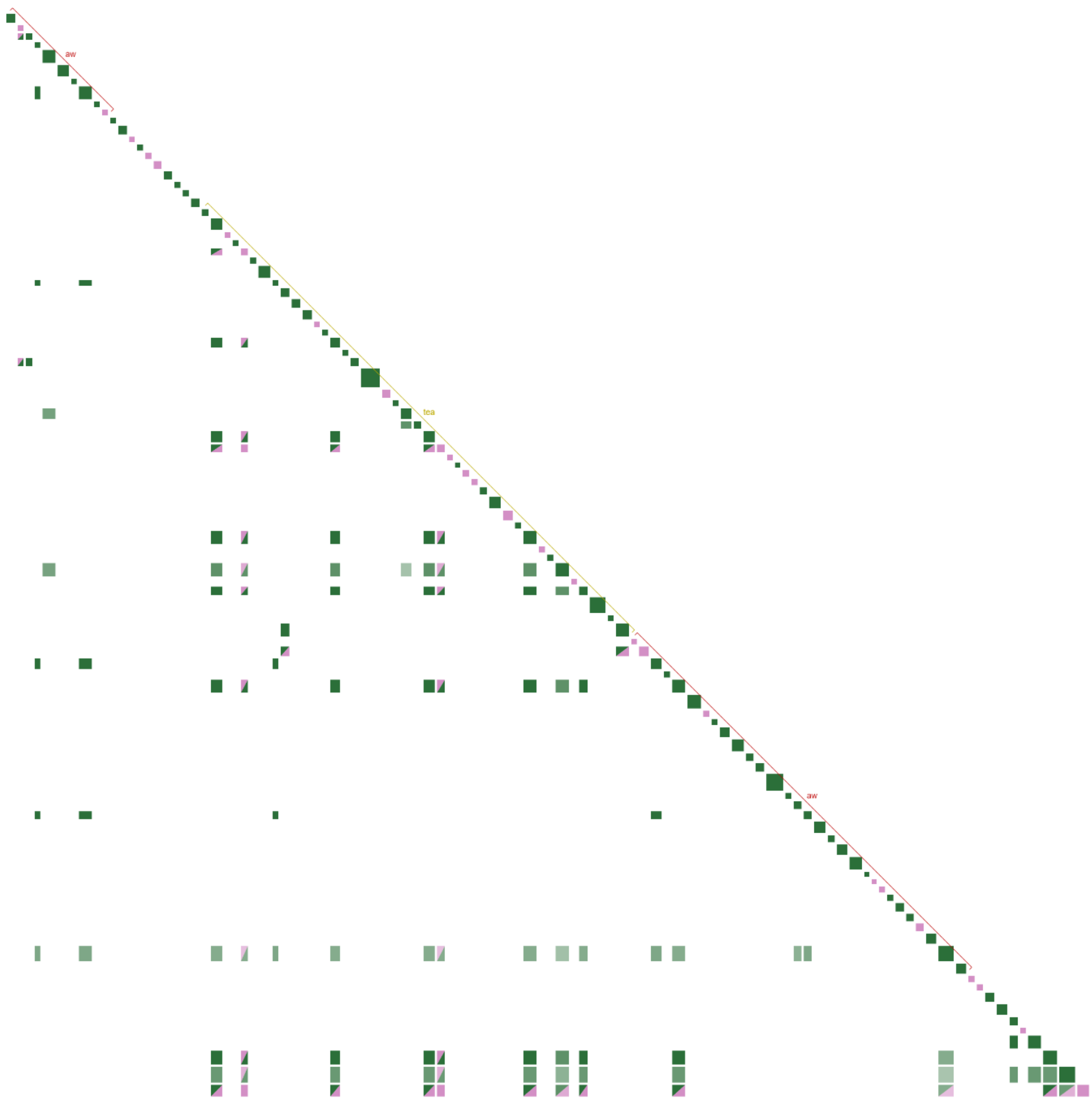


Figure B72

Discursis Temporally Sensitive Conversational Plot for Participant 35 – Functional play

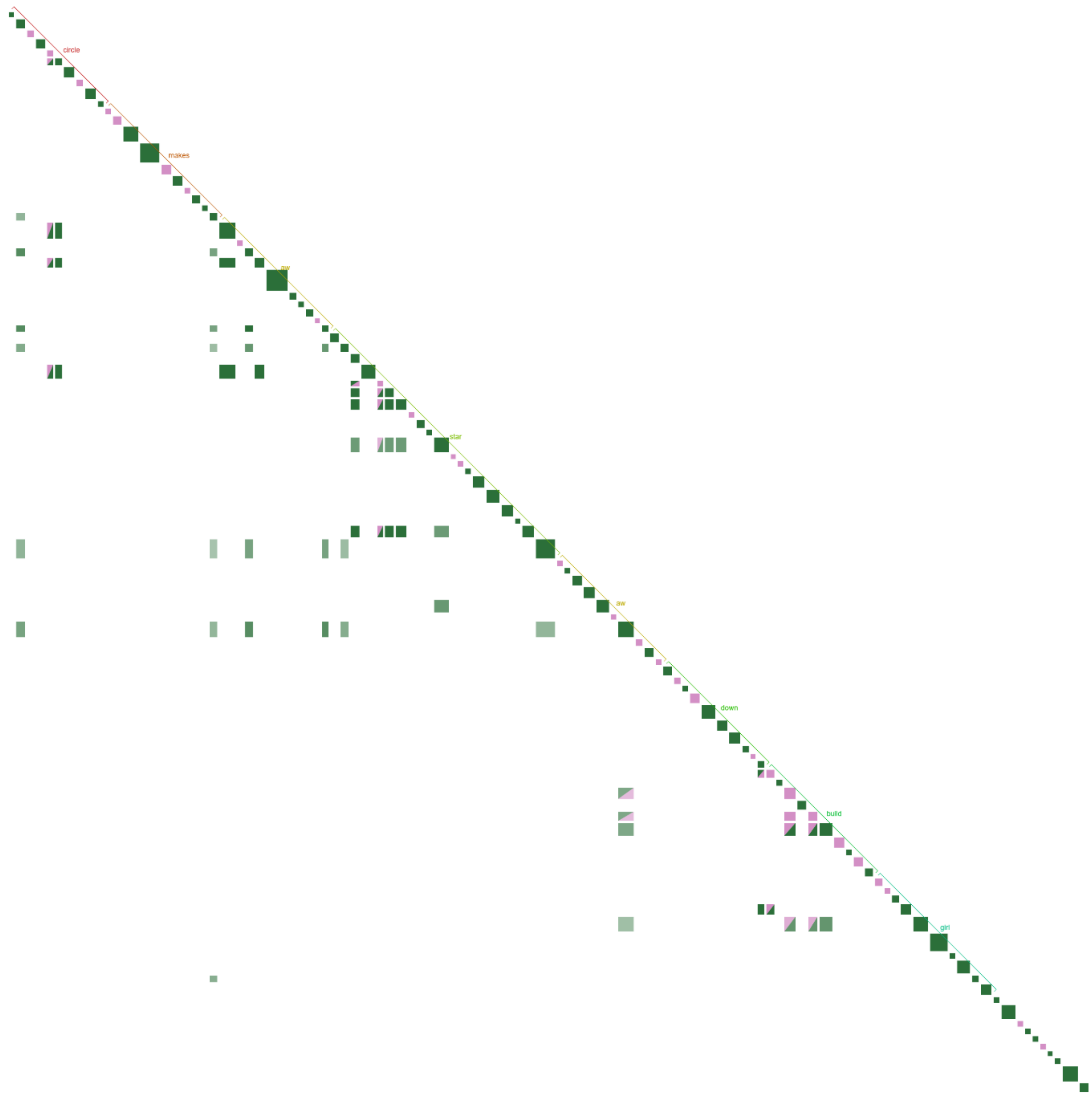


Figure B73

Discursis Temporally Sensitive Conversational Plot for Participant 36 – Symbolic play

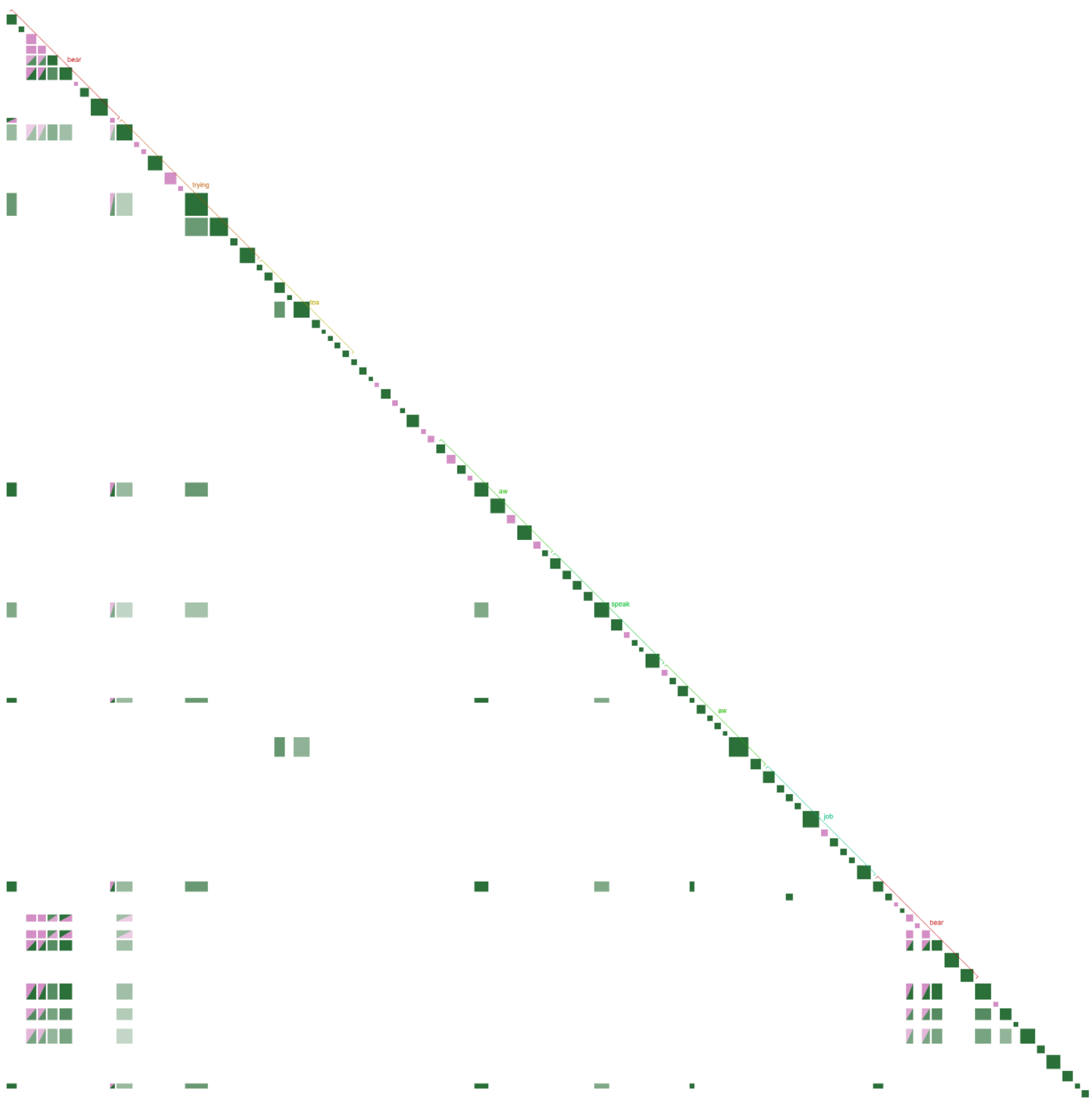


Figure B74

Discursis Temporally Sensitive Conversational Plot for Participant 36 – Functional play

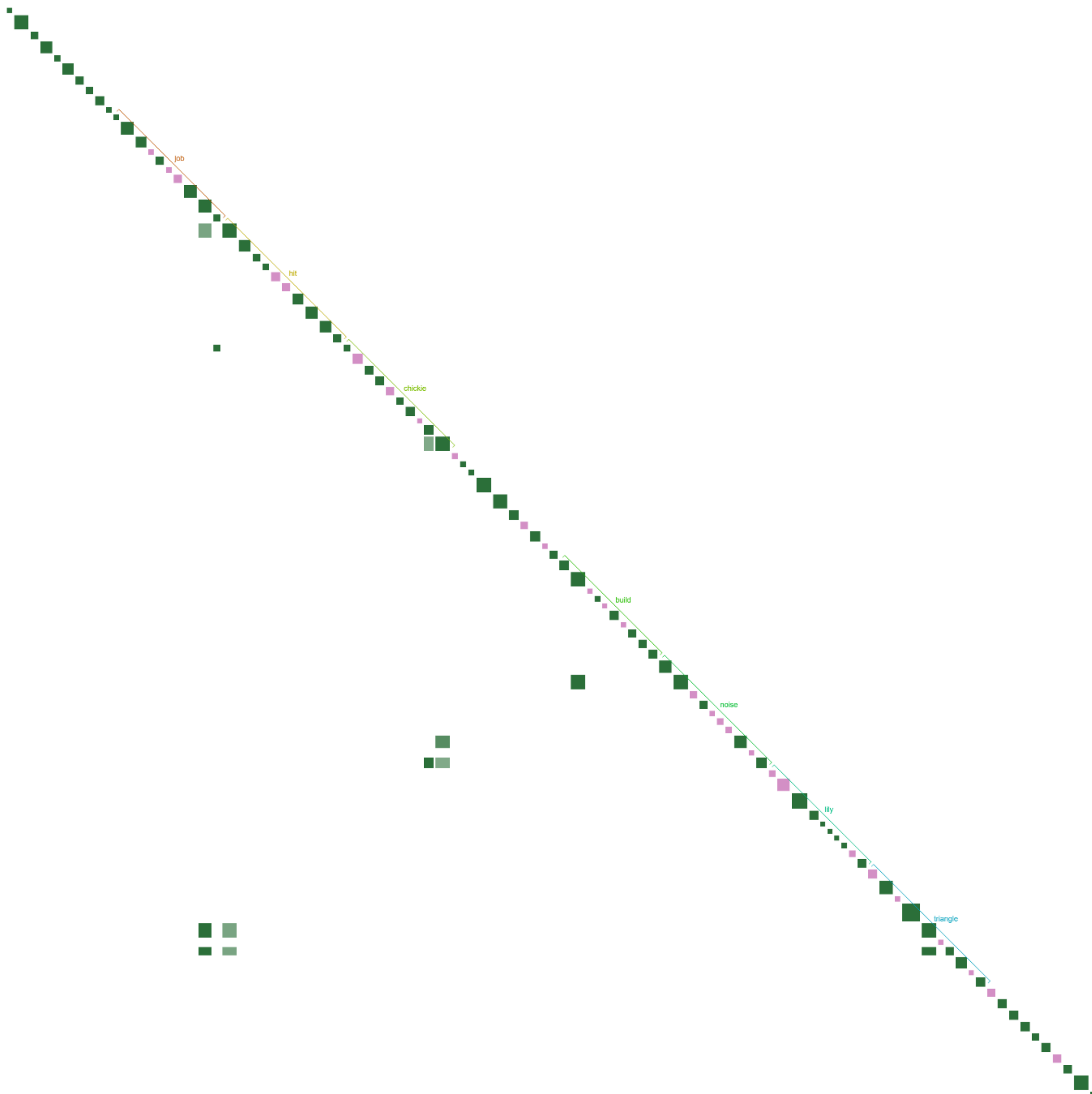


Figure B75

Discursis Temporally Sensitive Conversational Plot for Participant 37 – Symbolic play

