Formulaic Language in the Interactions of Children with Autism Spectrum Disorder: A Mixed Methods Multiple Case Study

by

Joëlle Lise Marie Doucet

A thesis submitted to the Faculty of Graduate and Post Doctoral Affairs in partial fulfillment of the requirements for the degree of

Master of Arts

in

Applied Linguistics and Discourse Studies

Carleton University
Ottawa, Ontario

Abstract

This mixed methods multiple case study examines formulaic language in the speech of four children with autism spectrum disorder (ASD). Play sessions were recorded to collect speech samples. Parents of participants acted as informants during the recording sessions and completed questionnaires. Three analyses were carried out: a qualitative analysis of situational factors that potentially impacted the prevalence of formulaic language, a quantitative analysis of the prevalence of formulaic language in speech samples using a classification system developed for the study, and a qualitative functional analysis of 36 formulaic sequences. Various situational factors increased or decreased formulaic language use, though all four participants used formulas. Formulas corresponded to several categories and varied in conventionality, whether in form or function. Nonetheless, the qualitative analysis indicated that formulas had several functional uses in the interactions of participants. These findings have implications for future research and language assessment and intervention in ASD.

Acknowledgements

First and foremost I would like to thank my supervisor, Dr. D. Wood, and J. Ballantine, for their guidance, encouragement, and thought-provoking questions, and for reading draft upon draft of research proposals, questionnaires, and chapters.

I would also like to express my great appreciation to the families and SLP who participated in this study for sharing their experience with such enthusiasm and openness.

Additionally, I offer my special thanks to Dr. E. Cray and Dr. M. Sénéchal for serving on my defense committee, and to H. Miller and C. Michaud for carrying out coding checks.

In no particular order, I wish to acknowledge the help provided by the following people: L. MacDonald-Hicks at CURE for her assistance with research ethics forms and the SLALS professors and staff, especially B. MacLeod, J. Ballantine, and M. Biezma for letting me audit their courses, M. Barker for his technical support, and J. Grant for helping me navigate administrative procedures.

I would also like to thank my family, friends, and classmates, in particular those who attended our writing group and my thesis defence, for their support, encouragement, kind ear, and patience over the past two years. I would like to offer my special thanks to C. Michaud for editing hundreds of pages of writing and being my sounding board, and to A. Doucet, M. Wellisch, S. Burns, and S. Maley for helping me keep a healthy work-life balance.

Finally, I would like to acknowledge the financial support from Carleton University and Hamlin Charitable fund that allowed me to focus my efforts on this research project.

Abridged Table of Contents

Table of Contents

List of Tables

List of Figures

List of Appendices

Notations and Abbreviations

Year ; Month	Convention for age
Minutes : Seconds	Convention for recording time or duration
@	In transcription, indicates a pulse of laughter
-	In transcription, indicates a truncated word or utterance
((WORDS))	In transcription, indicates metatranscription commentary
bold	In examples, bold indicates the object of analysis
(formulaic) sequence	Words in brackets are an optional part of the formula
[formulaic] sequence	Square brackets represent a slot in the formula frame
Formulaic sequence X	Indicates a slot that can be filled to complete a sentence
Formulaic sequence __	Indicates a slot that can be filled to complete a phrase
ASD	Autism spectrum disorder
AQ-Child	*Cambridge University Behaviour and Personality Questionnaire for Children* (Auyeung et al., 2007a)
CPPQ	Child Participant Profile Questionnaire
DSM-5	*Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (5th ed.) (APA, 2013)
DSM-IV-TR	*Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR* (4th ed., text rev.) (APA, 2000)
LaCAS	Language as a complex adaptive system
PRT	Pivotal response therapy
SLP	Speech-language pathologist
UVB	Unconventional verbal behaviour
WC%	Percentage of total word count

Preface

The difficulties of identifying formulaic language and the fallacies of native speaker intuition are well documented (see Wray 2002, Chapter 2 for an overview). As the identification of formulaic language in this study relies considerably on my intuition as a native speaker, I feel that it is important to give some background information about myself.

I am a trilingual graduate student in an Applied Linguistics and Discourse Studies program with a background in translation studies. French and English are my first languages; I also speak Spanish fluently. My interest in formulaic language arose from my experience as a translator, both academically and professionally, and from my work in the foreign language departments of two universities. It was through these experiences that I became particularly aware of expressions that do not translate word-for-word across languages or that are only used in certain contexts. I often found myself telling students *We just don't say it that way*, or, *We wouldn't say that in this situation*. Thus, while my formal exposure to the term *formulaic language* did not begin until my Master's program, I was interested in the field well before that.

As far as my interest in language and communication disorders, my first introduction to the field was through volunteer work in elementary classrooms with students with special needs. Later, I enrolled in psychology lectures in my undergraduate studies and audited a course in language and communication disorders during my Master's program. These classes further increased my curiosity about the field and strengthened my belief that atypical language use is not by definition dysfunctional. The language and communication disorders course in particular was especially influential; the

idea for this research project developed through a series of conversations with the instructor of the language and communication disorders course.

Therefore, my academic and professional background led me to this area of research. It is likely that these experiences have influenced my analysis of the data. However, I have taken a number of steps, such as member checking and coding checks to enhance the objectivity of my analysis.

1. Introduction

The purpose of this mixed methods multiple case study is to examine both the *prevalence* and the *nature* of the use of formulaic language in the interactions of four children with Autism Spectrum Disorder (ASD), a disorder "characterized by persistent deficits in social communication and social interaction… [and] the presence of restricted, repetitive patterns of behaviour, interests, or activities" (American Psychiatric Association [APA], 2013, p. 31). It is situated within the view that language is a complex adaptive system in which language emerges from interactions over time and is shaped by situational factors surrounding each instance of use (Beckner et al. [The Five Graces Group], 2009).

1.1. Formulaic Expressions

Formulaic expressions can be defined as utterances that "are not novel – that is, they are <u>not</u> newly created from the operation of grammatical rules on lexical items" (Van Lancker Sidtis, 2009, p. 446). To varying extents, they have fixed forms (e.g., *by and large*), agreed-upon meanings (e.g., *What's up?*), specific conditions of use (e.g., *You've got to be kidding me!*), and are known by members of a speech community (e.g., *thank you very much*) (Van Lancker Sidtis, 2012a, 2012b; Van Lancker Sidtis, Canterucci, & Katsnelson, 2009). Well-known classes of formulaic expressions include idioms, proverbs, expletives, etc. (Van Lancker Sidtis, 2012b).

Novel utterances, on the other hand, are produced and understood analytically (Perkins as cited in Wray & Perkins, 2000). Consider the sentence, "*The cat often sits on the sofa*" (Van Lancker Sidtis, 2012a, p. 65). In this example, neither the words nor the order are fixed; *often, the cat sits on the sofa*, *the cat sits on the sofa often*, and *the cat*

often sits on the couch all convey the same meaning and nuances as the first sentence. There are no social or contextual meanings beyond that of the words themselves as they can be replaced with synonyms and still convey the same message. The sentence is not closely associated with certain situations or registers; you could say the sentence at a house party, to your boss, to a young child, at any time of day, etc. On the other hand, a formula such as *nice to meet you* can only be said the first time you meet someone, for example. Finally, the utterance is not necessarily known by members of a speech community. That is to say, if members of the speech community were selected at random and asked to fill in the blank in *the __ often sits on the sofa*, it is unlikely that they would all guess *cat*. However, given a sentence such as *It's the __ that counts* (Van Lancker-Sidtis & Rallon, 2004, p. 234), they would likely say that the missing word is *thought*, indicating that the latter utterance is known to members of the speech community while the former is not.

1.2. Autism Spectrum Disorder (ASD)

Autism Spectrum Disorder (ASD) is characterized by (a) "persistent deficits in social communication and social interaction across multiple contexts" (APA, 2013, p. 50), and (b) the presence of "restricted, repetitive patterns of behaviour, interests, or activities…currently or by history" (APA, 2013, p. 50); they are present in the early developmental period, cause significant impairment in areas of current functioning, and are not better explained by another diagnosis (APA, 2013). However, the expression of the defining traits of ASD varies considerably among the population with ASD according to factors such as the severity of the condition, developmental level, and chronological age (APA, 2013). Based on a review of international epidemiological surveys, "a best

estimate of (74/10,000) (equivalences = 7.4/1,000 or 0.74%, or 1 child in about 70-90 children) can be confidently derived for the prevalence of ASD" (French, Bertone, Hyde, & Fombonne, 2013). Gender differences are also observed in the epidemiology of ASD; it is three to four times more prevalent in males than in females (Centers for Disease Control and Prevention as cited in Kim & Lord, 2013).

To date, there is no single-known etiology of ASD (APA, 2013; Kim & Lord, 2013; Reber 2012a; Reber 2012b; Waterhouse, 2013). Risk factors that predispose individuals to ASD include certain neurogenetic syndromes (Reber, 2012b), chromosomal abnormalities and single gene mutations (Reber, 2012b), epilepsy syndromes (Reber, 2012b), metabolic diseases (Reber, 2012b), advanced parental age (APA, 2013), low birth weight (APA, 2013), and foetal exposure to infectious agents or neurotoxins (Waterhouse, 2013), among many others. As there is no single biological, genetic, or environmental cause of ASD, the disorder is diagnosed based on core "clinical features - observed behaviour and reported symptoms" (Reber, 2012a, p. 3).