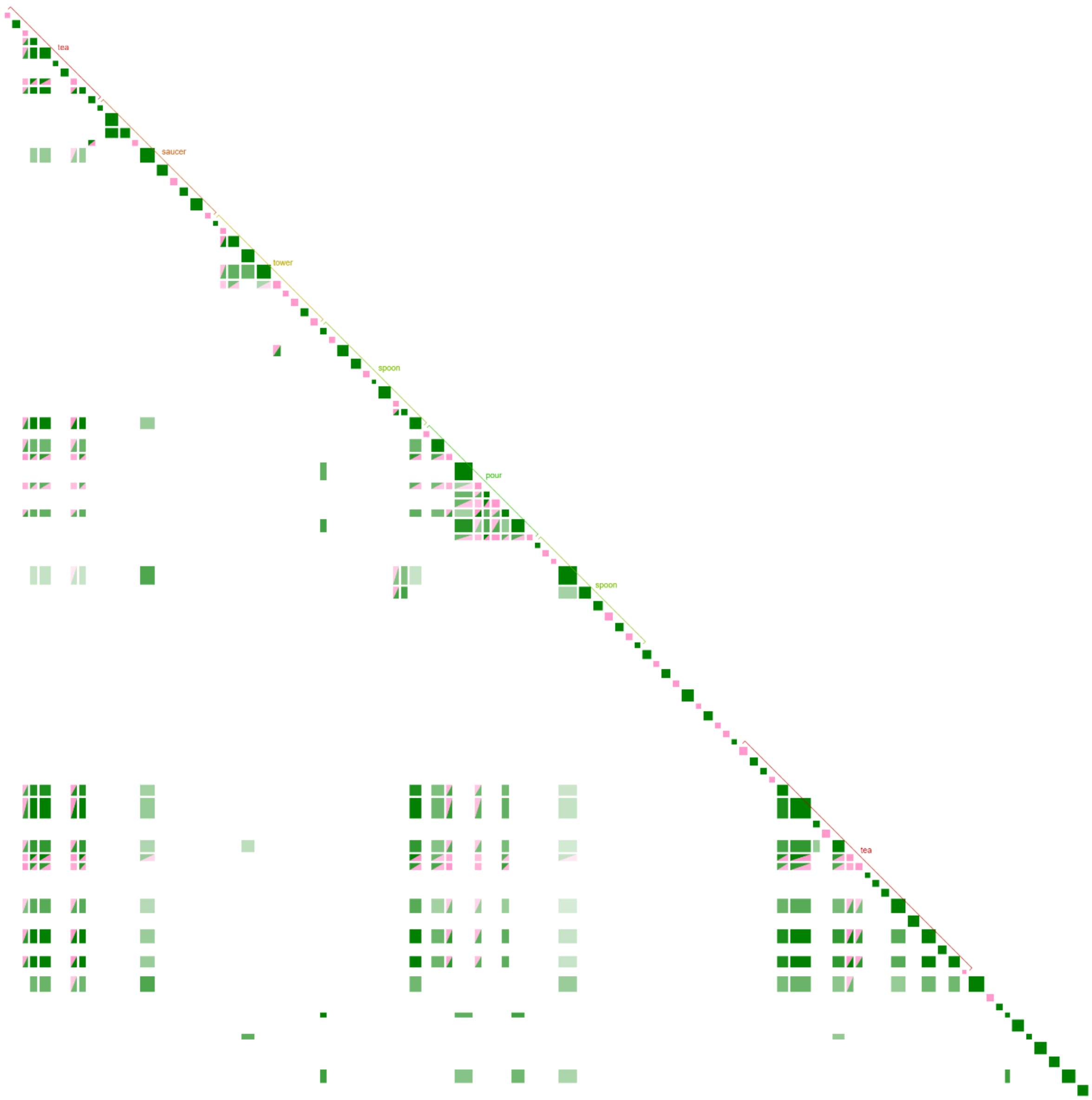


Figure B76

Discursis Temporally Sensitive Conversational Plot for Participant 37 – Functional play

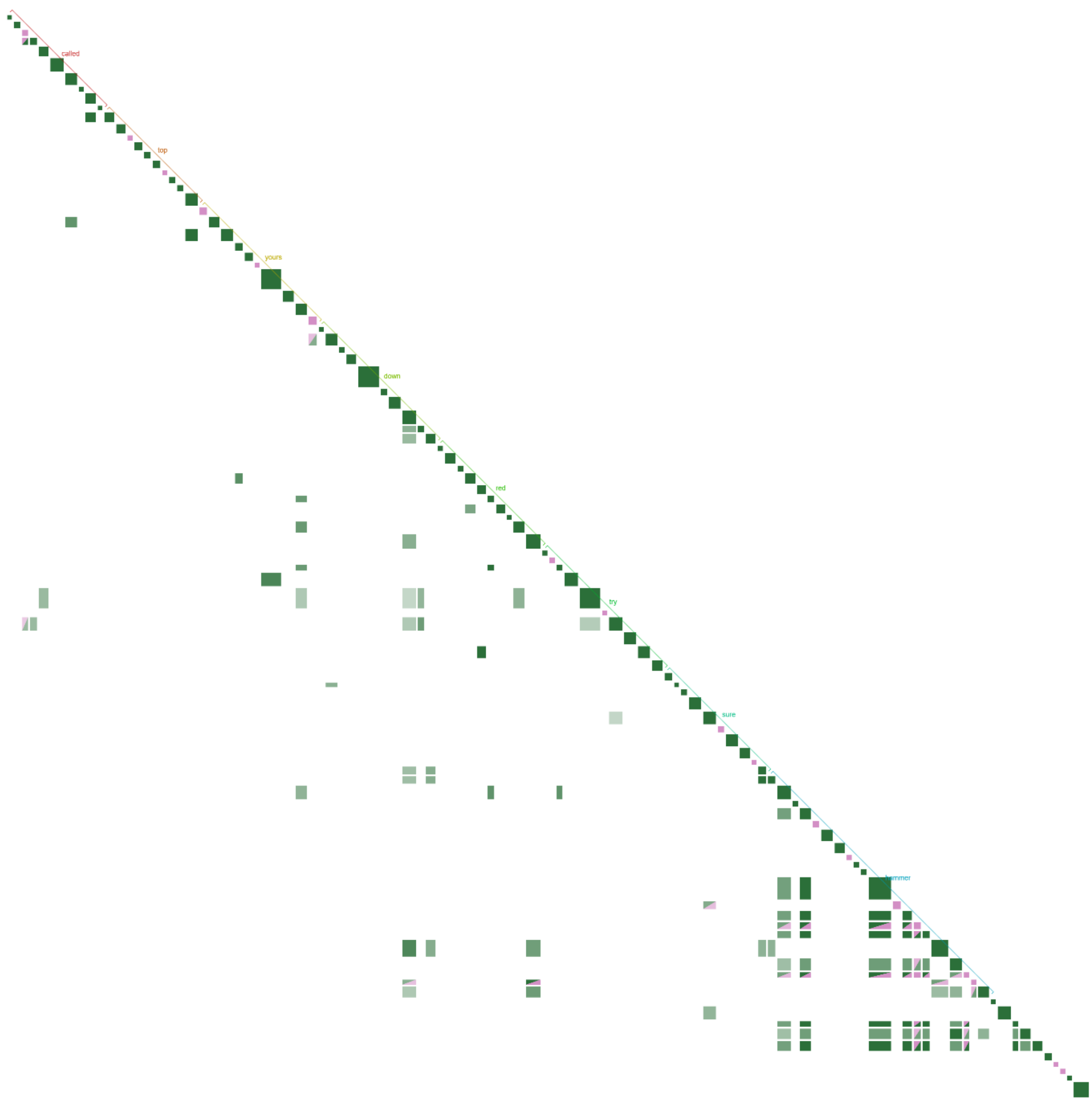


Figure B77

Discursis Temporally Sensitive Conversational Plot for Participant 38 – Symbolic play

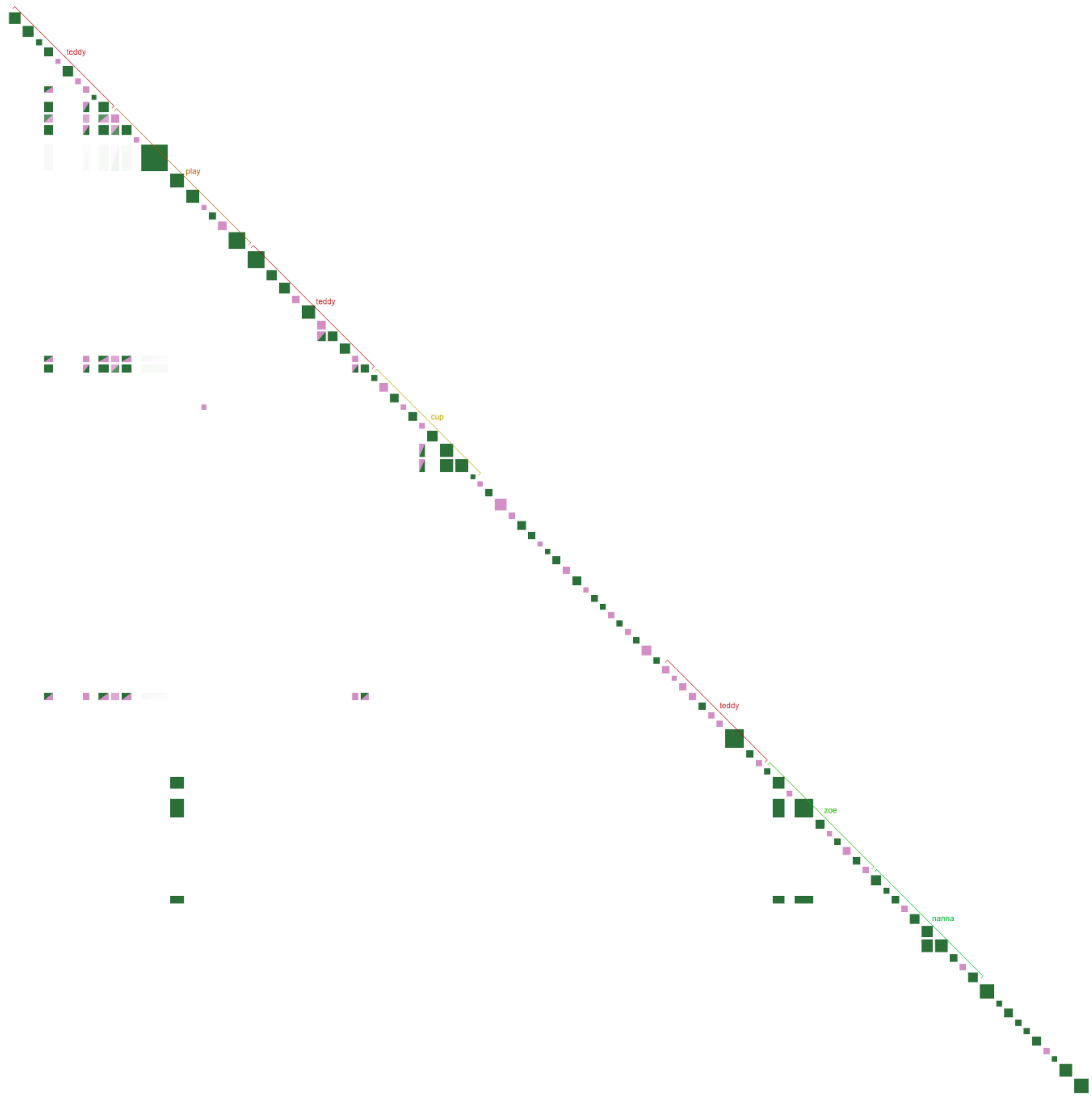


Figure B78

Discursis Temporally Sensitive Conversational Plot for Participant 38 – Functional play

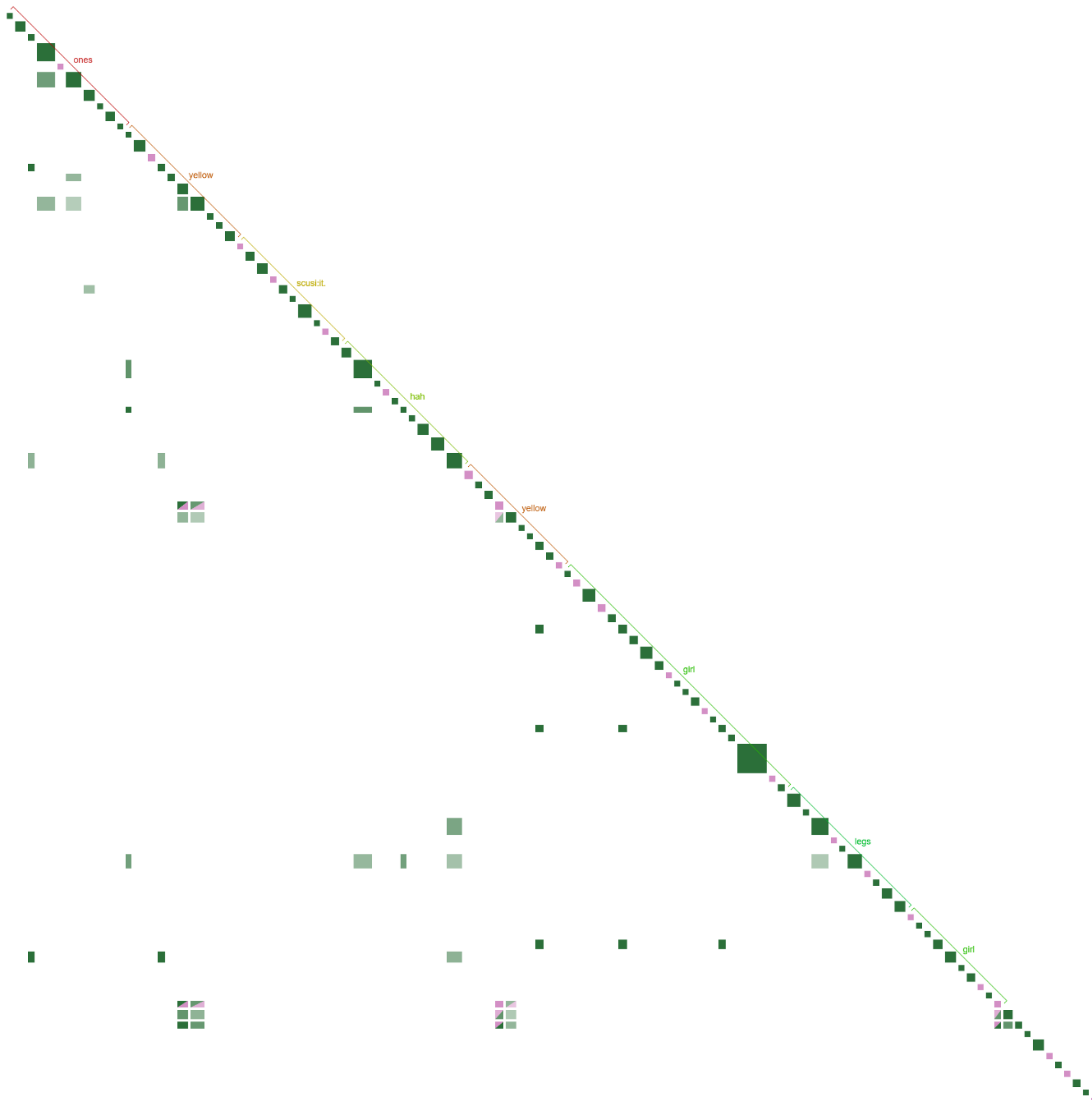


Figure B79

Discursis Temporally Sensitive Conversational Plot for Participant 39 – Symbolic play

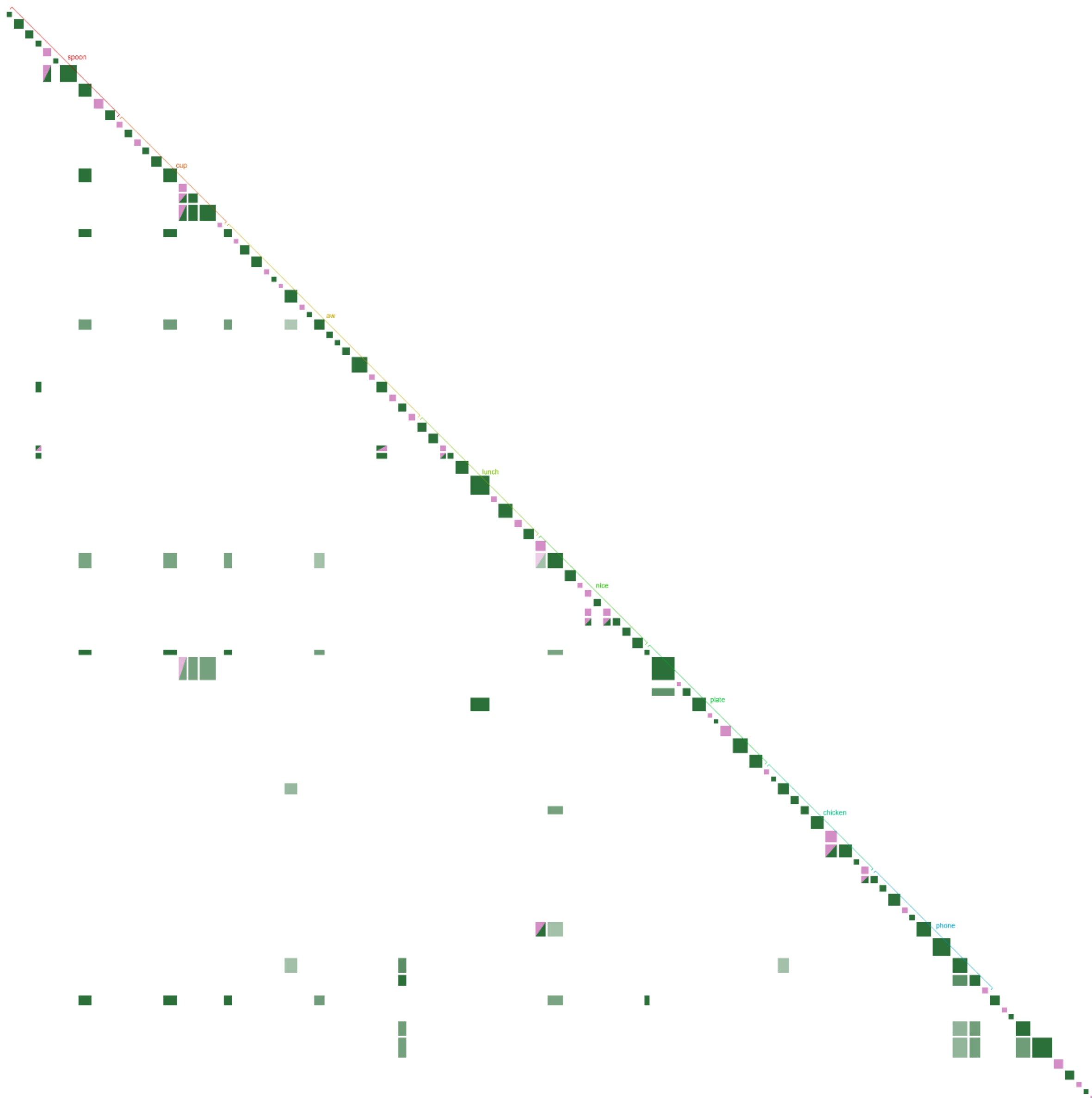


Figure B80

Discursis Temporally Sensitive Conversational Plot for Participant 39 – Functional play

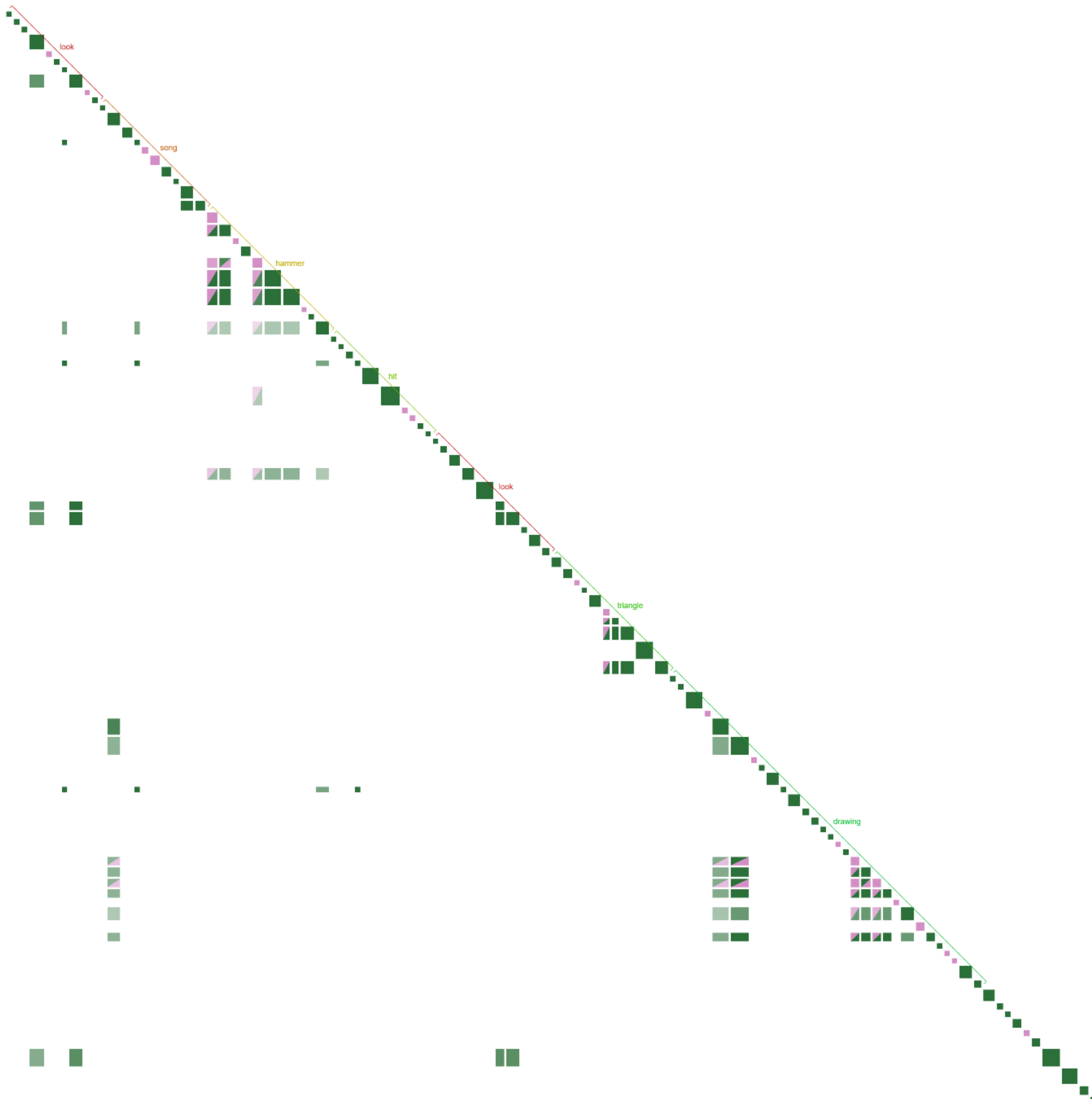


Figure B81

Discursis Temporally Sensitive Conversational Plot for Participant 40 – Symbolic play

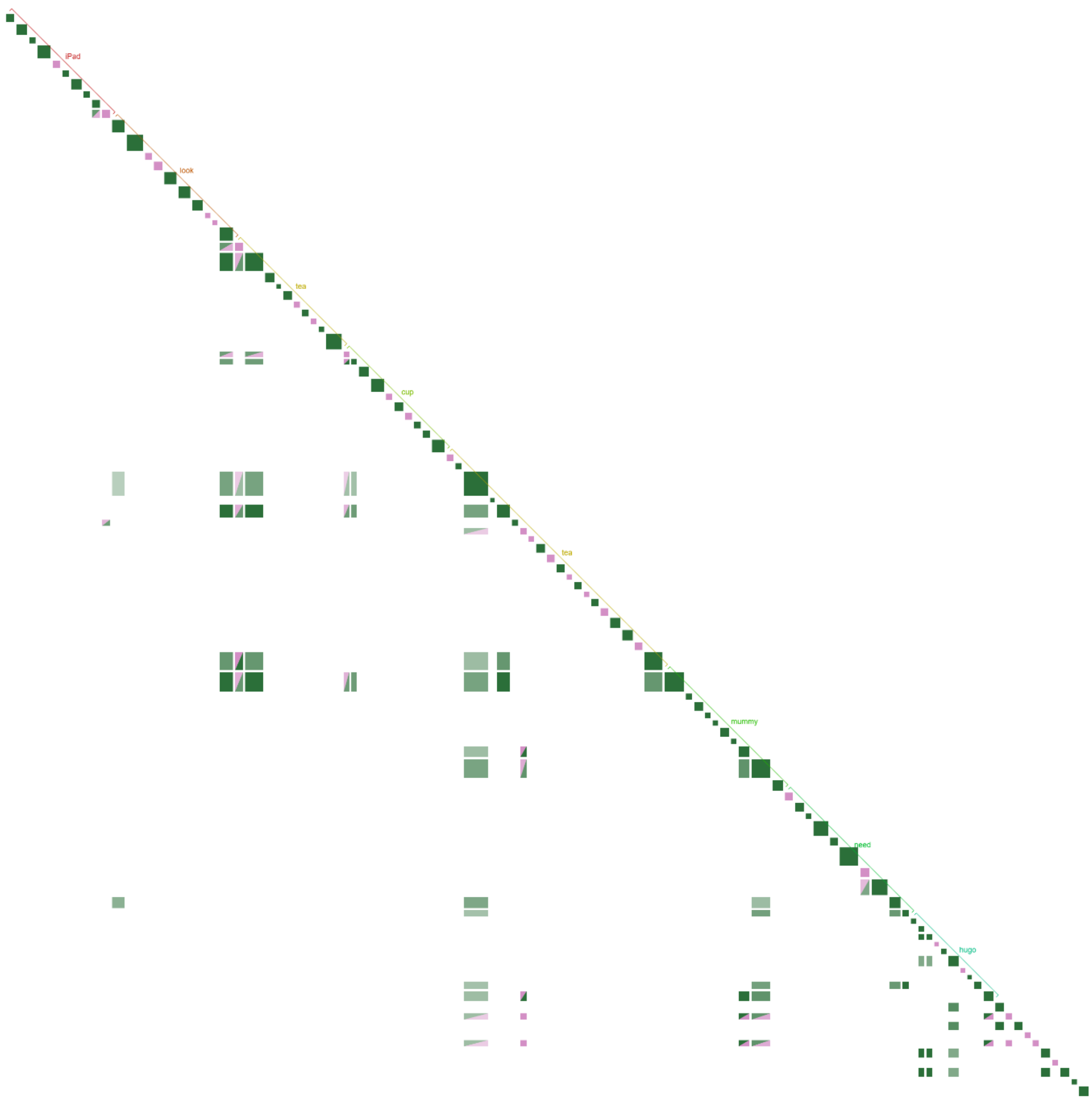


Figure B82

Discursis Temporally Sensitive Conversational Plot for Participant 40 – Functional play

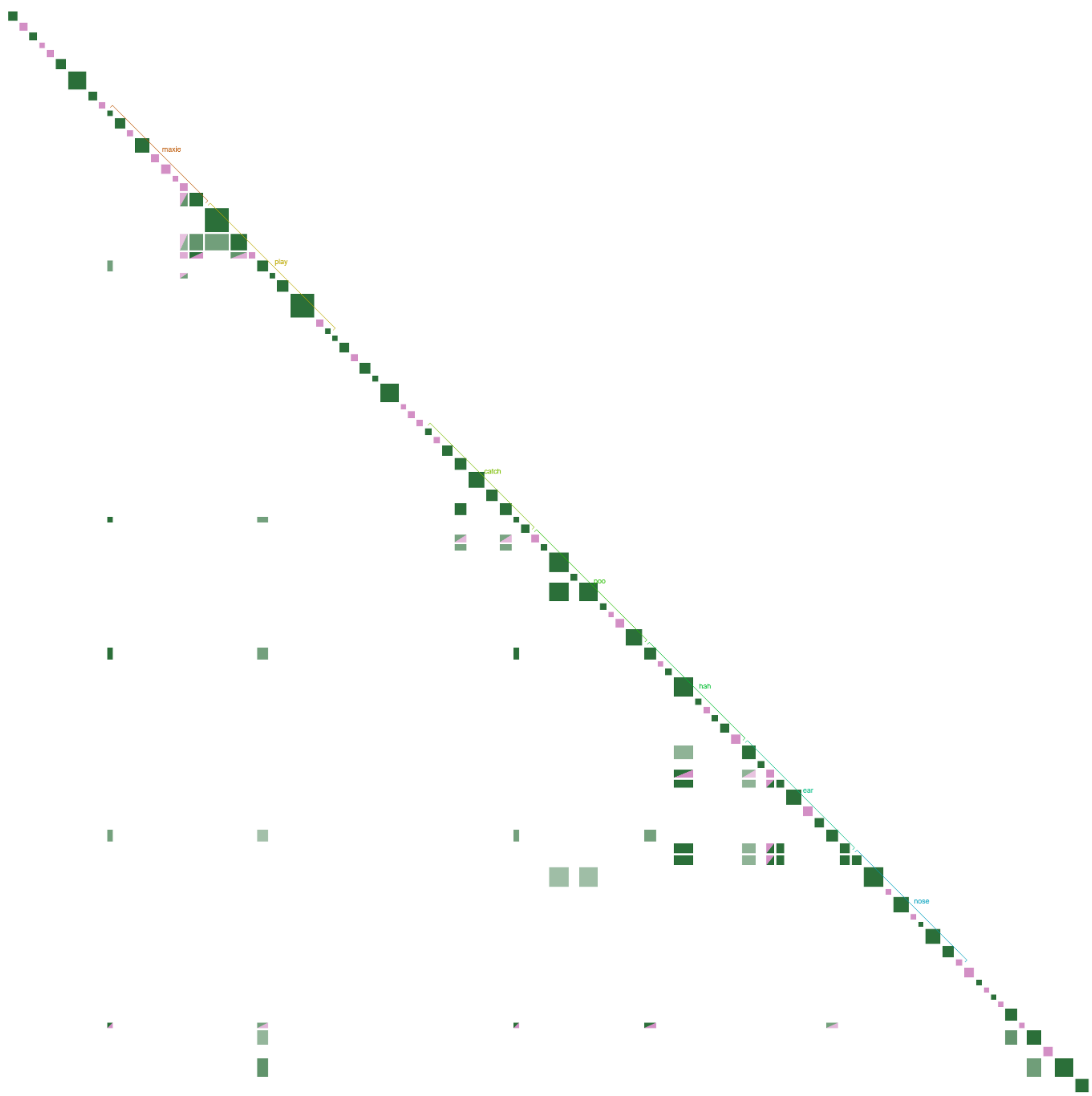


Figure B83

Discursis Temporally Sensitive Conversational Plot for Participant 41 – Symbolic play

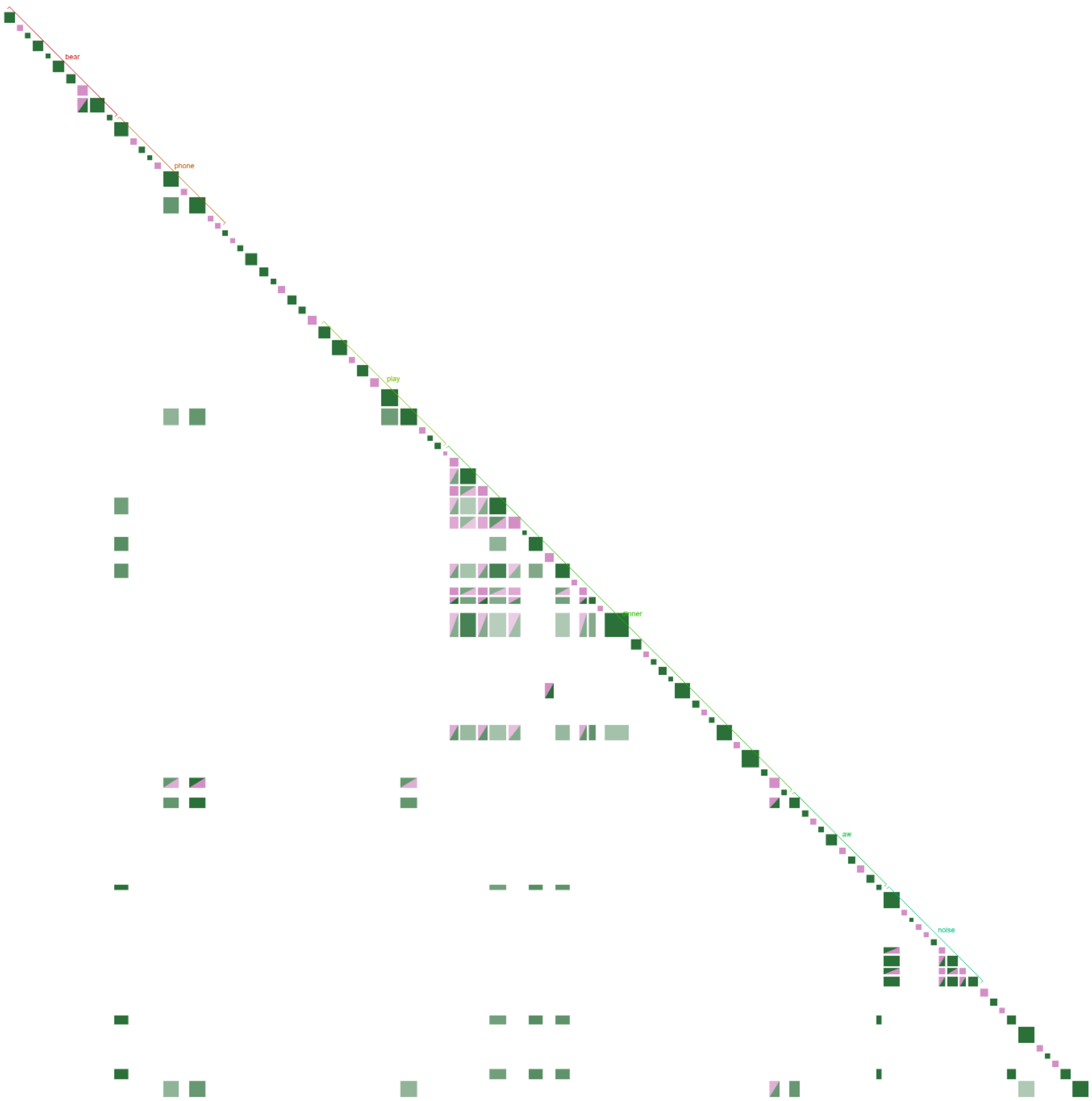


Figure B84

Discursis Temporally Sensitive Conversational Plot for Participant 41 – Functional play