The most recent set of diagnostic criteria is provided in the *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (abbreviated DSM-5; APA, 2013). DSM-5 (APA, 2013) does not use separate diagnostic labels for subgroups based on cognitive functioning or language abilities, such as high-functioning autism, low-functioning autism, pervasive developmental disorder, Asperger's disorder, and childhood disintegrative disorder. Rather, they are all subsumed into a single diagnostic category of autism spectrum disorder as studies have failed to conclusively identify consistent differences between the subgroups (Kim & Lord, 2013; Mahoney et al. as cited in Reber 2012a; Myhr, Klin et al. as cited in Reber 2012a; Witwer & Lecavalier as cited

in Reber 2012a). While some of the studies cited in this paper subdivided participants according to these diagnostic labels (e.g., Sirota, 2004; Solomon, 2004; Van Lancker Sidtis, 2012; Volden & Sorenson, 2009), this study adopts the convention set out in DSM-5 (APA, 2013) of using *specifiers* or *descriptors* (APA, 2013). In place of different diagnostic labels, DSM-5 (APA, 2013) proposes that descriptors be used to distinguish between different degrees of impairment. The severity of social communication and interaction impairments, as well as the severity of restricted, repetitive patterns of behaviour are ranked on a three-level scale from *requiring support* to *requiring very substantial support* (APA, 2013, p. 52). The severity descriptors and their descriptions are provided in Appendix A. Additional specifiers include intellectual impairment, language impairment, association with a known medical or genetic condition or environmental factor, and association with another neurodevelopmental, mental, or behavioural disorder (APA, 2013). In addition to those proposed by APA (2013), Lai, Lombardo, Chakrabarti and Baron-Cohen (2013) list an expanded series of descriptors that may help researchers uncover patterns of impairment within the autism spectrum.

Language in persons with ASD is highly variable; while some may never acquire speech, others may have unimpaired linguistic abilities including phonological skills, vocabulary, syntax, and morphology (Tager-Flusberg, Paul, & Lord, 2005). As a result of this variation, language impairment is considered a specifier of individual diagnosis, not a core feature of ASD (APA, 2013; Lai et al., 2013; Reber, 2012a). Thus, language is *not by definition* impaired in ASD as defined in DSM-5 (APA, 2013). This reflects a shift from earlier diagnostic criteria, including *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR* (APA, 2000), wherein language impairment or lack thereof was

used to distinguish between diagnoses such as autistic disorder and Asperger's disorder, respectively (Reber, 2012a). Nonetheless, the core impairments of ASD are reflected in language use, as demonstrated by the following criteria and examples provided in the DSM-5 (APA, 2013) ASD diagnostic criteria:

- Persistent deficits in social communication and interaction:
    - Criterion A1: "Deficits in social-emotional reciprocity, ranging, for example, from abnormal social approach and *failure of normal back-and-forth conversation*; to reduced sharing of interests, emotions, or affect; *to failure to initiate or respond to social interactions.*" (p. 50, emphasis added)
    - Criterion A2: "Deficits in nonverbal communicative behaviours used for social interaction, ranging, for example, from *poorly integrated verbal and nonverbal communication*; to abnormalities in eye contact and body language or deficits in understanding and use of gestures; to a total lack of facial expressions and nonverbal communication." (p. 50, emphasis added)
- Restricted, repetitive patterns of behaviour:
    - Criterion B1: "Stereotyped or repetitive motor movements, use of objects, or *speech* (e.g., simple motor stereotypies, lining up toys or flipping objects, *echolalia, idiosyncratic phrases*)." (p. 50, emphasis added)
    - Criterion B2: "Insistence on sameness, inflexible adherence to routines, or *ritualized patterns of verbal* or nonverbal behaviour (e.g.,

extreme distress at small changes, difficulties with transitions, rigid thinking patterns, *greeting rituals,* need to take same route or eat same food every day)." (p. 50, emphasis added)

- Criterion B3: "Highly restricted, fixated interests that are abnormal in intensity or focus (e.g., strong attachment to or preoccupation with unusual objects, *excessively circumscribed or perseverative interests*)." (p. 50, emphasis added)

1.3. Formulaic Language in ASD

From the perspective of language as a complex adaptive system, individual language behaviour emerges from the interaction of various factors (The Five Graces Group, 2009). The list in the previous section, for example, illustrated the potential impact of two non-linguistic impairments on language and language use. By extension, the different cognitive, behavioural, and social tendencies of persons with ASD are also likely to influence their use of formulaic language. With respect to the diagnostic criteria listed in the previous section, numerous interactions are possible.

In terms of the overall prevalence of formulaic language, ritualized patterns of verbal behaviour might lead to an increased preference for the use of formulaic language compared to novel language. Similarly, perseverative speech, or the tangential and persistent reintroduction of topics of interest to the speaker (Murphy & Abbeduto, 2007), may lead to a tendency to reuse certain formulas when discussing said topic (Dobbinson, Perkins, & Boucher, 2003).

With regards to the distribution of formula categories in ASD, deficits in social-emotional reciprocity, for example, might be expected to impact the use of formulas that

are used to guide the flow of conversations by nominating topics, shifting topics or turns, closing, etc., thus impacting "normal back-and-forth conversation" (APA, 2013, p. 50). Among other possibilities, this difficulty could be the consequence of not knowing which formulas to use, responding inappropriately to them, or using them incorrectly.

With respect to research methods, difficulties integrating verbal and nonverbal communication such as prosody or intonation might make it difficult to identify formulaic expressions in the speech of persons with ASD using phonological measures seen in child and second language formulaic language research (e.g., Peters, 1983; Wood 2006, 2009, 2010). Additionally, stereotyped speech in ASD may not fit into current categorization schemes for subclasses of formulaic language, and so current schemes may have to be adapted to include the range of linguistic behaviours particular to ASD.

While only a few possibilities for the interaction between the core deficits of ASD and formulaic language have been proposed here, it is clear that both the nature and prevalence of formulaic language in ASD may be affected by the underlying impairments in social communication and interaction. As such, it is important to carry out research on the speech of persons with ASD as opposed to assuming that the characteristics of formulaic language described in typically developing individuals apply to formulaic language in ASD.

Formulaic language is not well represented in research in the fields of speech pathology and communication disorders (Van Lancker Sidtis, 2012a). To date, there have only been two studies directly pertaining to formulaic language in the speech of persons with ASD. Dobbinson et al. (2003) found evidence of lexical, prosodic, and cross-conversational formulas with functional significance in six adults with ASD. Tager-

Flusberg and Calkins (1990) compared the prevalence of formulaic and novel language in children with ASD, Down syndrome, and typical development and found that children with ASD used significantly more formulas and significantly less novel language than the other two groups. Conversely, Van Lancker Sidtis's (2012a) observation-based account proposed that formulaic language might not be a characteristic of the entire ASD spectrum.

In summary, areas of formulaic language research in ASD that are poorly represented in the research body include: (a) identification methods, (b) classification taxonomies, (c) the prevalence of formulaic language across the ASD spectrum, and (d) the nature of formulaic language use.

1.4. Research Questions

The following research questions guided this study and were based on the research findings and gaps identified above:

1. Do speakers on the verbal ASD spectrum with varying language abilities use formulaic language in interactions?
    a. If formulaic language is used, is a range of categories of formulaic language represented in interactions?
        i. Are the observed categories of formulaic language conventional, ASD-specific, or a combination of the two?
    b. If formulaic language is used, is formulaic language varied or dependent on the repetition of a limited number of expressions?

2. How are the form and function of formulaic expressions related in the interactions of speakers on the verbal ASD spectrum with varying language abilities? Specifically,
    a. Do idiosyncratic formulas have functions in their context of use?
    b. Do conventional formulas have idiosyncratic functions in their context of use?
    c. Do conventional formulas have conventional functions in their context of use?
3. Which situational factors may have influenced the prevalence and nature of formulaic language use in the interactions of children on the verbal ASD spectrum?

Answering the above research questions is a starting point for describing the prevalence and nature of formulaic language use in ASD. The findings of this study have several implications for future research and language intervention in ASD.

With respect to the existing research body, this study addresses gaps in the fields of formulaic language and speech pathology and communication disorders. The findings can help reconcile inconsistencies between observation-based predictions of formulaic language use in ASD (e.g., Van Lancker Sidtis, 2012a) and previous research findings (e.g., Dobbinson et al., 2003, Tager-Flusberg & Calkins, 1990). Furthermore, the methods developed for this study, namely a categorization scheme and criteria for identification of formulaic language, are tailored to language behaviour in ASD and thus provide a starting point for future research on this topic. It may even be possible to apply them in research on formulaic language in other disorders characterized by idiosyncratic

speech. Finally, identifying situational factors that may have impacted formulaic language use can also help guide future research by pointing to factors that should be controlled in comparative studies or that may be of interest to future research on formulaic language use in ASD.

The findings of this study also have implications for language-based interventions in ASD. The first step in assessing difficulties in formulaic language use is to examine several aspects of the prevalence of formulaic language. The distribution of formulaic language, both in terms of classes and variability, can suggest starting points for intervention; it can help determine whether certain classes of formulaic language should be explicitly taught, for example. If the classes of formulaic language are well represented and the number of formulaic expressions is varied, then a focus on the nature of formulaic language use becomes important for assessing difficulties and designing interventions, if necessary.

Understanding the functions or lack thereof of idiosyncratic formulas in ASD can help determine whether intervention should aim to eliminate them or encourage their use. Determining whether formulas that have conventional forms are used idiosyncratically may help explain communicative difficulties observed in ASD. In this case, intervention could be based on helping speakers reassign functions to the formulas that they already know. Furthermore, identifying formulas with conventional forms being used appropriately could indicate preservation of some pragmatic abilities in ASD.

Lastly, examining the factors that may impact formulaic language use can have implications for assessment of language abilities in ASD. It can help clarify the impact of

assessment contexts on language behaviour. It might also lead to the tailoring of assessment situations to target formulaic or novel language.

1.5. Study Design

This study is a mixed method multiple case study of four children between the ages of 9 and 11 diagnosed with ASD. It is situated within the view that language emerges from interactions over time and is shaped by situational factors surrounding each instance of use (The Five Graces Group, 2009). This position describes language as a complex adaptive system (The Five Graces Group, 2009). As such, participants' past exposure to and use of language, as well as the contextual factors surrounding their language behaviour in this study are relevant to the analysis of their formulaic language use.

The main source of data for this study was a one-hour audio-video recording of a one-on-one play session between each of the participants and their current or former speech-language pathologist (SLP). The interactions of the participants and SLP were transcribed in order to proceed with the analyses of formulaic language use. Additional sources of data included parent observations, researcher observations, two questionnaires, and information provided by the SLP.

The analyses can largely be divided into three categories: an analysis of contextual factors, a quantitative analysis of formulaic language, and a qualitative analysis of formulaic language. The analysis of contextual factors was carried out to increase awareness of factors that may have increased or decreased the participants' use of formulaic language. Factors analyzed included: environmental factors such as the setup of the room and the observers' presence, interpersonal factors such as the pre-

existing relationship between the interlocutors, interactive factors such as the speech-language pathologist's interaction style, and cognitive factors such as the participants' level of arousal and age. The quantitative analysis of formulaic language was undertaken in order to examine the prevalence of formulaic language across the ASD spectrum. Aspects of interest included the relative distributions of formulaic and novel language, the subcategories of formulaic language based on a classification scheme developed for this study, and the variability of formulas used by participants. Finally, a qualitative analysis of select formulaic expressions was undertaken in order to determine whether formulaic expressions and their application in the speech of persons with ASD are conventional, idiosyncratic, or a combination of the two, thus providing a better understanding of the nature of formulaic language use in ASD.

1.6. Overview of Thesis

This thesis is divided into seven chapters, including the present. Chapter 2 Literature Review endeavours to explain what distinguishes formulaic expressions from novel ones and how this definition can be applied to identify categories of formulaic expressions applicable to language in ASD. It reviews studies on formulaic language and language use in ASD to situate this study with respect to the existing body of research and provide a theoretical basis for the identification and classification methods applied in this study. Chapter 3 Theoretical Framework presents the key points of the theoretical framework in which this study is grounded. The purpose of this section is to support the methodology, method, and operational definitions adopted in this study, as well as the stance taken with respect to atypical language behaviours seen in ASD. The fourth chapter, Study Design, lays out the methodology of the study, the study design, and the

method. It relies considerably on the information provided in the introduction and literature review. Chapter 5, Participant Profiles, provides profiles of the four participants who took part in this study. Their diagnostic history, the strengths and weaknesses of their language and communication abilities, and their home and school life are presented. Chapter 6, Findings and Discussion, combines the findings and discussion. It is subdivided into four sections: Contextual Factors, Quantitative Analysis of Formulaic Language, Qualitative Analysis of Formulaic Language, and Summary of Findings. While the first aims to situate the participants' language use and identify factors that may have impacted it, the second section answers questions pertaining to the prevalence of formulaic language, while the third section addresses the nature of formulaic language use. The final chapter, Conclusion, discusses the limitations of this study, the implications of the findings, and provides directions for future research in this field.

2. Literature Review

This chapter provides an overview of research on formulaic language with special attention to language in ASD. First, formulaic language is contrasted with novel language in terms of definitions, prevalence, key characteristics, and functions. The following section considers a range of approaches taken to identify formulas in context. These include frequency, psycholinguistic measures, phonological characteristics, and criteria-based checklists that depend on native speaker intuition. Three different criteria checklists are discussed. Finally, two organization schemes for the classification of formulaic language are examined. The subsequent chapter presents the theoretical framework adopted in this study in relation to the literature review.

2.1. Defining Formulaic Language

At the most basic level, formulaic expressions "differ from all other utterances in that they are not novel – not newly created" (Van Lancker Sidtis, 2012b, p. 343). That is to say, while novel utterances are produced in a combinatory way through the operation of grammatical rules on representations and understood analytically, formulaic utterances are not (Perkins as cited in Wray & Perkins, 2000). Other terms for formulaic language include *non-novel*, *non-propositional*, and *holistic*; alternate terms for novel language include *productive*, *propositional*, *generative* and *compositional* (Van Lancker Sidtis, 2004). The exclusive use of either type of language would be limiting:

> Without the rule-based system, language would be limited in repertoire, clichéd, and, whilst suitable for certain types of interaction, lacking imagination and novelty. In contrast, with only a rule-based system, language would sound pedantic, unidiomatic and pedestrian. It would require full access to all of the

> language faculties at all times, and there would be no "short cuts". (Wray as cited in Wray & Perkins, 2000, p. 11)

The characteristics and functions that further distinguish the two types of language are discussed later in the chapter.

In research on language in ASD, there has been a tendency to distinguish between *echolalia* and *propositional language*, though this usage of *propositional language* does not equate with the formulaic/productive dichotomy as defined above. In formulaic language research, echolalia, or the repetition of preceding utterances, is considered a subtype of formulaic language because it is not generated by the rules of grammar (Wray, 2008). In research on language in ASD, however, Howlin (1982) summarized previous findings stating, "the sheer frequency of their repetitive utterances has led a number of authors to suggest that *echolalic speech* may be syntactically more advanced than their *spontaneous, generative speech*" (p. 282, emphasis added). She then proceeded to provide the following operational definition of spontaneous language: "spontaneous utterances were defined as utterances which were *non-echoed* and used communicatively" (p. 285, emphasis added). In the appendix, she included the formulaic expressions *thank you* and *excuse me* as examples of spontaneous or, in her words, "generative language" (p. 293). Therefore, in defining the two types of language as *echoic* and *generative/spontaneous*, as opposed to formulaic and productive, she has drawn a distinction between echolalia on the one side, and all other types of formulaic language and productive language on the other.

Roberts (1989) made a similar classification, stating, "existing definitions for *propositional (creative) speech* and *echolalia* were not useful in determining which of the

utterances constituted propositional speech" (p. 276, emphasis added). Again, Roberts has divided language into echoic and productive.

The previous two examples suggest that the terms *propositional* and *non-propositional language* are not used to denote the same phenomena in formulaic language research and research on language in ASD. Here, the definitions outlined in the formulaic language research tradition are used. Henceforth, the terms *propositional*, *novel*, and *productive* are used interchangeably, as are the terms *non-propositional*, *non-novel*, and *formulaic*.

2.1.1. Holistic and analytic modes of language processing. As a generalization, the holistic mode of language processing equates with formulaic language and the analytic mode of language processing, with propositional language (Dobbinson et al., 2003). Holistic and analytic modes of language processing differ in both production and comprehension:

> Production of propositional expressions requires lexical retrieval and arrangement according to grammatical rules; non-propositional production involves activating and retrieving prepackaged units of schemata. Similarly, comprehension demands involved grammatical and lexical analysis for propositional language in contrast to apperception of a configured phrase and mapping onto its complex meaning. (Van Lancker Sidtis, 2004, p. 29)

Numerous models of holistic and analytic language processing have been proposed (e.g., Sinclair as cited in Wray, 2008; Van Lancker Sidtis as cited in Wray, 2008; Wray as cited in Wray, 2008). Processing may be temporally parallel or serial, but based on experimental data, it appears that the holistic route must either be faster or first

in the series (Wray, 2008). However, that is not to say that the two processes must be completely independent; to maximize efficiency and accuracy, a system in which information is fed between the two processing systems "would enable a holistically retrieved frame to be edited analytically, using morphology and lexis to tailor-make it to its context" (Wray, 2008, p. 190), for example. For the same purpose of achieving maximum efficiency, units may also be represented multiple times at different levels of granularity (Bannard & Lieven, 2009; Bannard & Lieven, 2012; Wray, 2002). Evidence for dual-processing models come from clinical and developmental linguistics; the former has found that neurological disorders can lead to impairment of either route selectively while the latter has found that the two routes have different maturational schedules (Van Lancker Sidtis, 2012b; Wray, 2008).

In first language acquisition, Wray (2002) proposes the following progression of holistic and analytic language processing modes, based on a model proposed by Wray and Perkins (2000): (a) from birth until the end of the single-unit phase at approximately 2 years of age, the holistic mode is most involved in language processing although there are individual differences in the rate at which children transition from unanalyzed chunks to word- and morpheme-sized units (Gestalt and Analytic styles of acquisition; see Peters as cited in Wray, 2002; Plunkett as cited in Wray, 2002); (b) after the child's vocabulary spurt until approximately eight years of age, grammatical development takes place and analytic processing is preferred to holistic processing, though the latter still plays a role in "achieving routine interactional goals" (Wray, 2002, p. 134); (c) between the ages of approximately eight and eighteen, the proportion of holistic processing gradually increases while the analytic mechanism is mainly involved in "constantly readjusting the

formulaic continuum by deciding whether a given item is unique, or else shares sufficient properties in common with other items to justify subsequent collapsing and re-storage as a single, partly productive formulaic frame" (Wray & Perkins, 2000, p. 21); (d) finally, an adult-like system of holistic and analytic language processing emerges in the late teenage years.

Wray's (2002) model proposes an interaction between holistic and analytic processing though the segmentation of units in the first stage (see e.g., Bannard & Lieven, 2009; Hickey, 1993; Howarth, 1998; Peters, 1983; for segmentation of echolalia in autism see e.g., Baltaxe & Simmons as cited in Prizant, 1983; Prizant, 1983; Prizant & Rydell, 1984) and the chunking of items in the third stage (for fusion see e.g., Bannard & Lieven, 2012; Peters, 1983). The processes of segmentation yield "not only the sub-units [of the original unit] but also information about the underlying structural patterns of the original unit" (Peters, 1983, p. 44). Chunking is the converse operation of segmentation. As a result of chunking, "a group of words…can be as efficiently recalled as a single word" (Reuterskiöld & Van Lancker Sidtis, 2012, p. 221). Short-term memory is limited to seven plus or minus two units (Miller, 1956), and so by grouping several words into a single unit or chunk, fluent production can easily exceed this limit.

Handl and Graf's (2010) pilot study of developmental first language acquisition provides evidence for the overall progression proposed by Wray (2002). Handl and Graf (2010) traced collocations, defined as "multi-word units that are predominantly formed on the basis of the habitual co-occurrence of lexical items" (p. 119), in a corpus of 27 000 words representing three age groups, which was created with data from three pre-existing corpora of spontaneous language. Using 20 search words, a total of 249 collocations was

found and classified into three groups: (a) lexical collocations, which only occurred in one form; (b) patterns, which showed semantic variability; and (c) syntactic collocations. The proportion of lexical collocations and patterns with respect to the total number of collocations showed inverse developmental trends; lexical collocations, associated with holistic processing, decreased in the intermediate stage, then increased again, while patterns, associated with analytic processing, increased in the intermediate stage then decreased among the older speakers. Handl and Graf took these findings as evidence that language processing follows the progression proposed by Wray (2002), "from a predominantly holistic approach, via a more analytic one back to an adult-like co-existence of holistic and analytic processing" (Handl & Graf, 2010, p. 140).