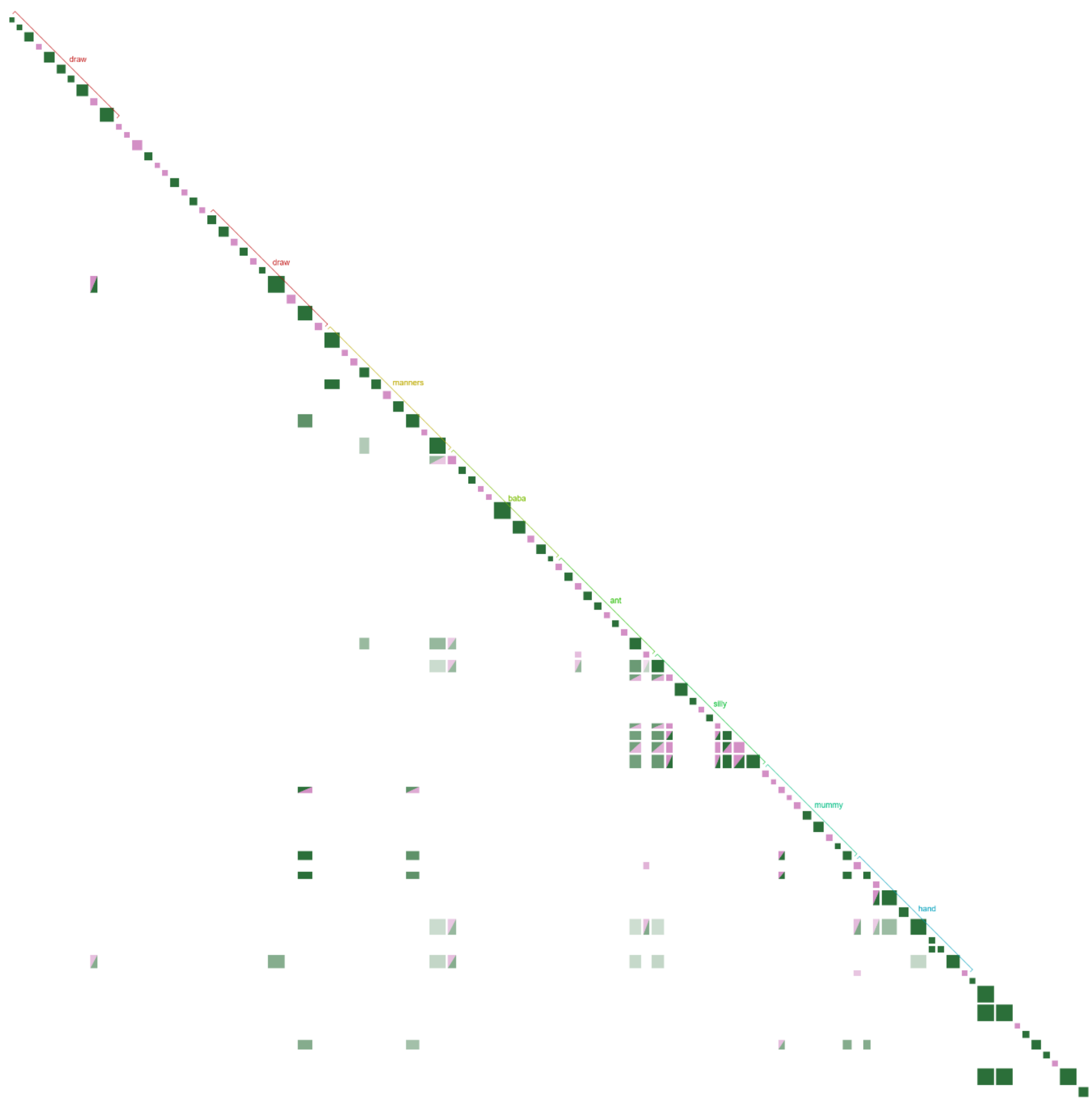


Figure B85

Discursis Temporally Sensitive Conversational Plot for Participant 42 – Symbolic play

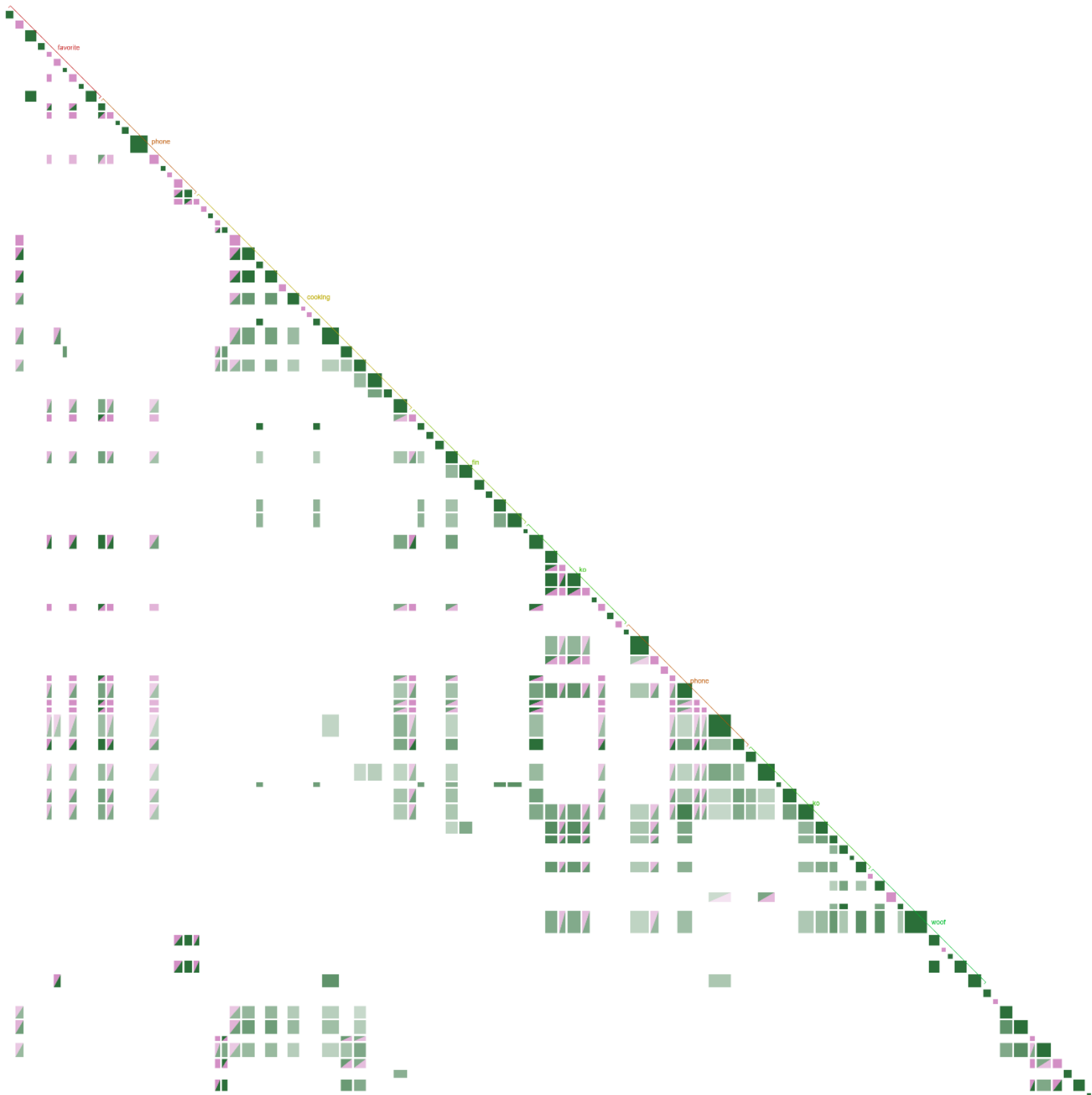


Figure B86

Discursis Temporally Sensitive Conversational Plot for Participant 42 – Functional play

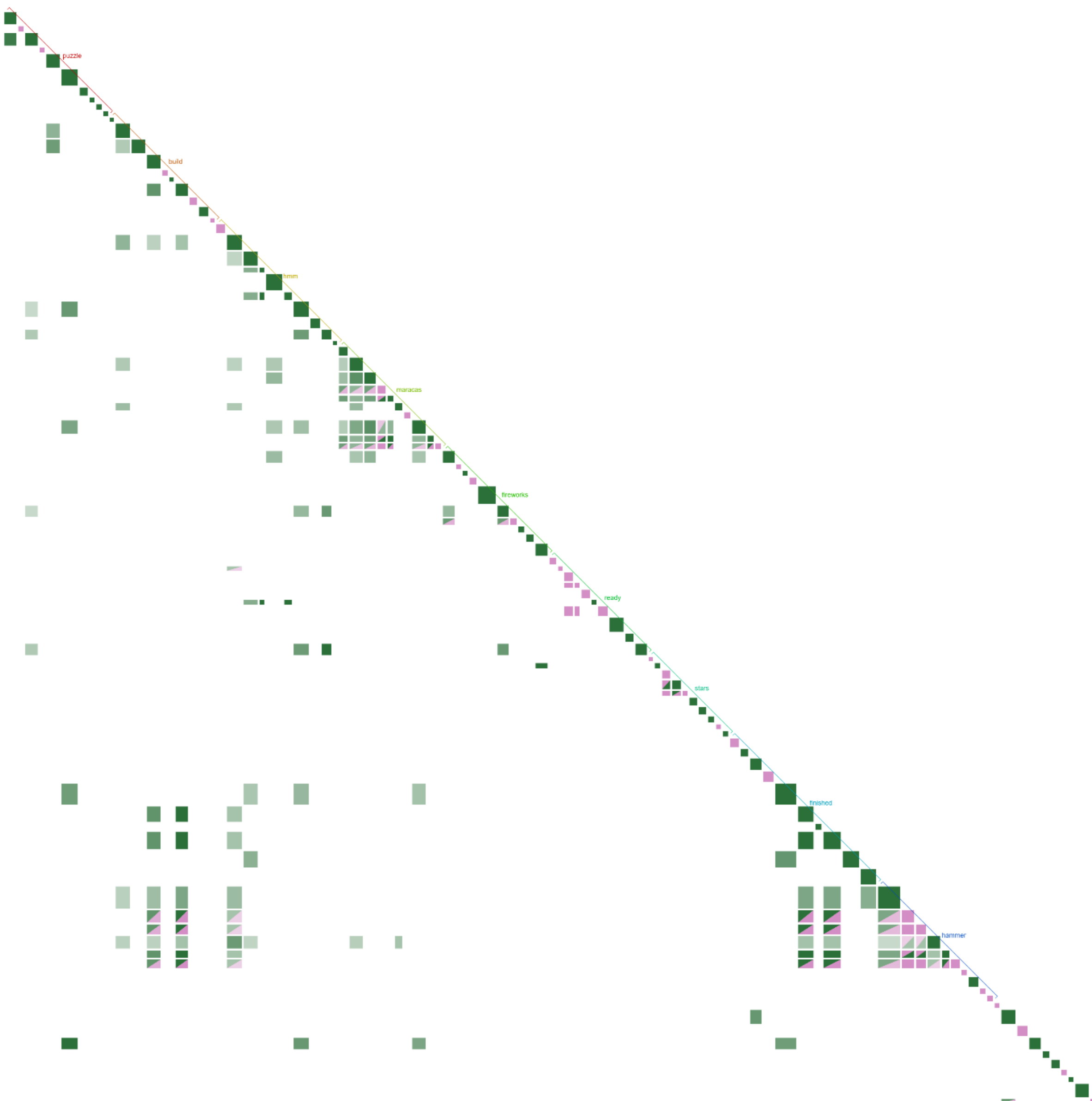


Figure B87

Discursis Temporally Sensitive Conversational Plot for Participant 43 – Symbolic play

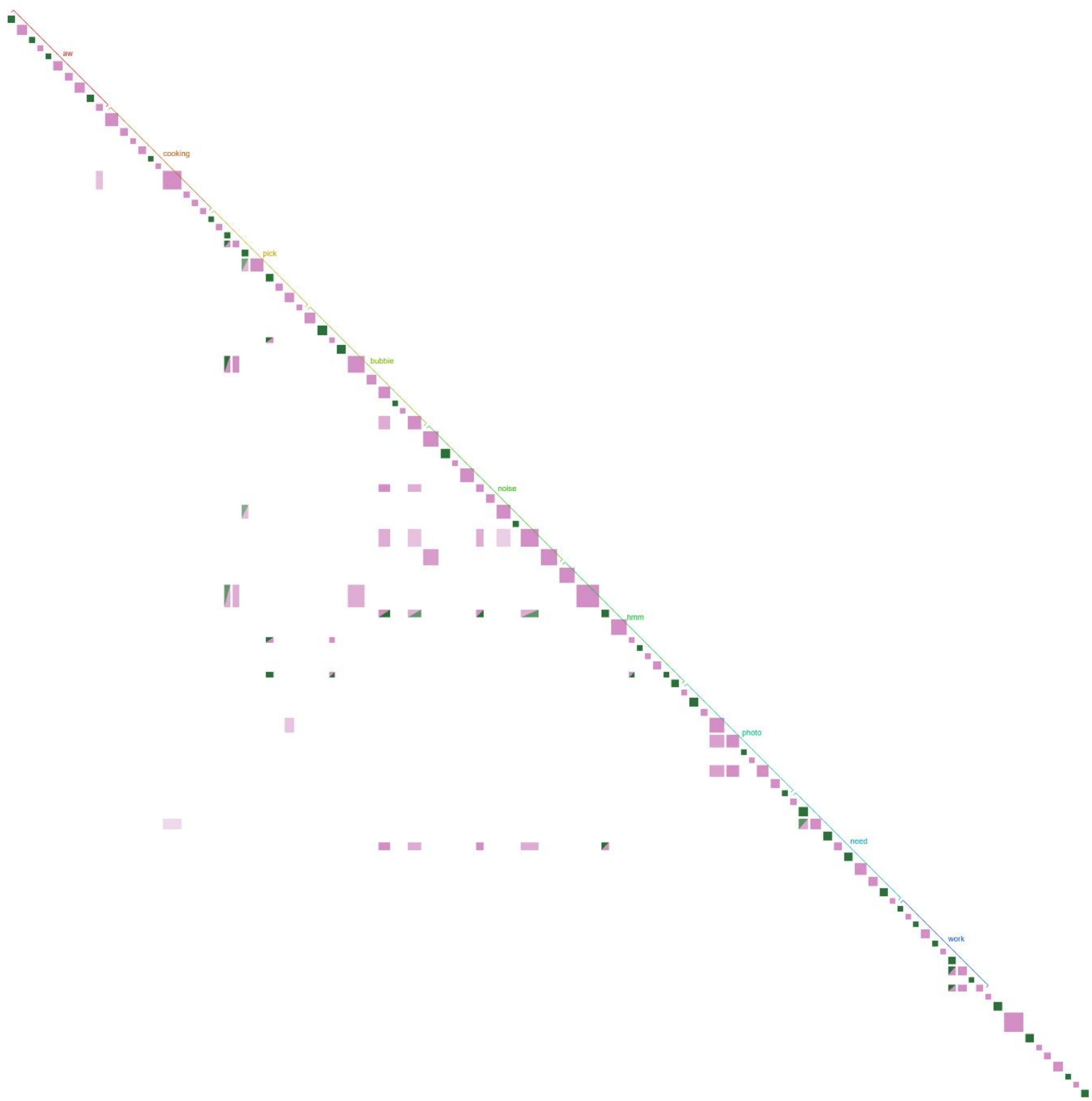


Figure B88

Discursis Temporally Sensitive Conversational Plot for Participant 43 – Functional play

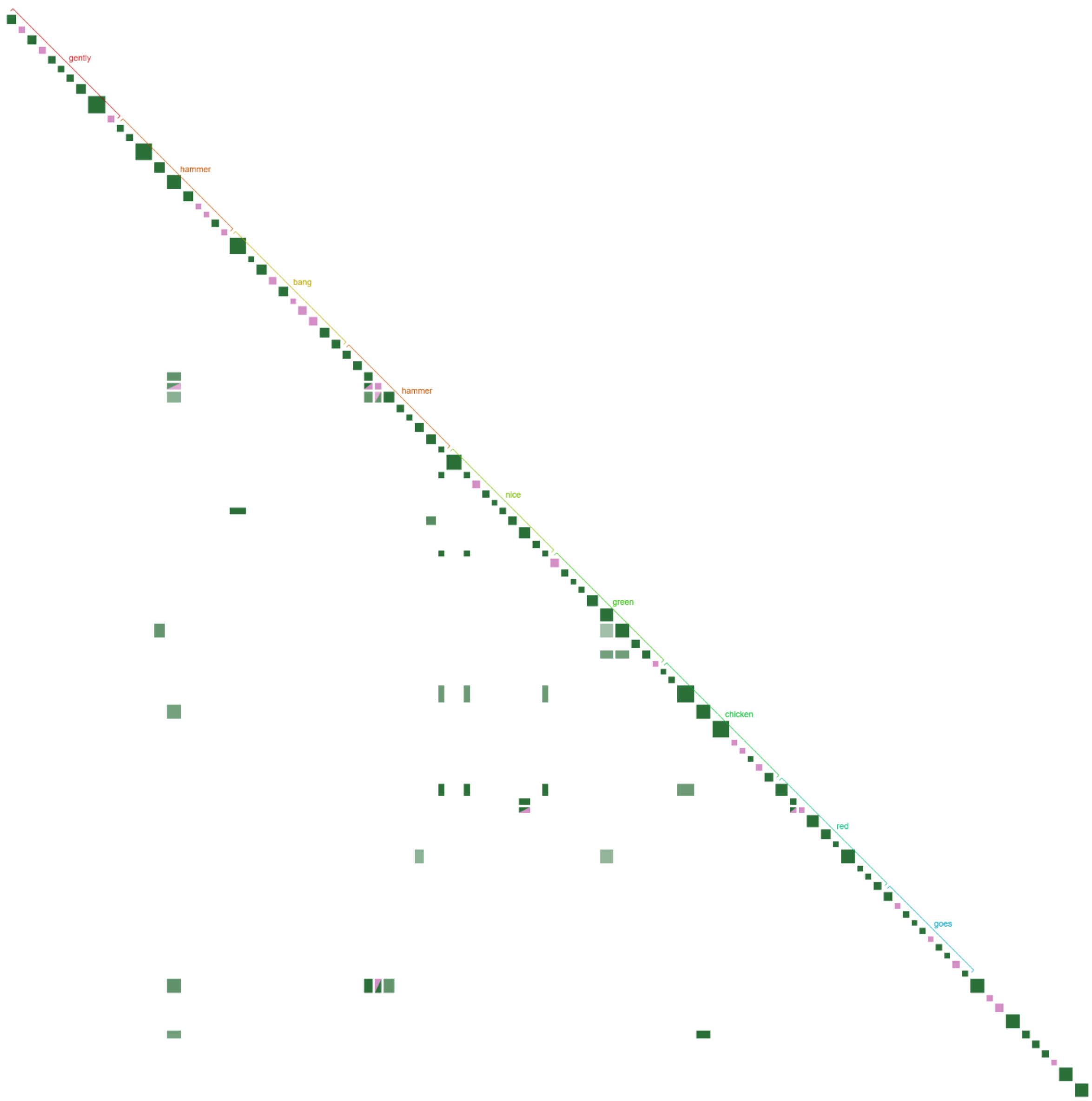


Figure B89

Discursis Temporally Sensitive Conversational Plot for Participant 44 – Symbolic play

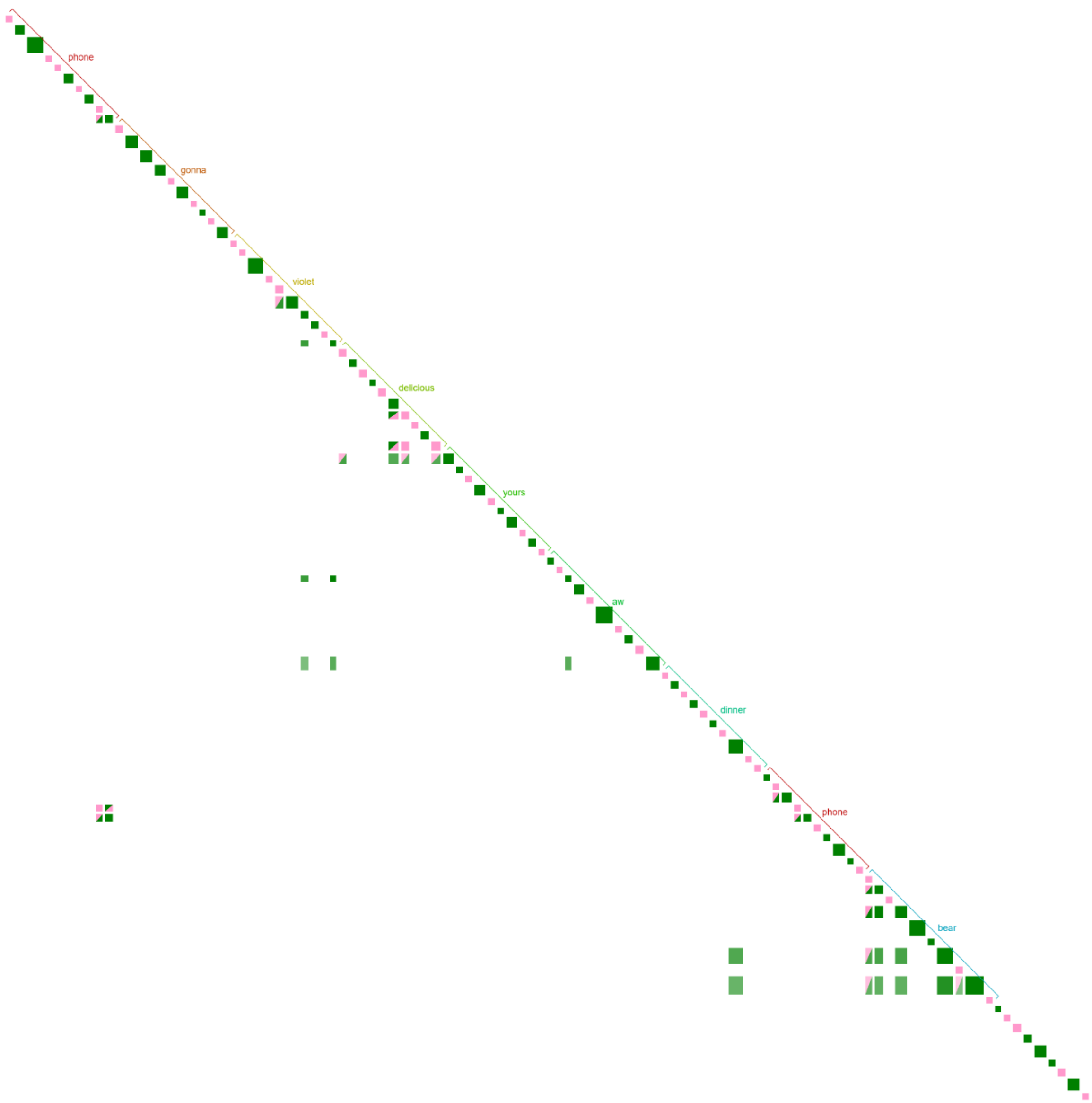


Figure B90

Discursis Temporally Sensitive Conversational Plot for Participant 44 – Functional play

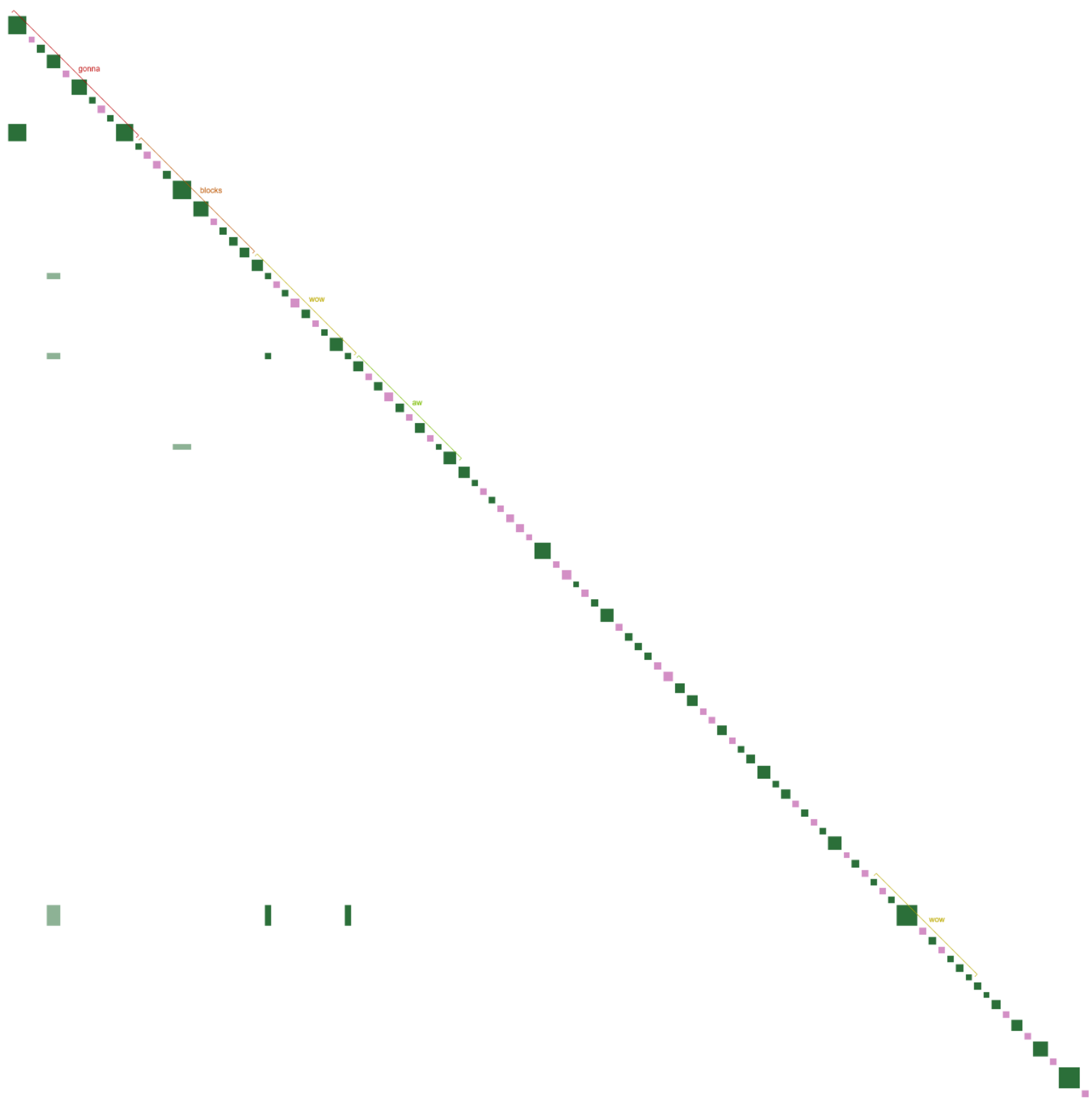


Figure B91

Discursis Temporally Sensitive Conversational Plot for Participant 45 – Symbolic play

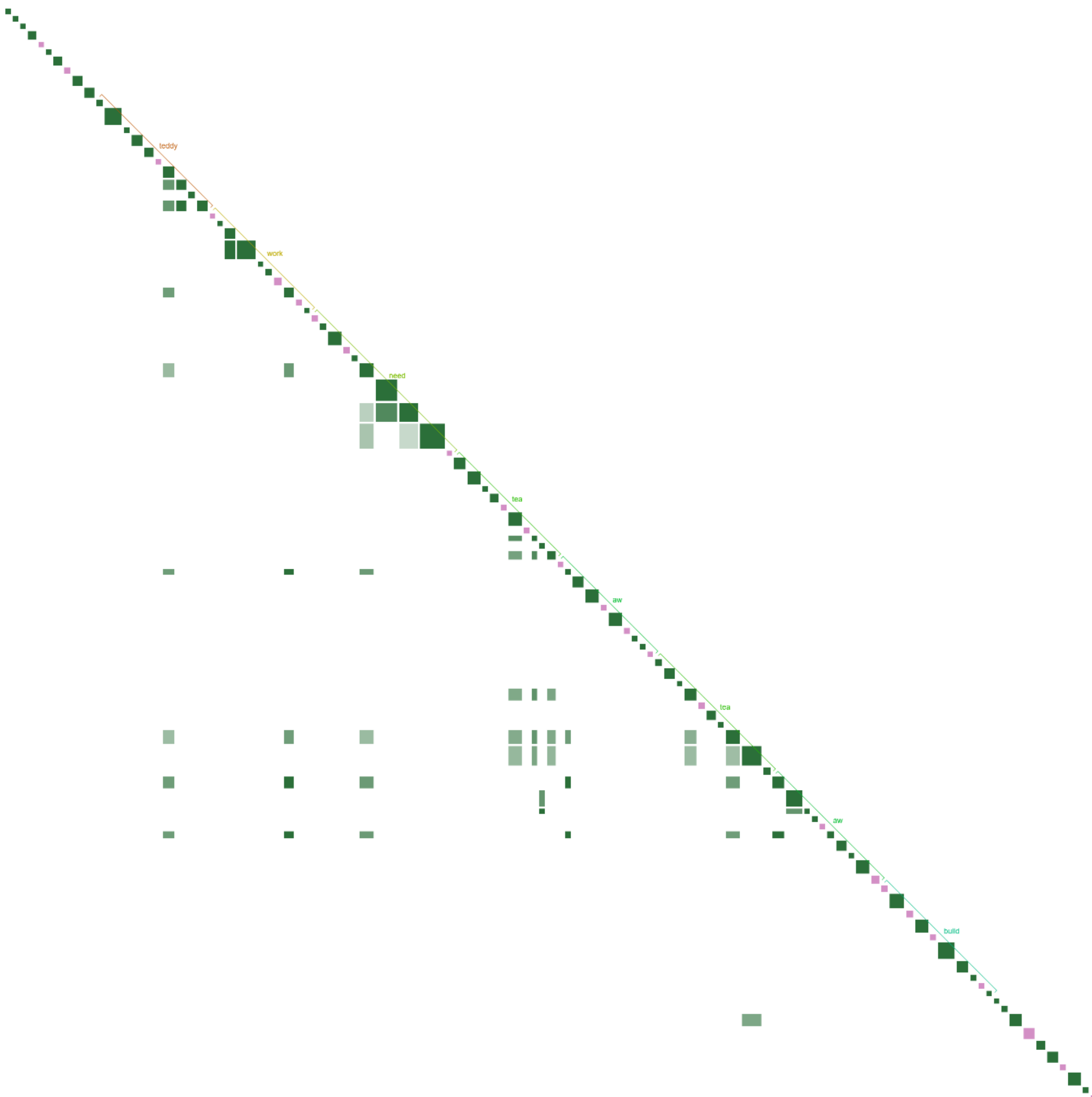


Figure B92

Discursis Temporally Sensitive Conversational Plot for Participant 45 – Functional play

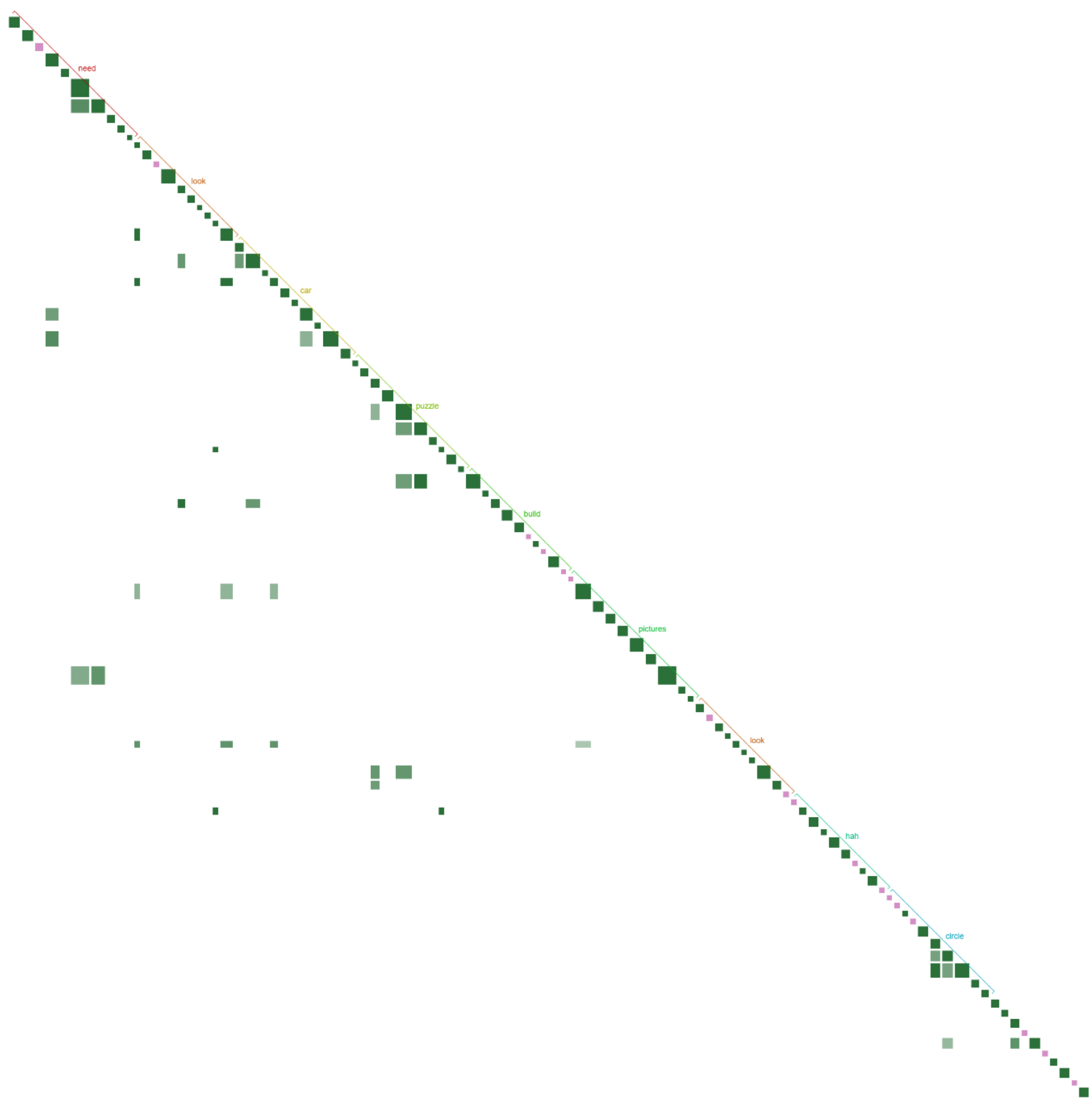


Figure B93

Discursis Temporally Sensitive Conversational Plot for Participant 46 – Symbolic play