Wray and Perkins (2000) also note, "there is considerable scope for variation in the balance between holistic and analytic processing as a result of individual sociocognitive and sociocultural differences" (p. 21). In ASD, a preference for the holistic mode of language processing has been observed (Prizant, 1983). "Frequently cited abilities of autistic persons include an excellent rote memory for both visual and auditory information" (Prior as cited in Prizant, 1983, p. 307). As an extreme example of rote memory capacity, Jordan (2008) provided a description of a woman with ASD who was able to repeat the entire soundtrack of films, including words and sounds. The soundtrack must have been retained as a whole, as accurate reconstruction of such a lengthy segment would be highly unlikely. Thus, in ASD, it would appear that the holistic mode of language processing might in some cases play a larger role than the analytic mode of language processing.

Note that this tendency in language does not contradict local, detail-focused cognitive processing tendencies observed in ASD (Noens & Van Berckelaer-Onnes, 2004). Rather, the holistic mode of language processing may be an alternative strategy to compensate for the relatively lower contribution of global cognitive processing to language (Noens & Van Berckelaer-Onnes, 2004). In global cognitive processing, the parts are integrated into a coherent whole. However, full integral perception of all dimensions in communication tends to be impaired in ASD (Noens et al. as cited in Noens & Van Berckelaer-Onnes, 2004). Without a meaningful interpretation of a sequence as a whole, segmentation is prevented and so a holistic mode of language processing, wherein chunks are acquired without analysis, is favoured (Noens & Van Berckelaer-Onnes, 2004). In the example provided by Jordan (2008), the woman was not able to explain what the movie was about despite having memorized the entire script, suggesting the chunk had not been analyzed.

In comparing autistic echolalia in early acquisition and unanalyzed language chunks in typically developing children, the combination of detailed-focused cognitive processing with a holistic mode of language processing is evident. Autistic echolalia is characterized by "parasitic fidelity" (Fay & Schuler, 1980). This suggests that the unit has been acquired holistically but with a focus on details such as articulation, intonation, etc. Conversely, unanalyzed language chunks in typically developing children are recognizable for their tune but not necessarily their precise articulation (Plunkett as cited in Lin, 2010).

2.1.2. What does formulaic language encompass? A wide range of language use can be considered non-propositional. Van Lancker Sidtis (2012b) illustrates this

range using a continuum from novel to reflexive speech divided into formal and functional categories in Figure 1. The figure below is based on Van Lancker's continuum of non-propositional speech (as cited in Van Lancker Sidtis, 2012b).

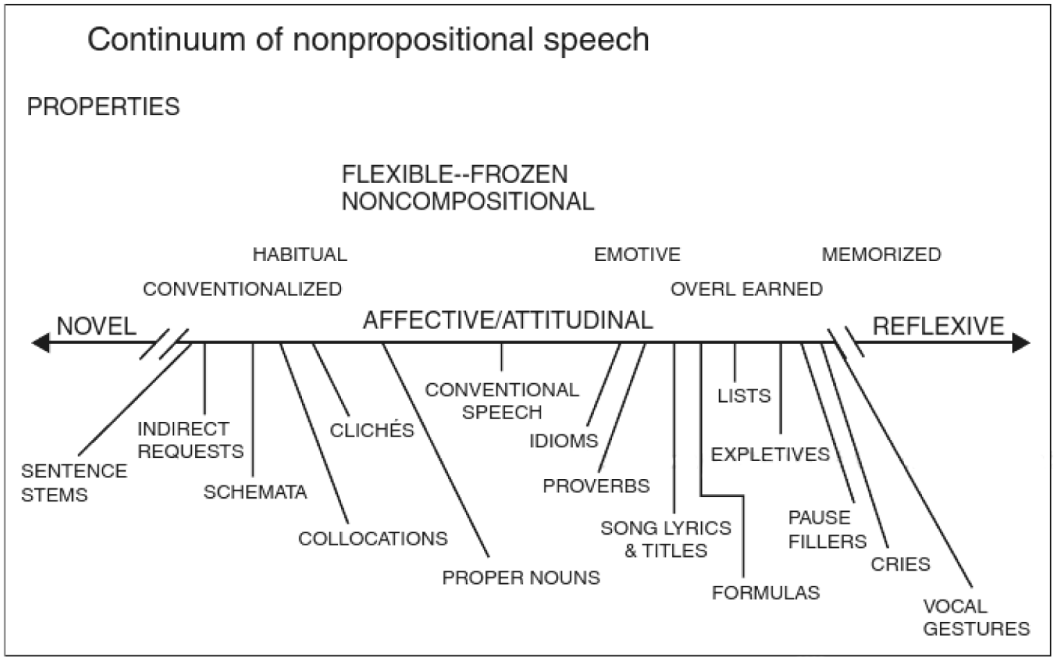


Figure 1. Continuum of Non-Propositional Speech (Van Lancker Sidtis, 2012b, p. 344). The continuum presents subtypes of formulaic language.

Thus, Van Lancker Sidtis (2012b) proposes that formulaic language encompasses a breadth of language behaviour, from short formulas such as pause fillers and expletives to extensive sequences such as song lyrics and lists. Yet, definitions of formulaic language from the "three main orientations identified in the literature" (Durrant & Mathews-Aydınlı, 2011, p. 59) systematically overlook one-word formulas such as expletives and pause-fillers.

In terms of a psychological approach, Wray (2002) provides the following definition: " a *sequence*, continuous or discontinuous, of words or other elements, which is, or appears to be, prefabricated: that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation or analysis by the language grammar"

(p. 9, emphasis added). Frequency-based approaches define "formulas as *strings of linguistic items* (including words, parts of speech, and semantic fields), which have a statistical tendency to co-occur in corpora" (Durrant & Mathews-Aydınlı, 2011, p. 59, emphasis added). Lastly, phraseological approaches define "formulaicity in terms of either the degree to which the meaning of *a word combination* is predictable from the meaning of its parts or the degree to which words with similar meaning can be substituted into the phrase" (Durrant & Mathews-Aydınlı, 2011, p. 59, emphasis added). Nattinger and DeCarrico (1992) make a small concession, proposing, "[formulas] are similar to lexicon in being treated as units, yet most of them [and therefore not *all of them*] consist of more than one word" (p. 36). Additionally, Wray (2002) proposes that her definition of formulaic sequence "covers morphemes and words as well" (p. 295) and uses the terms *formulaic word strings* and *formulaic words* (e.g., exclamations, expletives) to distinguish between the two. Nonetheless, as Wood (2002) observed, it appears that, as far as definitions for formulas are concerned, "the consensus seems to be that they are *multiword units* of language" (p. 2, emphasis added).

When the object of study is a specific subclass of formulaic language, such as collocations or idioms, defining a formula in terms of a minimum length is not surprising or even problematic; by definition, there must be a sequence of multiple words for a formula to be considered a member of said class. However, when the object of study or the definition is intended to represent the entire spectrum of formulaic language, equating a formula with strings of words is limiting. The conventional expression *thanks*, for example, is no less formulaic than its longer counterpart *thank you very much*. This

becomes clear if you try to replace the expression with synonyms such as *gratitudes* or *appreciations*; *thanks* delivers a message that its synonyms do not.

Though Wray (2002) suggests that *formulaic sequence* is a cover term that includes formulaic words, *sequence* implies a string of elements. As such, in this thesis, *formulaic sequence* refers to an instance of formulaic language that includes two or more words. The terms *formulaic expression* and *formula* are used to refer to any instance of formulaic language and include both formulaic sequences and one-word formulas.

2.1.3. Additional classes of formulaic language in ASD. Based on the distinction between novel and non-novel speech made in this study, certain types of language behaviours observed in disordered speech can also be considered formulaic. Certain *unconventional verbal behaviours* (Prizant & Rydell, 1993), or understandable speech that violates social conventions, fall within this category. Wray (2009), for example, proposes, "the most noticeable type of formulaic language in autism is echolalia" (p. 187). Three classes of unconventional verbal behaviour seen in ASD are discussed here: immediate echolalia, delayed echolalia, and utterance-level perseveration. Incessant questioning is addressed, although the same considerations concerning the formulaicity of utterance-level perseveration also apply to incessant questioning.

2.1.3.1. Immediate echolalia. Immediate echolalia is the repetition of speech that "is produced either following immediately or within two turns of original production" (Prizant & Rydell, 1993, p. 264). Fay suggests that short-term echoic memory is implicated in immediate echolalia (as cited in Sterponi & Shankey, 2014). When immediate echolalia is structurally an exact replica of the original production, it is called *pure* echolalia (Prizant & Rydell, 1993). Conversely, if the repetition features minor

structural change with respect to the original, it is called *mitigated* echolalia (Prizant and Rydell, 1993). In relation to previously established subcategories of formulaic language, immediate echolalia is comparable to "repetitions of others' and one's own previous speech" (Wray, 2011, p. 433).

2.1.3.2. Delayed echolalia. Delayed echolalia is the repetition of speech that "is repeated at a significantly later time (i.e., at least three turns following original utterance), but more typically hours, days; or even weeks later" (Prizant & Rydell, 1993, p. 364). The distinction between pure and mitigated echoes applied to delayed echolalia as well. The source of the delayed echo can be another person's speech or even something heard on television, video games, etc. Delayed echolalia is also called *scripting* when the source of the repetition is from a video, commercial, television show, or other media source (Silla-Zaleski & Vesloski, 2010).