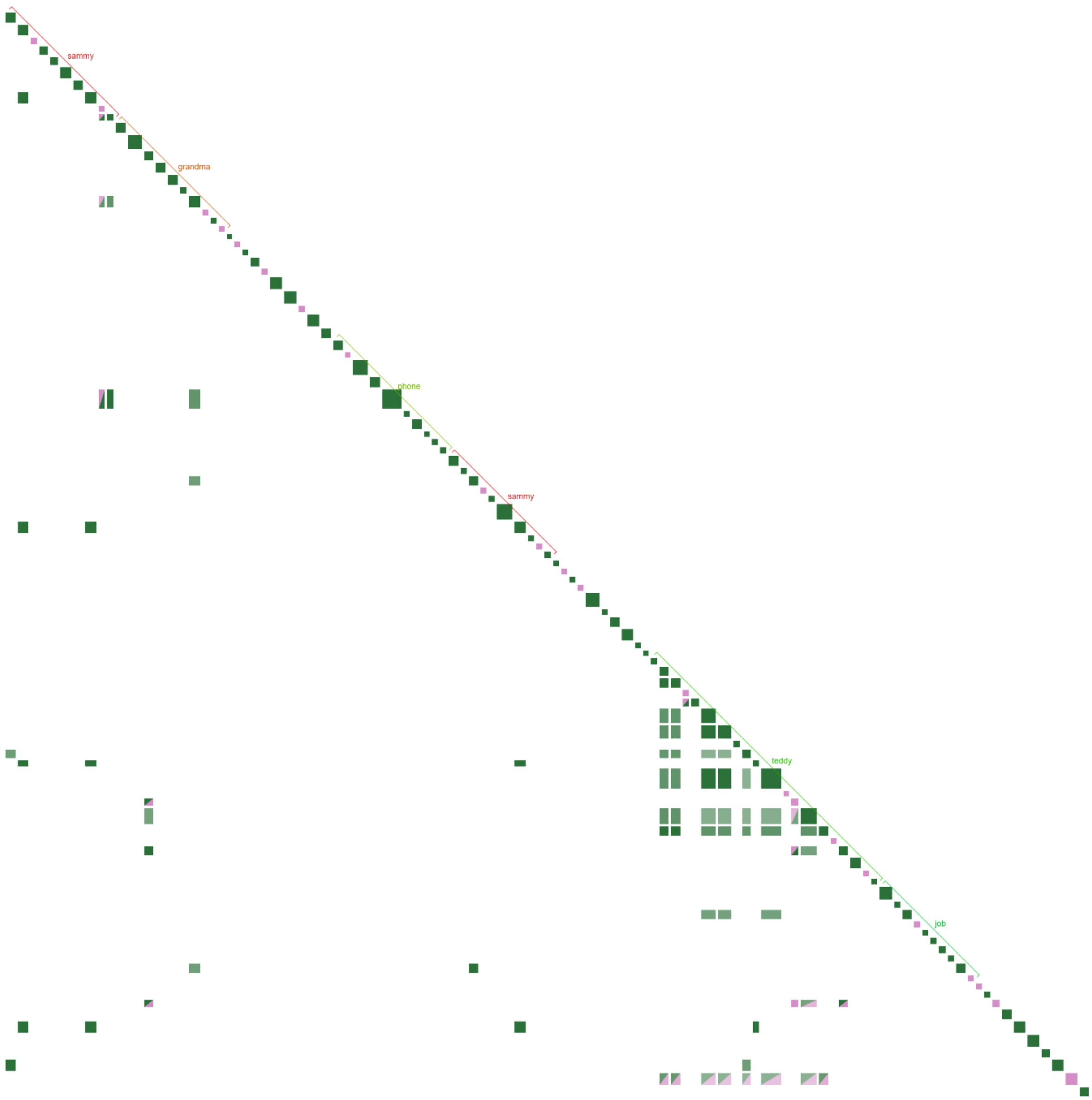


Figure B94

Discursis Temporally Sensitive Conversational Plot for Participant 46 – Functional play

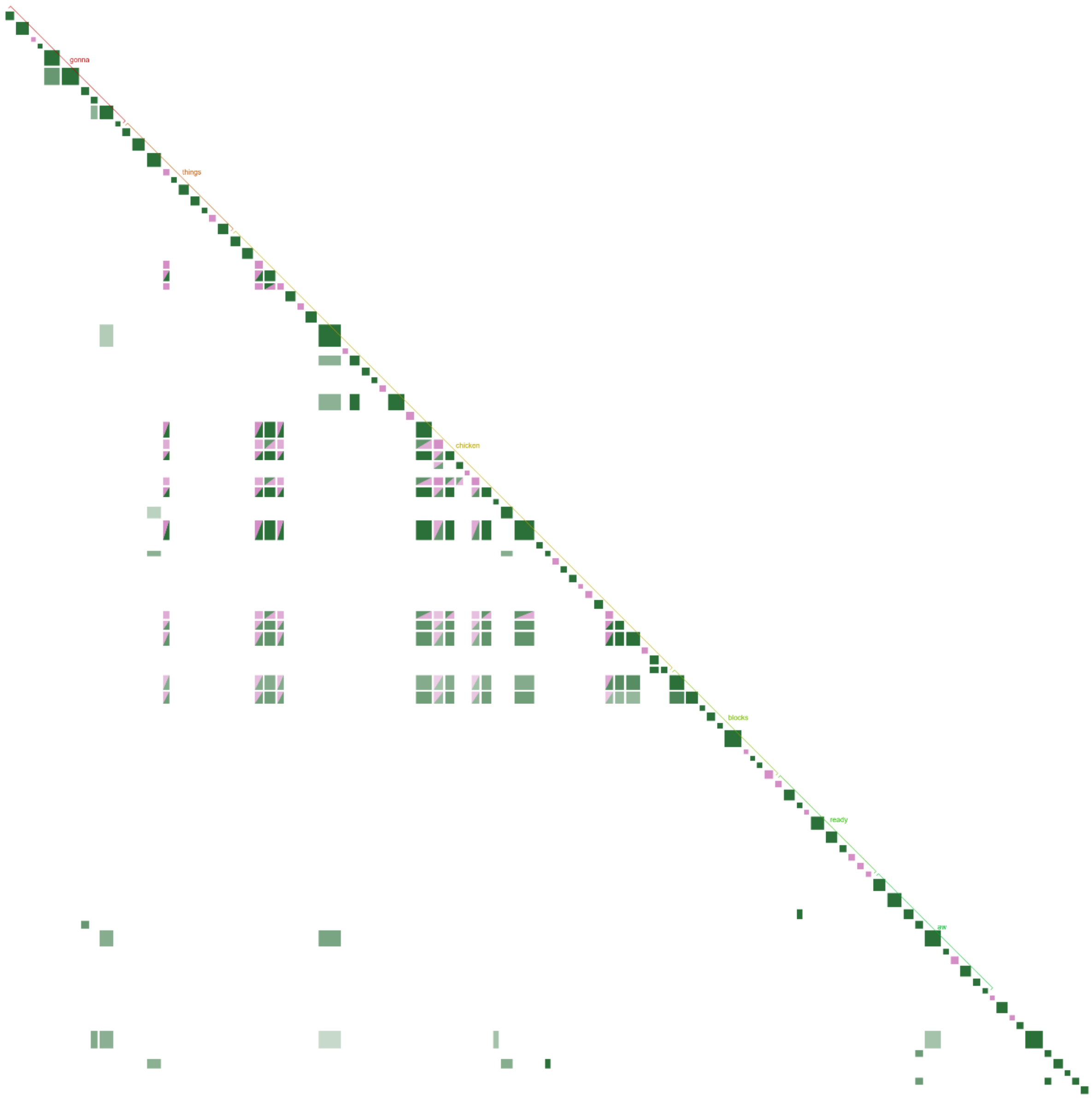


Figure B95

Discursis Temporally Sensitive Conversational Plot for Participant 47 – Symbolic play

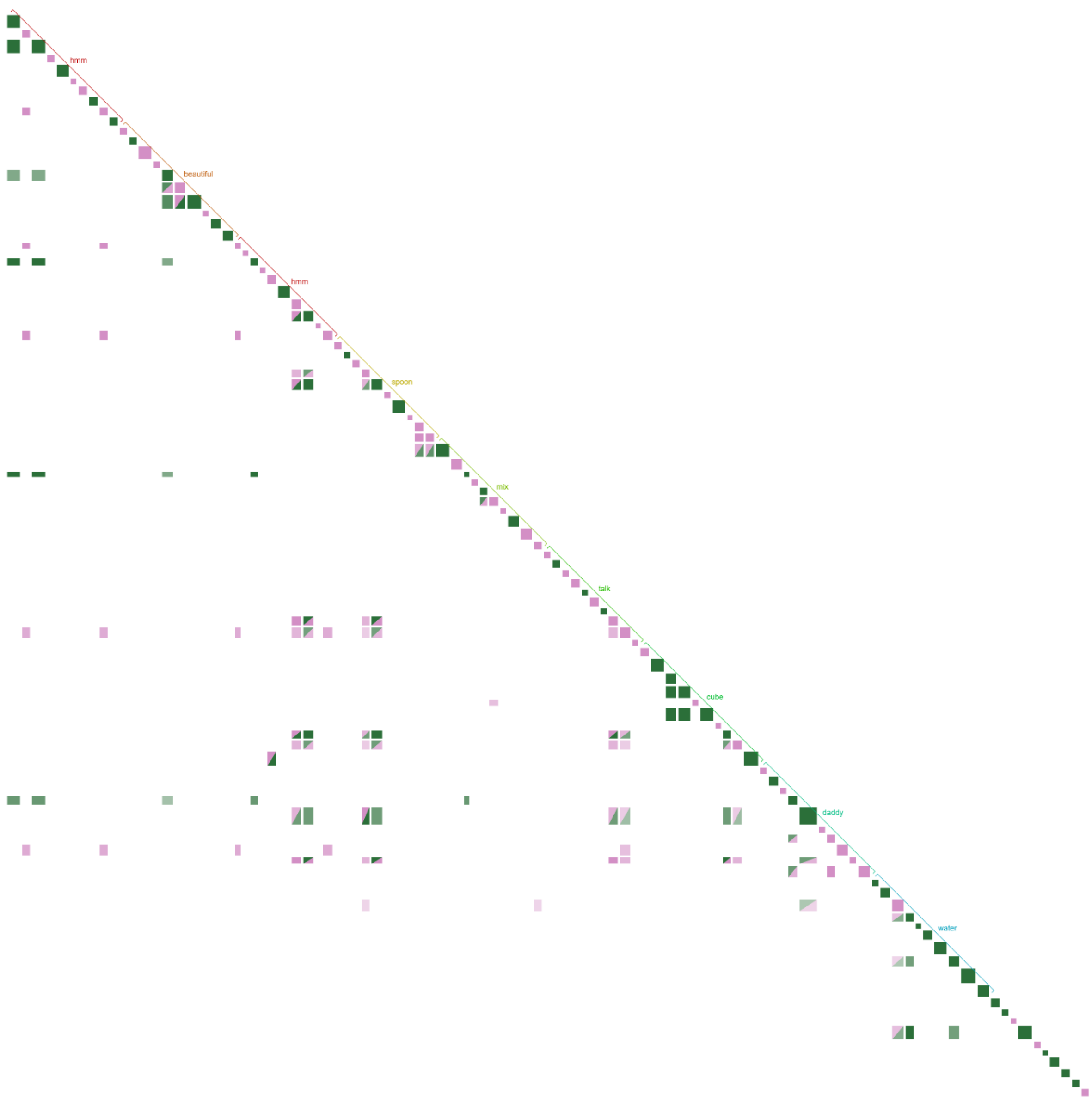


Figure B96

Discursis Temporally Sensitive Conversational Plot for Participant 47 – Functional play

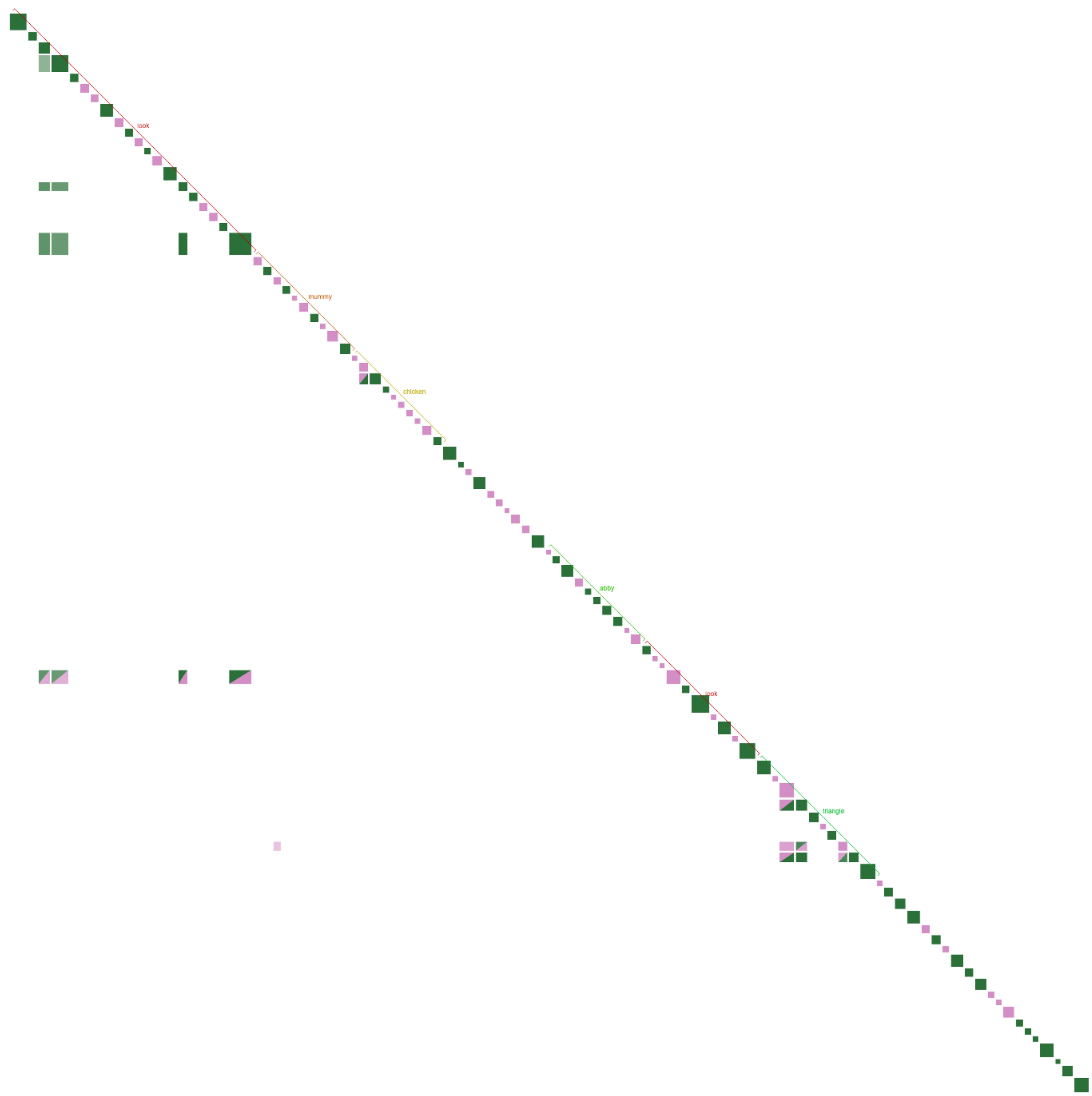


Figure B97

Discursis Temporally Sensitive Conversational Plot for Participant 48 – Symbolic play