Delayed echolalia is associated with long-term memory processes (Fay as cited in Sterponi & Shankey, 2014). It bears resemblance to a number of subsets of formulaic language including: quotations (Wray & Perkins, 2000), lengthy memorized texts (Wray & Perkins, 2000), and song lyrics (Van Lancker Sidtis, 2012b).

2.1.3.3. Utterance-level perseveration. Utterance-level perseveration is the "persistent repetition of a speech pattern that consists of…a phrase, or combination of utterances…[that] is produced in a cyclical, recurring manner" (Prizant & Rydell, 1993, p. 264). It differs from echolalia in that the utterance that is repeated need not be formulaic in the first instance. Consider the following three illustrative examples (bold indicates formulaic sequences):

1. The cat is black. **The cat is black. The cat is black. The cat is black. The cat is black. The cat is black**.
2. **We must clean up the mess. We must clean up the mess. We must clean up the mess. We must clean up the mess. We must clean up the mess.**
3. Speaker 1: Do you want the book?

   Speaker 2: **Do you want the book? Do you want the book? Do you want the book? Do you want the book? Do you want the book?**

In Example 1, the utterance appears to be novel. Without any external evidence from longitudinal data or an informant, it can be assumed that the speaker has generated the utterance productively. Therefore, the first instance is not formulaic. The subsequent repetitions, on the other hand, are formulaic as they consist of repetitions of the speaker's own speech (Wray, 2011). Example 2 is taken from Prizant and Rydell (1993). In their example, the speaker repeats a sequence that was said to him a month earlier in the same location. Consequently, all iterations of the utterance are formulaic in Example 2. Additionally, the perseverative utterance is an example of a delayed echo (Prizant & Rydell, 1993). Finally, Example 3 illustrates the perseveration of an immediate echo. Like Example 2, all productions of the formula are considered to be examples of formulaic language. Therefore, the first production of a perseverated utterance may be novel, retrieved from long-term memory, or retrieved from short-term memory. As such, its classification as formulaic or propositional will vary. However, all subsequent productions are formulaic in that they consist of repetitions. Thus, the convention adopted in this study is to code the first instance according to the two types of speech (i.e., formulaic and novel) and the appropriate subtype (e.g., immediate echo, delayed echo,

conventional expression, etc.) while all following repetitions are considered to be perseveration, a formulaic subcategory in its own right, similar to automatic speech (Peters, 1983).

2.2. The Prevalence of Formulaic Language

Estimates regarding the prevalence of formulaic language range from 15% to 80% (for a list of studies citing different results, see Conklin & Schmitt, 2012; Van Lancker Sidtis & Postman, 2006; Wood, 2009). Measures of the prevalence of formulaic language with respect to novel language depend on a number of factors, including the method of counting (Van Lancker Sidtis & Postman, 2006), language knowledge (Wray & Perkins, 2000), the interlocutor (Wray, 2009), communicative context (Wray, 2009), the topic (Van Lancker Sidtis, 2004), and interactional goals (Wray & Perkins, 2000). There is also a relationship with the cognitive demands of a situation; when adults are put under stress, aphasic-like language consisting of predominantly formulaic sequences can be induced (for a list of studies, see Wray & Perkins, 2000). In ASD, situations that are cognitively or socially demanding are two key factors associated with an increase in echolalia (Prizant & Rydell, 1993).

2.2.1. Prevalence of formulaic language in ASD. Based on the relationship between the holistic mode of language processing and formulaic language (Dobbinson et al., 2003), as well as the preference for the holistic mode of language processing in ASD (Prizant, 1983), it is possible that autistic speech will be more formulaic than that of typical speakers. Perkins, Dobbinson, Boucher, Bol and Bloom (2006) note that a significant feature of autistic speech is “the extent of its repetitiveness and lack of

productivity" (p. 801). However, to date there appear to be only two studies on the prevalence of formulaic language in ASD.

Dobbinson et al. (2003) looked at formulaicity at various levels in the speech of six adult research participants with ASD, although only findings pertaining to two participants were discussed. Three types of formulaicity were found: prosodic formulaicity (e.g., using a specific voice quality when discussion a favourite topic), lexical formulaicity with discourse significance (e.g., *yeah* as a minimal response, turn-taker, confirmer, etc.), and cross-conversational formulaicity (e.g., lexical and structural similarities when discussing the same topic across conversations). Dobbinson et al.'s (2003) findings suggest that formulaic language is prevalent in ASD and that formulaicity extends beyond the lexical aspect. However, the study did not address the subclasses of formulaic language or their distribution. Furthermore, they did not explain the criteria they used to identify lexical formulaic sequences.

The high proportion of formulaic language in autistic speech has been confirmed quantitatively by Tager-Flusberg and Calkins (1990), who compared the prevalence of formulaic and spontaneous language use in twelve children, four with ASD, four with Down's syndrome, and four with typical development. Three categories of formulaic language were coded: (a) routines (including songs, games, social routines, book reading, commercials, etc.), (b) self-repetition, and (c) imitations of the interlocutor's utterances. The interaction of utterance category by participant group was significant for routines and repetitions, but not for imitations. It was also significant for spontaneous utterances. Thus, children with ASD use significantly more routines and self-repetition and significantly less spontaneous speech than children with Down's syndrome or typical

development. Tager-Flusberg and Calkins (1990) did not further segregate their *routines* category, which included several formulaic language subclasses. While category definitions were provided, they did not explain the criteria they used to identify formulaic language. For example, they considered "other routines in which mother and child frequently engaged" (p. 597) to be formulaic, but did not provide a minimum benchmark for frequency.

Van Lancker Sidtis (2012a), conversely, suggested that enhancements in formulaicity are not uniform in ASD. She distinguished between high-functioning autism and Asperger's disorder on one side of the spectrum, and low-functioning autism on the other. While the distinction between the subtypes has not been validated (APA, 2013), in school-aged children they are generally associated with fluent and flexible expressive language and poor expressive language, respectively (Tager-Flusberg et al., 2005). As no measure of language abilities was provided in the previously mentioned studies, the accuracy of these claims could not be determined from current data, though Dobbinson et al. (2003) reported that their participants had a wide-range of cognitive abilities and characterized autism "right across the autistic spectrum" (p. 300).

Van Lancker Sidtis (2012a) proposed: "persons falling toward the severely impaired end of the autistic spectrum may be observed to produce formulaic expressions almost exclusively, while those toward the higher-functioning extreme end of the spectrum communicate with an abnormal paucity of formulaic expressions" (p. 74). While these assumptions are inconsistent with the preference for the holistic mode of language processing previously described (see Section 2.1.1), they are in line with characterizations of language in high-functioning autism and Asperger's disorder as

pedantic (Tager-Flusberg et al., 2005); pedantic is also a descriptor associated with excessive propositional speech (see quotation in Section 2.1, page 14). Alternate explanations for pedantic speech are proposed in Section 2.4.3.3.

Although it is possible that formulaic language use differs across the autism spectrum and that persons with strong expressive language do not use formulaic language, another explanation is proposed here: it may be that Van Lancker Sidtis's (2012a) observation-based description of formulaic language in ASD was referring to trends in the prevalence of unconventional verbal behaviour as opposed to tendencies in formulaic language use. As discussed in Section 2.1, there has been a tendency in ASD research to draw a line between unconventional verbal behaviour on the one side and all other subcategories of formulaic language, along with novel language on the other. There are several similarities between the unconventional verbal behaviour/propositional division in ASD research and the formulaic/novel division in formulaic language research. First, unconventional verbal behaviour is considered a subtype of formulaic language. Second, the term *propositional language* in both ASD and formulaic language research refers to newly generated utterances, although it includes other types of utterances in ASD research. Furthermore, echolalia is the most salient type of formulaic language seen in persons with ASD (Wray, 2008), which, in ASD, suggests a strong relationship between unconventional verbal behaviour and formulaic language. The use of the same terminology in the two research traditions, as well as the similarities between their referents, make it easy to understand how unconventional verbal behaviour and formulaic language could easily be mistaken as the same phenomenon.

If Van Lancker Sidtis's (2012a) comments are reinterpreted according to definitions of propositionality used in ASD research, the assumptions can be rephrased as follows: persons falling toward the severely impaired end of the autistic spectrum may be observed to produce [*unconventional verbal behaviour*] almost exclusively, while those toward the higher-functioning extreme end of the spectrum communicate with a paucity of [*unconventional verbal behaviour*] (p. 74, modified). These observations do not negate a preference for the holistic mode of language processing seen in ASD (e.g., Prizant, 1983) and they coincide with findings regarding the prevalence of echolalia across the autism spectrum. McEvoy, Loveland, and Landry (as cited in Tager-Flusberg et al., 2005) found that rates of echolalia were highest in children with poor expressive language; in other words, in children who would be considered low functioning. Prizant (1983) proposed that the disappearance of echolalia coincides with an increase in expressive language. Thus, echolalia would *not* be prevalent in children with strong expressive language skills (i.e., high-functioning autism or Asperger's disorder).

Therefore, it may be that Van Lancker Sidtis's (2012a) observation-based description of formulaic language in ASD was based on definitions for propositional language used in ASD research and not formulaic language research. Indeed, this is the most concise explanation for the discrepancies between the observations and previous research on formulaic language in ASD. However, Van Lancker Sidtis (2012a) does not define formulaic language nor are any examples provided. Therefore, it is impossible to determine with absolute certainty which definitions of formulaic language were applied to form the basis for these observations.

Collectively, these studies and trends suggest that formulaic language use may vary across the autism spectrum, especially in terms of category prevalence, but that the variability in distribution across categories might not necessarily equate with "an abnormal paucity" (Van Lancker Sidtis, 2012a, p. 74) of formulaic language use in persons with strong expressive skills.

2.3. Characteristics of Formulaic Language

Formulaic language has several characteristics that distinguish it from novel language. These include: stereotyped form, conventionalized meaning, specific conditions of use, and institutionalization (Van Lancker Sidtis, 2012a, 2012b).

The property of *stereotyped form* (Van Lancker Sidtis, 2012a) has also been called *fixedness* (Wray, 2002) and *invariance* (Code, 1997). It refers to the observation that certain types of "formulaic expressions contain precisely specified words in a certain word order spoken on a set intonation contour" (Van Lancker Sidtis, 2009, p. 447).

Conventionalized meaning (Van Lancker Sidtis, 2012a) or *non-compositionality* (Wray, 2002) means that the "form-meaning pairing" (Pawley & Syder, 1983, p. 192) does not depend on internal analysis; "the string is no longer obliged to be grammatically regular or semantically logical" (Wray, 2002, p. 33).

The *specific conditions of use or pragmatics* (Van Lancker Sidtis, 2012a) of formulaic expressions refers to their sensitivity "to social conditions, such as social register, formality indexes, discourse styles, and the format of the communication, speaker, topic, purpose of the talk, and numerous other variables" (Van Lancker Sidtis, 2012a, p. 65). "The expression as a whole may have its own function, as with routine

expressions (e.g., *see you later*, *thank you very much*), or a layer of additional pragmatic weight (e.g., *I don't think so!*)" (Wray, 2011, p. 432).

Finally, the property of being *institutionalized* (Pawley & Syder, 1983) refers to the shared knowledge of formulas in a community; "speakers in a community know these chunks intuitively" (Van Lancker Sidtis, 2012a, p. 64).

However, it is important to note that these characteristics of formulaic language are *gradable* (Howarth, 1998); that is to say, they apply to varying degrees to different classes and exemplars of formulaic expressions. In terms of fixedness, some types of formulas, such as Nattinger and DeCarrico's (1992) phrasal constraints and sentence builders, by definition allow variation of words and phrases. They give examples such as *a __ ago*, as in *a year ago*, or *the __er the __er*, as in *the bigger the better*. The phonological delivery of a given formulaic expression may also be variable; Aijmer found that *thank you* tends to be produced in one of six different tones (as cited in Lin, 2012). Even conventionalized meanings, which tend to be associated with semantic or syntactic irregularity, "have only limited value as a measure of the phenomenon as a whole" (Wray & Perkins, 2000, p. 5). This becomes clear when we look at collocations, which are strings of words that are found together in speech at a rate above chance (e.g., significant collocations, Sinclair, 1991), or items of conventional speech such as *I'd be happy to help.* These types of formulas may potentially be semantically and syntactically transparent, but are nonetheless preferred ways of expressing an idea. Likewise, formulas need not have special functions or pragmatic weight in speech; examples include idioms and collocations (Nattinger & DeCarrico, 1992). With regards to shared knowledge of formulas, it is also true that individuals may use idiosyncratic formulas or

> …expressions to mark themselves out from others, perhaps expressions associated with another community to which they have belonged (e.g., childhood dialect), something they once heard from an influential friend or relation, jargon expressions from their work, or a phrase they once coined and still find useful. (Wray, 2011, p. 433)

Therefore, while the four characteristics previously described may help distinguish non-novel from novel speech, it is also true that the absence of a given characteristic does not necessarily imply that an expression is propositional.

2.3.1. Characteristics of formulaic language subtypes in ASD. There is also considerable variation in the application of these four characteristics to the three subtypes of formulaic language in ASD discussed in Section 2.1.3. The following table indicates which characteristics typically apply to each of the three subtypes.

Table 1
Characteristics of Three Formulaic Language Categories in ASD

Characteristic	**Applies to**	**Immediate echolalia**	**Delayed echolalia**	**Perseveration**
Stereotyped form	Utterance	Yes	Yes	Yes
Conventionalized meaning	Speaker	Sometimes	Sometimes	No
Specific conditions of use	Speaker	Sometimes	Sometimes	No
Institutionalization	Community	Sometimes	Sometimes	Sometimes

By definition, immediate echolalia, delayed echolalia, and perseveration involve repetition, and therefore stereotyped or invariant form. Fay and Schuler (1980) characterize echolalia as having "parasitic fidelity" (p. 34) to the original production, even to the pauses, accents, and other nonsegmental features. However, immediate and delayed echolalia can be mitigated, that is, they can involve "minimal structural change"

(Prizant & Rydell, 1993, p. 264) such as pronoun reversals. In the latter case, they are similar to Nattinger and DeCarrico's (1992) phrasal constraints, which are short- to medium-length formulas that allow variation.

Immediate or delayed echoes may or may not have conventionalized meanings or specific conditions of use for the speaker. Prizant and Rydell (1993) describe the following case of Mary, a 9-year-old girl with ASD:

> While working with her teacher, Mary observed an unfamiliar visitor to her classroom. After noticing the stranger, Mary turned toward the teacher and exclaimed in a distressed voice, "You've got a splinter, got a splinter!" Mary's teacher responded, "Don't be afraid, that's Barry. He's come to spend some time with us today." Mary repeated, "That's Barry," shook his hand, and was able to continue working. Mary's teacher later explained that ever since Mary had a painful splinter the year before, she repeats this phrase, which was said to her at the time, whenever she is upset or is experiencing pain. (p. 266)

Thus, neither the meaning nor the intention of Mary's utterance relates to a literal interpretation of the utterance (Prizant & Rydell, 1993). In this respect, Mary's utterance lacks semantic transparency in the same way that idioms do; "…it would be impossible for a hearer to understand it for the first time without substantial pragmatic or direct explicational context" (Wray & Perkins, 2000, p. 4). Furthermore, there is no doubt that the phrase has specific conditions of use as Mary only repeats it when she is upset or experiencing pain (Prizant & Rydell, 1993). Methodologically, this example illustrates the need for substantial contextual or background information in ASD research to identify form-meaning or form-function pairings.

Nonetheless, in immediate and delayed echolalia, and perseveration, the utterance that has been repeated may sometimes have an institutionalized form-meaning pairing or a specific function in the speech community. That is to say, an individual with ASD may repeat an utterance that others would be able to recognize, understand, and act on regardless of semantic or syntactic transparency. However, the production of a recognizable utterance by a speaker with ASD does not imply that the speaker has made the same form-meaning or form-function pairing unless the context of use justifies this assumption. This is especially noteworthy in the case of perseveration, wherein the repetition "is produced with no evidence of communicative intent or expectation of a response from the partner" (Prizant & Rydell, 1993, p. 264). In the perseverative context of use, the formula has no conventionalized meaning and no specific conditions of use for the speaker. Differences in form-meaning or form-function pairings between an individual speaker's idiolect and common usage in the speech community are not unheard of in disordered speech research; in aphasia, for example, Van Lancker proposes, "a greater functional load is placed upon the ones [formulas] which can be accessed, so that they convey a number of meanings not normally associated with them" (as cited in Wray & Perkins, 2000, p. 15).

As Mary's story illustrated, language use in ASD can be highly idiosyncratic (Prizant & Rydell, 1993). This has been noted elsewhere (e.g., Boucher, Mayes & Bigham, 2007; Rydell & Mirenda, 1994), including in the DSM-5 (APA, 2013) diagnostic criteria. However, while an echo or perseverative utterance may be not be known to a naïve member of the speech community at large, it is possible that it a given utterance is known by members of a smaller speech community such as the speaker's

family, friends, or co-workers; hence, it may be institutionalized if group membership is defined more narrowly.

2.4. Functions of Formulaic Language

Largely because of the characteristics described in the previous section, formulaic language, as opposed to propositional language, is especially well suited to serving certain functions for speakers.

2.4.1. Wray and Perkins (2000). Wray and Perkins (2000) group the functions of formulaic language into two categories: (a) devices of social interaction and (b) compensatory devices for memory limitations. The first category includes the use of formulas for the purpose of manipulating others, asserting separate identity, and asserting group identity (Wray & Perkins, 2000). Wray (1999) proposes the following scenario:

> In a crowded and noisy bar, asking a stranger to move so that you can get past requires attracting their attention and interrupting their conversation. A formulaic expression such as *excuse me* or *mind your backs* is easily recognized…In contrast, a less formulaic utterance, such as *I'm just walking behind you*, must be heard more accurately because it is unpredictable, and requires more decoding, so it is more intrusive. (p. 216)

In the scenario above, a formula is more effective than a novel utterance at manipulating the hearer. The use of formulas to assert group or individual identity is related the institutionalization of formulaic language. As indicated earlier, speakers can use formulas associated with their community to mark group membership, or they can use idiosyncratic formulas or formulas associated with other communities to distance themselves from a group (Wray, 2011).

With regards to compensating for memory limitations, formulas also act as processing short cuts, buy time, and allow for manipulation of information (Wray & Perkins, 2000). Standard phrases such as *I have known __for __ years in my capacity as __,* fillers such as *if you want my opinion*, and phrases to replace a single word such as *make a decision* instead of *decide* have one thing in common: they group several words into a single unit (Wray & Perkins, 2000). In doing so, they increase the amount of fluid speech a speaker can deliver, which is constrained by the capacity of short-term memory to manipulate five to nine units (Miller, 1956). Pawley and Syder (1983) first proposed that formulaic language could promote fluent speech. Wood (2010) discusses a number of mechanisms that may bring about this effect. These include bypassing short-term memory, reducing hesitations, and lengthening runs (Wood, 2010).

In promoting fluency, formulas such as repetitions of preceding input also allow speakers to hold their turn while planning upcoming utterances (Wray & Perkins, 2000). Repetitions of preceding input as a class of formulaic language have been observed in the conversations of native speakers (Tannen as cited in Wray & Perkins, 2000), in the speech of second language learners (Bygate as cited in Wray & Perkins, 2000), and in ASD in the form of echolalia (APA, 2013).

The final cognitive function of formulaic language is to manipulate message content. To this effect, mnemonics, deliberate memorization of lengthy texts, and rehearsal can be used to increase our limited memory capacity (Wray & Perkins, 2000).