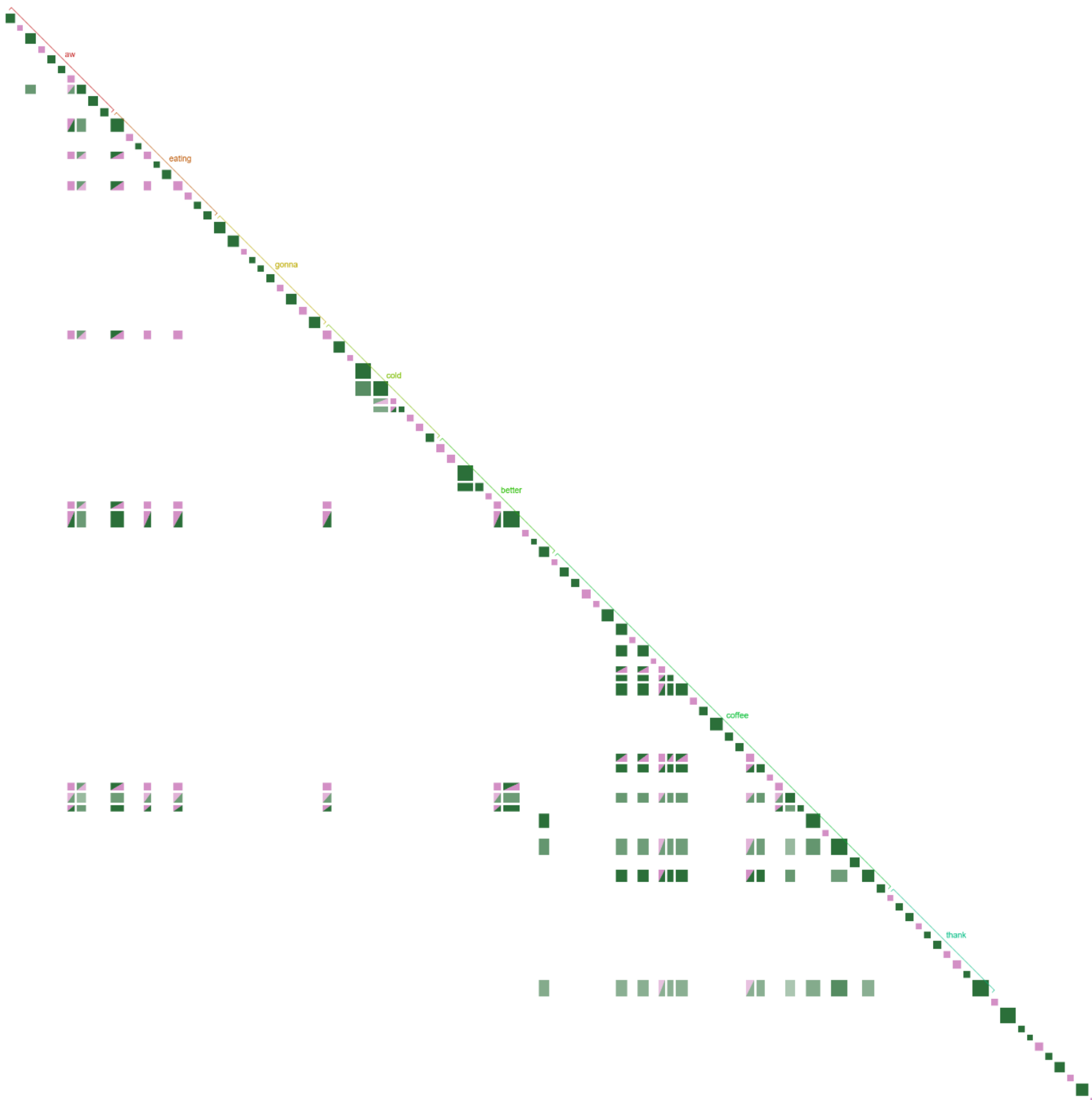


Figure B98

Discursis Temporally Sensitive Conversational Plot for Participant 48 – Functional play

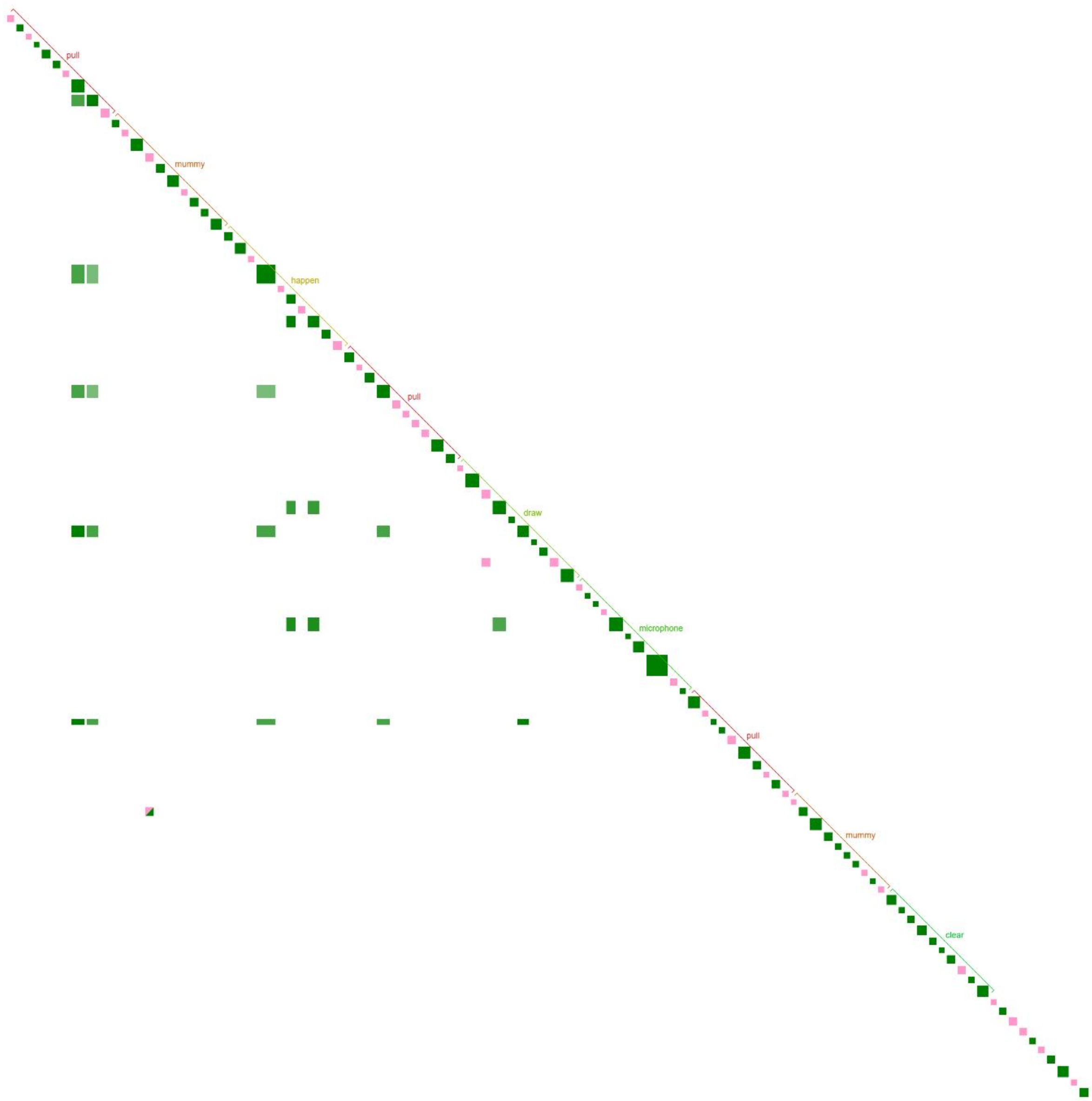


Figure B99

Discursis Temporally Sensitive Conversational Plot for Participant 49 – Symbolic play

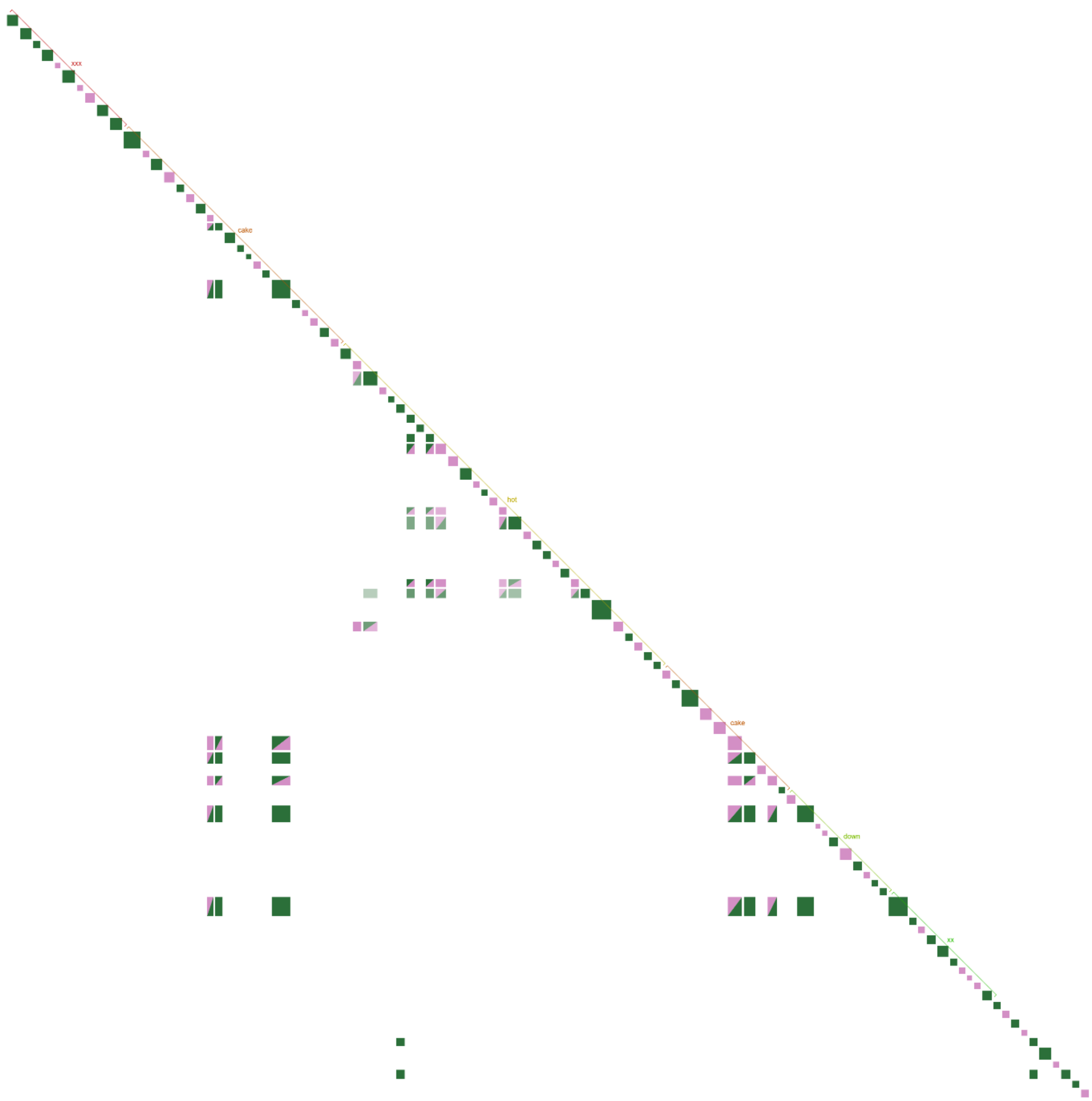


Figure B100

Discursis Temporally Sensitive Conversational Plot for Participant 49 – Functional play

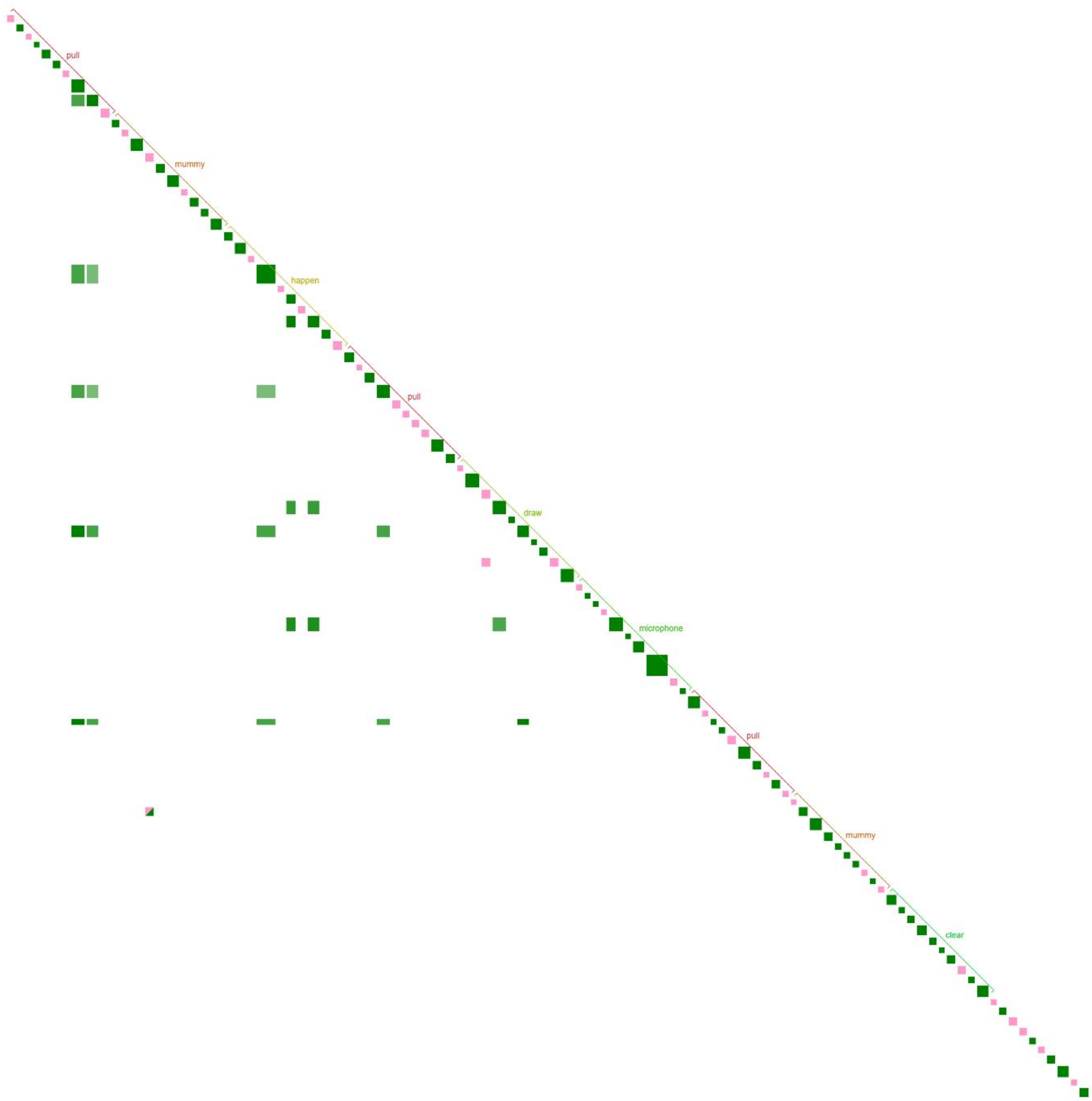


Figure B101

Discursis Temporally Sensitive Conversational Plot for Participant 50 – Symbolic play

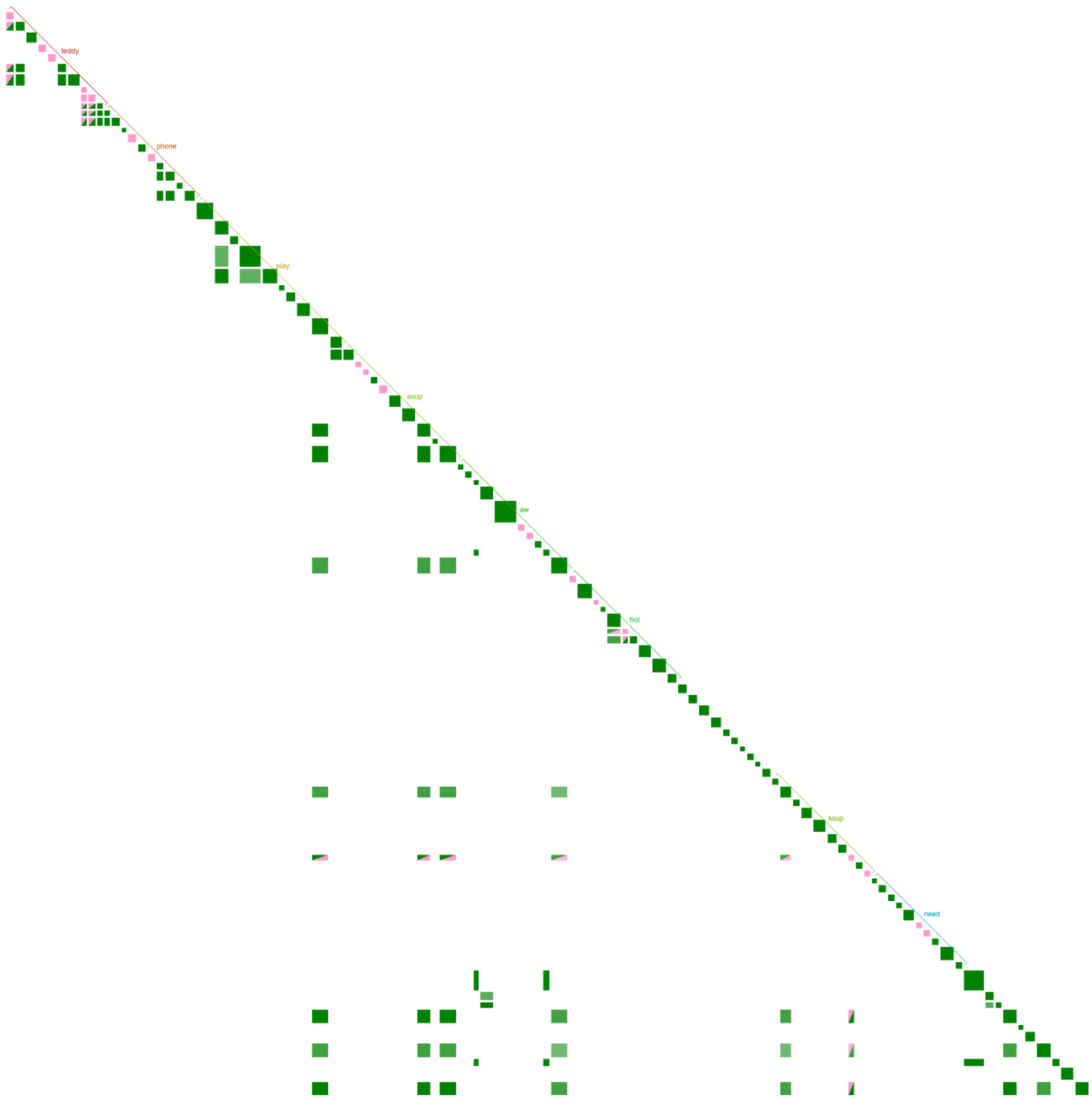


Figure B102

Discursis Temporally Sensitive Conversational Plot for Participant 50 – Functional play