The extent to which a speaker exploits the cognitive and social functions of formulaic language will depend on the type of language user (e.g., children, non-natives, aphasics, adult natives), as each has different agendas and needs to satisfy (Wray &

Perkins, 2000). Children, for example, are especially constrained by their short-term memory capacity (Wray & Perkins, 2000). Consequently, for this group of speakers, the cognitive functions of formulaic language may be more important than the social ones, as sensitivity to hierarchical relationships is less important than it is in communication between adult speakers (Wray & Perkins, 2000). On a related note, Prizant (1983) suggests that the functions of echolalia in children with ASD may become more varied as their needs evolve as a result of cognitive growth and social experience, or, as they become more attuned to hierarchical relationships.

2.4.2. Nattinger and DeCarrico (1992). Nattinger and DeCarrico (1992) propose a list of functional aspects of formulas with reference to the needs of second language learners. They include three major categories: (a) social interactions (conversational maintenance and conversational purpose), (b) necessary topics, and (c) discourse devices. Formulas used for conversational maintenance organize the beginning, continuance, and end of conversations through summons (e.g., *How are you?*), checking comprehension (e.g., *All right?*), shifting turns (e.g., *Could I say something here?*), etc. (Nattinger & DeCarrico, 1992). Related to this is the use of discourse devices such as *you know*, *in other words*, and *to make a long story short*, which "connect the meaning and the structure of the discourse" (Nattinger & DeCarrico, 1992, p. 64). On the other hand, formulas with a conversational purpose are related to speech acts; they are used to question (e.g., *Are there X?*), request (e.g., *May I X?)*, refuse (e.g., *No way*), and so on (Nattinger & DeCarrico, 1992). While the functions of social interaction and discourse device formulas overlap with those proposed by Wray and Perkins (2000), necessary topics in particular are relevant to the needs of second language learners. Necessary

topics are formulas that "mark topics about which learners are often asked, or ones that are necessary in daily conversations" (Nattinger & DeCarrico, 1992, p. 63). Examples include formulas for autobiographical information (e.g., *My name is* __), language (e.g., *How do you say __?*), and likes and dislikes (e.g., *I like* __), etc. (Nattinger & DeCarrico, 1992).

While Nattinger and DeCarrico (1992) do not address the application of necessary topics for first language speakers, it is plausible that children would benefit from these types of formulas as well. Similarly to second language learners who are frequently asked about certain topics, children exist "within a socio-interactional bubble" (Wray & Perkins, 2000, p. 22) with a high degree of consistency in their verbal interaction routines. However, it is worth noting that the topics that are relevant to children will not necessarily the same ones that second language learners speak about in day-to-day conversation.

2.4.3. Functions of formulaic language in ASD. To date, there appear to be no survey studies of the functions of formulaic language in ASD. However, there is reason to believe that formulaic language may serve different functions in persons with ASD as a result of their impairments in social communication (Wray & Perkins, 2000) and difficulties achieving full integral perception of all dimensions in communication (Noens et al. as cited in Noens & Van Berckelaer-Onnes, 2004). Together, these impairments may lead to a situation in which "formulaicity is not socio-interactionally motivated but rather is a 'Hobson's choice' [i.e., having no real alternative] solution to processing constraints" (Wray & Perkins, 2000, p. 23). That is to say, formulaicity in ASD might not socio-interacionally motivated because of the impairment in social communication (Wray

& Perkins, 2000) nor may there be a real choice between analytic and holistic processing because difficulties in integrated perception hinder segmentation and thus analytic processing (Noens & Van Berckelaer-Onnes, 2004). With respect to Wray and Perkins' (2000) division in functions, we would thus expect formulaic language to be used for cognitive purposes rather than as social interaction devices. However, impairment in pragmatic abilities in ASD is best described as a *deficiency* than a *complete inability* (Vogindroukas & Zikopoulou, 2011). Indeed, research pertaining to the categories of formulaic language, including immediate and delayed echolalia (e.g., Prizant & Duchan as cited in Prizant & Rydell, 1993; Prizant & Rydell, 1984; Stribling, Rae & Dickerson, 2007), politeness sequences (e.g., Volden & Sorenson, 2009; Sirota, 2004), and discourse markers (de Villiers, 2011; Niemi, Otsa, Evtyukova, Lehtoaro & Niemi, 2010) suggest that while the social functions of formulaic language may be impaired or less prevalent, they are not necessarily non-existent. These findings are discussed in greater detail below.

2.4.3.1. Functions of immediate echolalia. Stribling et al. (2007) used Conversation Analysis to explore the functions of immediate repetition in the speech of a 16-year-old female with ASD and severe learning difficulties. Through their analysis of the context of use of repeated utterances and the ongoing activity, Stribling et al. provided examples of interactionally relevant repetitions, such as: (a) those that accompanied an action and finished when the action did, and (b) responses to prior turns that were addressed to the participant. While the participant may not have been able to generate novel speech to respond to a prior turn, she demonstrated her orientation to the speaker and acknowledged the prior turn through repetition. They concluded she "may

possess a level of pragmatic competence over and above what might be expected from the level of lexical and syntactic skills she displays" (p. 442).

While Stribling et al. (2007) did not create a comprehensive list of the functions of immediate echolalia in their participant's speech, the functions they attributed to instances of immediate repetition were related both to conversational maintenance, such as the acknowledgement of prior turns, and to conversational purpose, as in the case of offers and requests (see Nattinger & DeCarrico, 1992). This suggests that repetition was used for both interactive and instrumental purposes.

Prizant and Duchan (as cited in Prizant and Rydell, 1993) analyzed audio-video interactions gathered over an 8-month period of four boys with ASD aged 4- to 9-years-old for the purpose of describing the functions of immediate echolalia. From these analyses, they identified seven functional categories in their data. The interactive functions of echolalia they noted include: turn taking, declarative, yes-answer, and request. The non-interactive functions observed include: nonfocused, rehearsal, and self-regulatory.

Like Stribling et al.'s (2007) findings, the interactive functions of echolalia proposed by Prizant and Duchan (as cited in Prizant & Rydell, 1993) resonate with Nattinger and DeCarrico's (1992) social interaction formulas used for conversational maintenance and conversational purpose. With respect to Wray & Perkin's (2000) functional categories, rehearsal and requests are examples of cognitive and social functions, respectively.

2.4.3.2. Functions of delayed echolalia. Using a similar method to Prizant and Duchan's (as cited in Prizant & Rydell, 1993), Prizant and Rydell (1984) carried out

functional analyses of 378 instances of delayed echolalia in the interactions of three boys with ASD between the ages of 4 and 15. The samples of the boys' interactions with their teacher or clinician were collected by audio- and video-recorded interactions of familiar activities in the child's daily schedule. They did not distinguish between scripting and delayed echoes from other non-media sources. The functions assigned to the echoes were derived from the data. The interactive functions identified include: turn-taking, verbal completion, providing information, labelling (interactive), protest, calling, affirmation, and directive. The non-interactive functions included: non-focused, situation association, self-directive, rehearsal, and labelling (non-interactive).

All of the functions of immediate echolalia identified by Prizant and Duchan (as cited in Prizant & Rydell, 1993) have direct equivalents in Prizant and Rydell's (1984) functional categories of delayed echolalia. As with immediate echolalia, there are similarities between the interactive functions of delayed echolalia and those identified in Nattinger and DeCarrico's (1992) functional description of formulas in second language learners. In addition, a number of Prizant and Rydell's (1984) interactive functions correspond to those listed in Wray and Perkins (2000). Of particular interest are: (a) calling attention to oneself, which is indicative of the use of formulas to assert identity; and (b) verbal completion of familiar routines, which is an example of the use of formulas to assert group membership. Thus, despite the social communication and interaction impairments of persons with ASD, Prizant and Rydell (1984) provide evidence that some persons with ASD may be able to harness formulaic language socio-interactively; furthermore, they may be able to do so for interactional purposes beyond

the instrumental purpose of meeting their physical, emotional, and cognitive needs by manipulating others.

2.4.3.3. Functions of politeness expressions. Sirota (2004) examined a range of idiomatic and semi-routinized politeness practices in recorded interactions of 16 children with high-functioning autism or Asperger's disorder between the ages of 8 and 13 in family and community settings. While not a study of formulaic language per se, the examples she provided are indicative of formulaic language being used appropriately. All 16 participants employed idiomatic politeness practices, such as acceptance/refusals (e.g., *no thank you*), conventionally indirect requests (e.g., *Can I be excused please?*), and apologies (e.g., *I'm sorry*). Semi-routinized politeness sequences, such as expressing sympathy and engaging in small talk were used by 15 of the 16 participants. Sirota proposed that the acquisition and successful use of politeness sequences was facilitated by their structured nature and through situational connections made with familiar movies, stories, lyrics etc. Wray (2002) also noted that the use of politeness formulas might be the result of direct instruction by parents.

Thus, Sirota (2004) provided evidence that children with ASD have access to the linguistic forms of politeness sequences and are able to use them in appropriate contexts. However, the study did not give any indication as to the prevalence of these sequences. Furthermore, while the examples were illustrative, there were no counterexamples. For example, cases in which formulas should have been used but were omitted were not addressed.

Research on register variation can further exemplify the nature of politeness sequence use in ASD. Volden and Sorenson (2009) examined the ability of children with

high-functioning autism and Asperger's disorder with a mean age of 10 to vary requests along a continuum of *politeness/bossiness*. They found that participants were as successful as typically developing control participants in varying their requests along the continuum, using formulas such as *Please, May I have*, *Pretty please*, *Do you mind if I have a candy?*, *whether you like it or not*, *or else*, and *right now*. Qualitatively, some forms appeared to be idiosyncratic (e.g., *Desperately please*, *Please have mercy*), but no patterns distinguishing participants with ASD from control participants were found.

Like Sirota (2004), Volden and Sorenson's (2009) findings demonstrated that persons with ASD not only have access to the linguistic formulas for politeness and bossiness sequences, but also that they are able to use them appropriately. However, both studies included only participants with high-functioning autism and Asperger's disorder. Therefore, it is not known whether this generalization extends to participants with low-functioning autism or poor expressive language skills. Both studies also found some evidence of idiosyncratic forms.