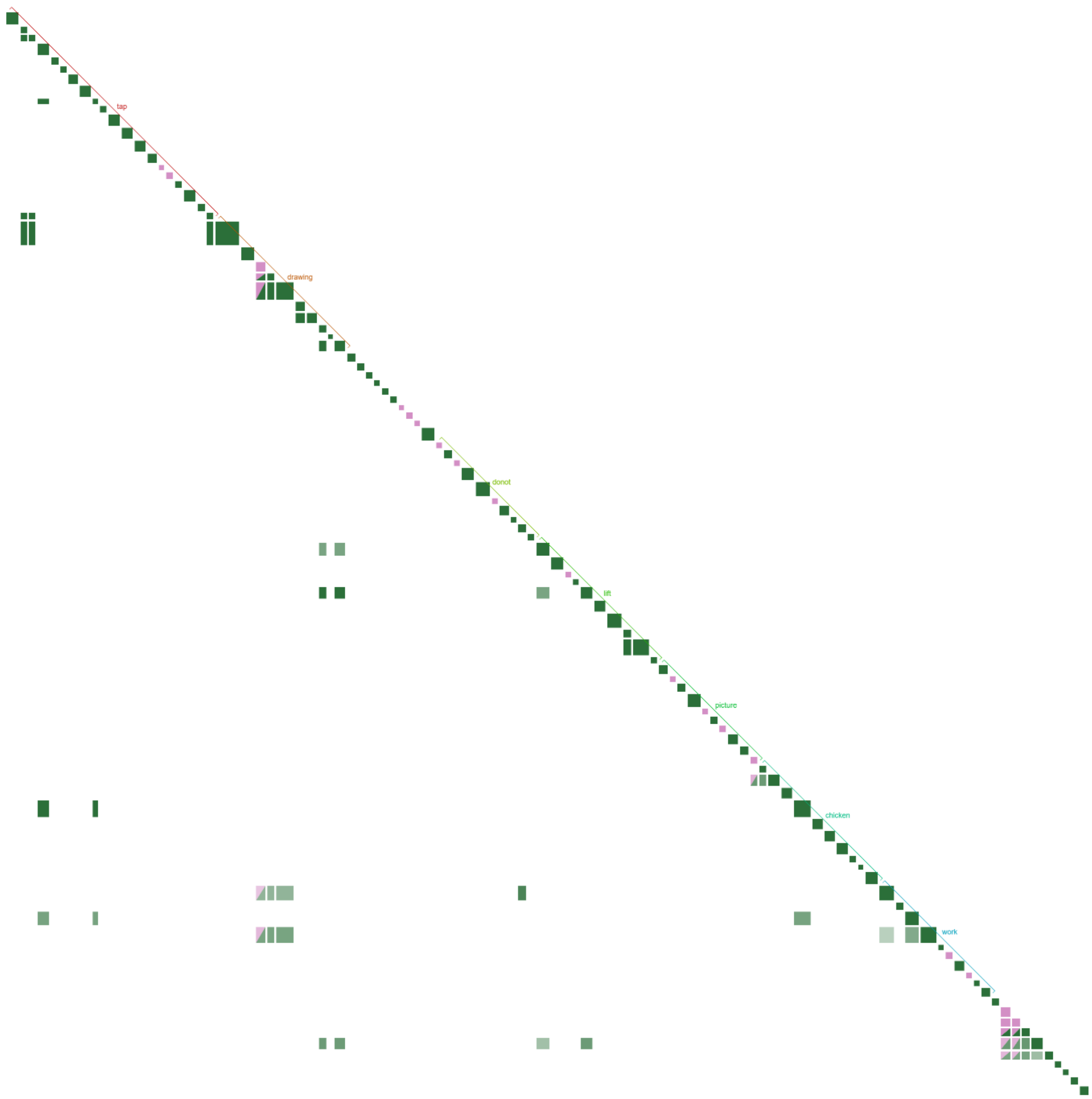


Figure B103

Discursis Temporally Sensitive Conversational Plot for Participant 51 – Symbolic play

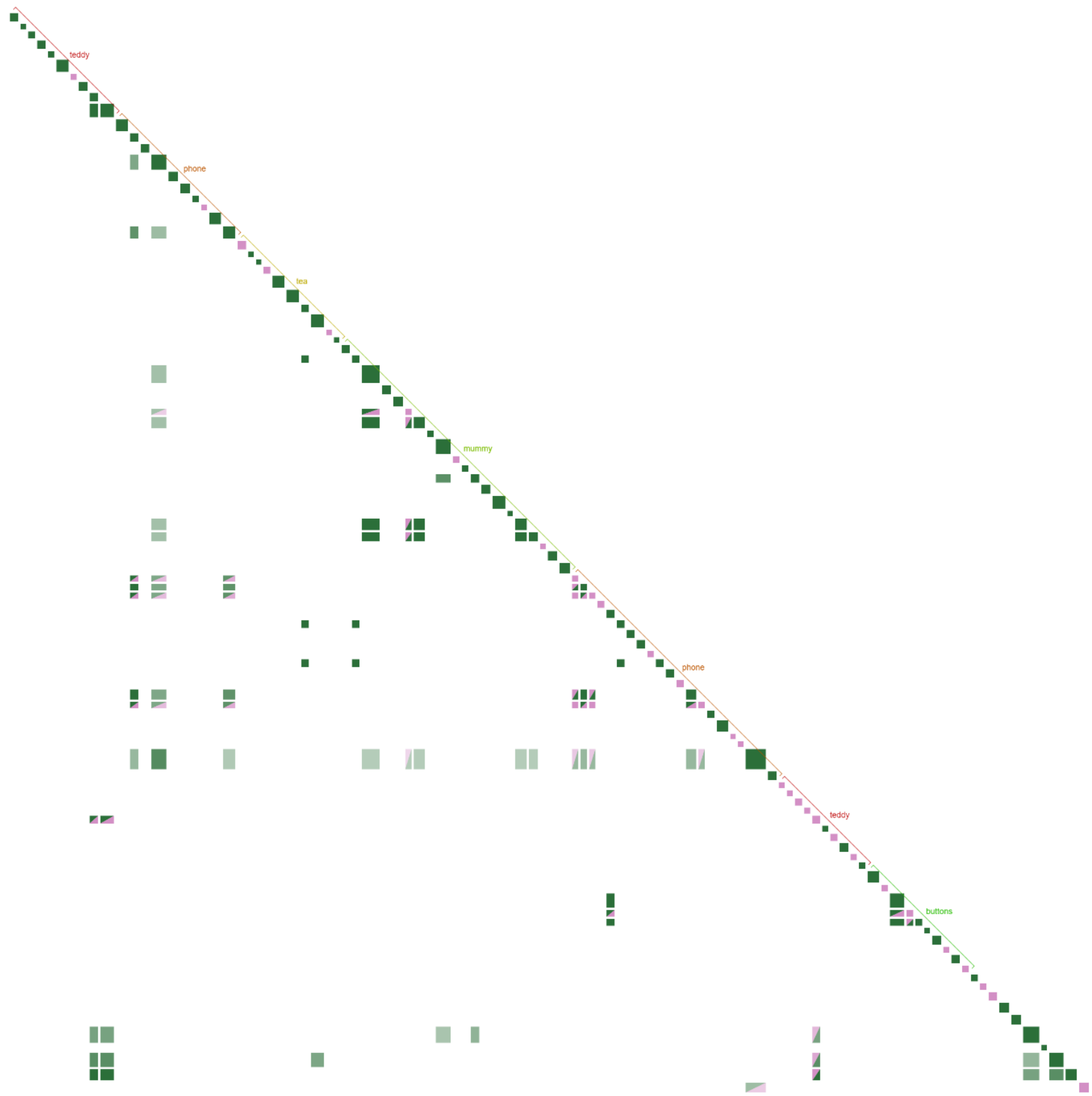


Figure B104

Discursis Temporally Sensitive Conversational Plot for Participant 51 – Functional play

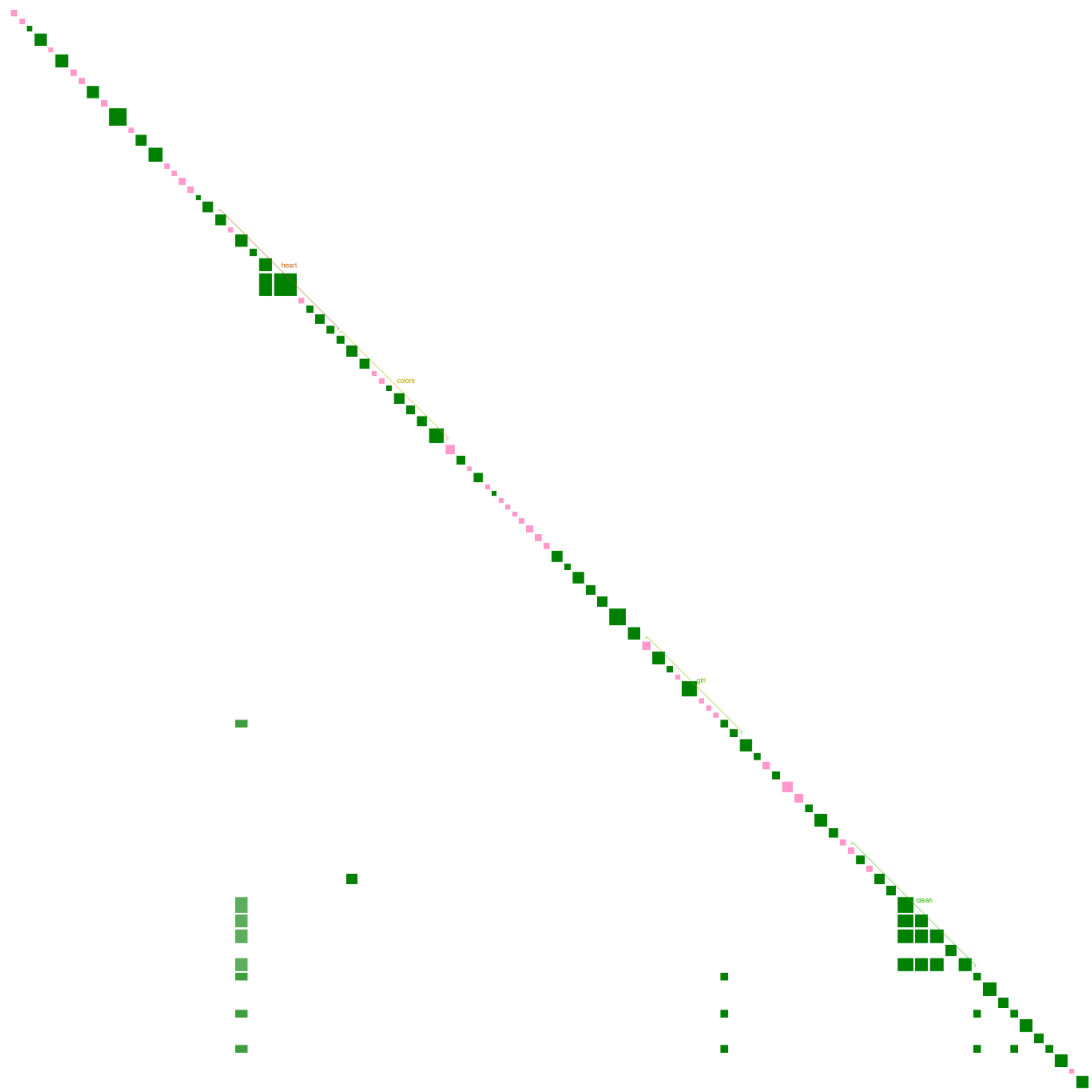


Figure B105

Discursis Temporally Sensitive Conversational Plot for Participant 52 – Symbolic play

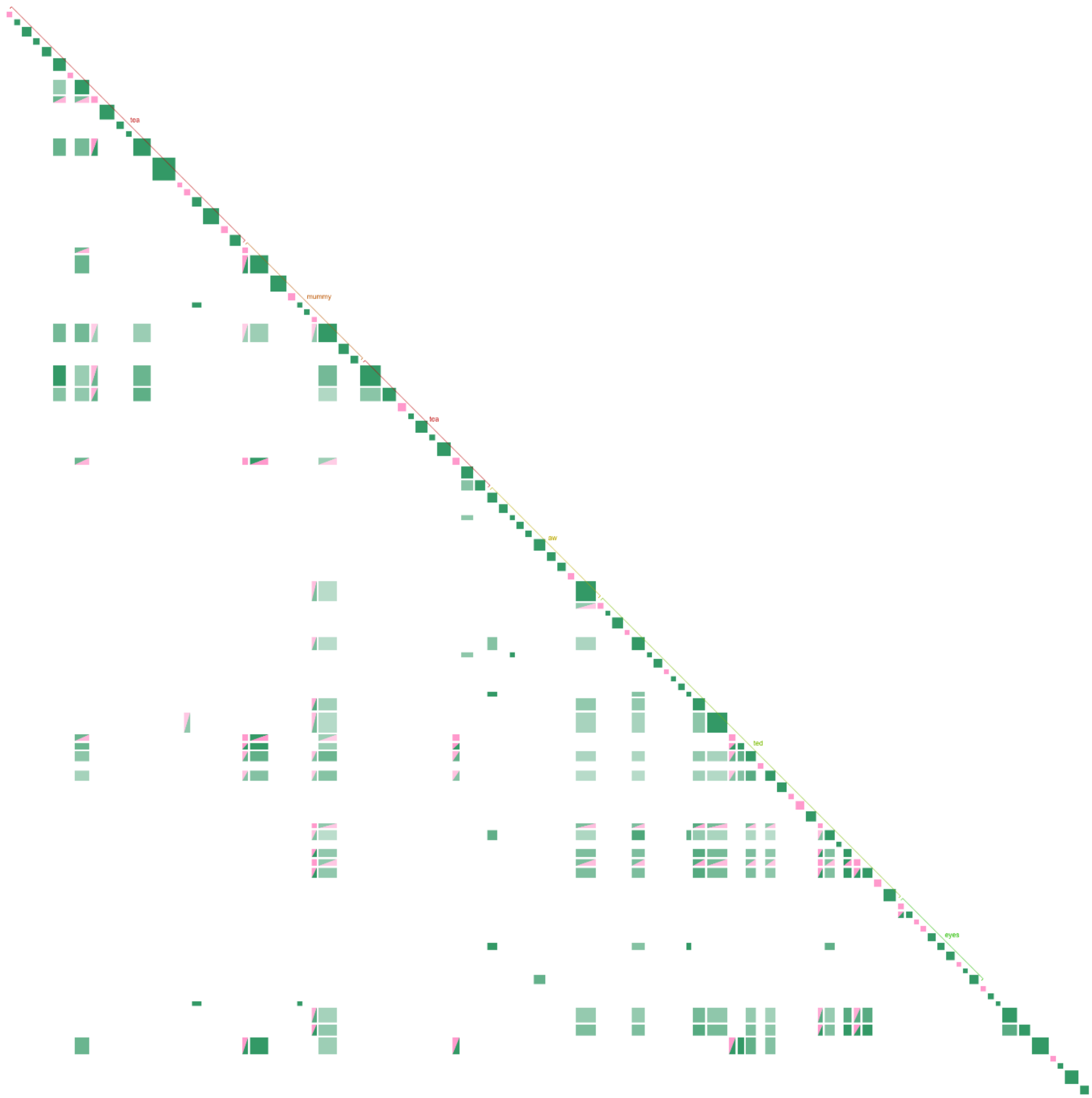


Figure B106

Discursis Temporally Sensitive Conversational Plot for Participant 52 – Functional play