Additionally, Volden and Sorenson (2009) cautioned that different success rates might emerge under more demanding conditions. Using a more cognitively demanding elicitation task, Volden, Macgill-Evans, Goulden and Clarke (2007), for example, found that high-functioning autistic children and adolescents were able to vary register in response to different listener characteristics such as age and second-language but were less successful at doing so spontaneously than matched control participants.

Difficulties in varying register may explain the observation that speech in certain persons with ASD is pedantic (Tager-Flusberg et al., 2005). The pedantic style is related to the use of "overly *formal* or precise words, and general 'odd phrasing'" (Eigsti, de

Marchena, Schuh & Kelly, 2011, p. 683, emphasis added). This description of pedantic speech in ASD is also reminiscent of the examples proposed by Pawley and Syder (1983) of unidiomatic speech that is grammatically correct (e.g., *The fact that Harry could be brought by you causes me to be so glad*; *It is my wish that I become married to you*) but less natural than a nativelike equivalent (e.g., *I'm so glad you could bring Harry*; *I want to marry you*). Thus, the pedantic style observed in some persons with ASD may be related to non-nativelike selection (a) by not using formulaic sequences as proposed by Van Lancker Sidtis (2012a) (see discussion in Section 2.1), (b) by selecting a sequence from a more formal register than the situation would require (e.g., *the fact that*; *it is my wish that*) as difficulties in spontaneous register variation might suggest, or (c) perhaps even by choosing a sequence from a written register as opposed to a spoken register (David Wood, personal communication, March 7, 2014).

2.4.3.4. Functions of discourse markers. We can relate findings from research on discourse and narration in ASD to the use of formulaic language for the purpose of conversational maintenance. For example, topic changes tend to be indicated with a sequences such as *by the way* or *to change the subject a moment* (Dobbinson, Perkins & Boucher, 1998). Fay and Schuler (1980) noted, "normal flow of conversation is further thwarted because autistic persons do not properly introduce the topic of conversation with phrases such as 'by the way', 'remember that', 'talking about'" (p. 107). Abrupt topic changes were also seen in Dobbinson et al.'s (1998) analysis of the speech of Mary, a 28-year-old woman with ASD. Similarly, Niemi et al. (2010) compared the interactions of two participants with Asperger's disorder and two matched control participants with an adult interlocutor and found that turn openings were significantly less likely to be

included in the speech of participants with Asperger's disorder than in that of control participants. This was reflected in a paucity of discourse particles such as *well* or *definitely*. In the example Niemi et al. provided, the lack of an opening discourse particle inhibited successful communication. However, Solomon's (2004) analysis of narratives by participants with high-functioning autism and Asperger's disorder included several examples of topic introductions such as *I have a story to tell you*, *I wanna tell you about*, *by the way*, and *imagine if*, indicating that the use of formulas for conversational maintenance is not completely nonexistent in ASD.

Research on use of formulaic language suggests that formulas used for conversational maintenance may be appear less frequently in the speech of persons with ASD. However, it is also possible that they are using different strategies to achieve the same functional purposes. Dobbinson et al. (1998) point out that persons with ASD may use other strategies for conversational maintenance. For example, they note that Mary used repetition to maintain a topic, repeating *very nice* on three occasions in the space of 25 conversational turns. Cross-turn repetition of phrases is a typical characteristic of autistic conversation (Dobbinson et al., 1998).

2.5. Identification of Formulaic Language

Several means of identifying formulas in data sets have been proposed, although not all are equally applicable to different speaker types or definitions of formulaic language. Three means of empirical measurement-based identification are discussed, followed by a comparison of criteria-based checklists, which rely on native speaker intuition as opposed to measurement instruments.

2.5.1. Frequency. Statistical identification of formulas is generally associated with the frequency-based approach to formulaic language (Durrant & Mathews-Aydınlı, 2011). In the bottom-up approach to frequency-based identification, minimum lengths of combinations, as well as minimum criteria for frequency are preselected, and then corpora are scanned for combinations that meet the requirements (Wood, 2009). Established minimums for frequency can range from 10 to 40 occurrences per million words (Simpson-Vlach & Ellis, 2010). The combinations identified using this approach are not necessarily complete structural units (Cortes, 2004).

The frequency-based method is not appropriate for small data sets, as the standard minimums for frequency established in the field may not be met. Additionally, this method does not give any information about the psycholinguistic validity of the formulas, and so it is not appropriate for identifying formulas in individuals' idiolects, as is the goal of psycholinguistic research, unless further steps are taken. This limitation was confirmed in a study by Schmitt, Grandage, and Adolphs (as cited in Conklin & Schmitt, 2012), who extracted formulas from a corpus and included them in spoken dictation tasks designed to exceed short-term memory capacity. Based on the participants' reconstructions of the dictations, the authors concluded that the holistic storage of the sequences, though formulaic according to corpus data, varied from participant to participant (Schmitt, Grandage, and Adolphs as cited in Conklin & Schmitt, 2012). Finally, additional steps are also required to eliminate meaningless combinations of words for functional analyses of formulaic language.

2.5.2. Psycholinguistic Measures. Several studies of formulaic language have been carried out using a variety of measures of processing speed. Conklin and Schmitt

(2012) summarize a list of studies that represent a wide variety of measurements, including reaction times (e.g., Conklin & Schmitt as cited in Conklin and Schmitt, 2012), eye-movement (e.g., Underwood, Schmitt & Galpin as cited in Conklin and Schmitt, 2012), reading times (e.g., Arnon & Snider as cited in Conklin and Schmitt, 2012), repetition (e.g., Bannard & Matthews as cited in Conklin and Schmitt, 2012), and electrophysiological (ERP) measures (e.g., Tremblay & Baayen as cited in Conklin and Schmitt, 2012).

Many of the measures listed above rely on reading, and therefore have limited applications with children whose literacy skills may not be fully developed. While psycholinguistic measures are well suited to determining which sequences a given individual has stored holistically, they do not provide any indication of the prevalence of the formula in the speech community. The formulas identified may include idiosyncratic forms that the speaker has found useful to combine. Additionally, they are limited in the number of formulas that can be practically examined in a given study.

2.5.3. Acoustic analysis. The third and final empirical method of formula identification discussed here is phonological coherence. Acoustic measures of speech have a long history in child language research (Lin, 2010). The term *phonological coherence* was first used by Peters (1983) to described utterances that are "always produced fluently as a unit with an unbroken intonation contour and no hesitations for encoding" (p. 8). Prosodic features that are associated with formulas include: alignment with pauses and intonation units, resistance to internal dysfluency, no internal hesitations, fast speech rhythm, and stress placement restrictions (see Lin, 2010, 2012 for a discussion). However, Lin (2010) cautions that equating phonological coherence with

formulas in other populations is “debatable” (p. 180), especially in adult native speaker speech. In ASD, attested impairments in prosody (e.g., Fay & Schuler, 1980; Tager-Flusberg et al., 2005) might also hinder the use of this identification method. Phonological coherence must be validated in populations with ASD before being applied as the sole criterion for formulaicity. Furthermore, the standard definition of phonological coherence may not apply in echoic behaviour if the participant is faithful to the original model; in this case, pauses and hesitations may reflect the original utterance as opposed to online processing in the production of the echo. As with psycholinguistic methods, phonological coherence as a means of identification of formulas only reveals formulas in the speaker’s idiolect. Additionally, analysis is limited by the amount of data that can be processed and by the quality of the audio data recorded.

It is interesting to note that echolalia in ASD also has salient phonological features. Fay and Schuler (1980) characterize echolalic utterances as a “single chunk of speech sound” (p. 46), although echoic behaviour may also rigidly mimic the pauses, accents, and nonsegmental features of the original model. The former characteristic is similar to phonological coherence (Peters, 1983); the latter can be compared to stress placement restrictions seen in formulas in speakers without ASD (Lin, 2010). However, while formulaic language in children with typical development tends to be “articulated fluently but imprecisely” (Plunkett as cited in Lin, 2010, p. 176), echolalia in children with ASD is characterized by good articulation compared with the speaker’s other utterances (Fay & Schuler, 1980).

2.5.4. Criteria checklists and native speaker intuition. One alternative that has been proposed to identify formulas in other data sets or different populations is criteria

checklists that combine characteristics typically associated with formulaic language. While some checklists have been developed for specific populations, others are more general. Three checklists for different types of speakers are discussed here: child language acquisition (Peters, 1983), second language acquisition (Wood, 2006, 2009, 2010), and a checklist applicable to child and adult native or non-native speakers (Wray & Namba, 2003). All three checklists are designed such that none of the criteria are necessary nor must they all be met for the purpose of identification. Wray and Namba (2003) propose that each applicable criterion on their list should be rated on a 5-point Likert scale from *strongly agree* to *don't know* to *strongly disagree*, where *strongly disagree* indicates "the absence of a trait that sometimes indicates it [formulaicity]" (p. 26), not evidence against formulaicity. All three checklists represent a departure from the methods described above in that they place considerable importance on native speaker intuition. A summary of the criteria for each checklist is provided below in Table 2:

Table 2
Criteria for Identification of Formulaic Language from Three Checklists

Criterion	**Peters (1983)**	**Wood (2006, 2009, 2010)**	**Wray & Namba (2003)**
Phonology	X	X	X
Invariance of form	X		X
Form		X	
Semantic irregularity		X	X
Syntactic irregularity		X	X
Complexity	X	X	X
Frequency	X		X
Repetition			X
Derived from a known formula			X
Community-wide use	X		X
Idiosyncratic use	X	Accepted	X
Inappropriate use	X	Accepted	X
Situation dependence	X		X
Pragmatic function			X

Of the three checklists, Wray and Namba's (2003) is the most elaborate as it has a total of 11 criteria that address 13 points. However, the combinations of criteria that can be applied to a given sequence depend on the type of speaker as well as the correctness of the form and usage of the utterance. Both the list of criteria and a table illustrating the potential combinations are included in Appendix B. Peters (1983), on the other hand, lists 6 criteria that address 8 points while Wood's (2006, 2009, 2010) checklist is based on 5 criteria.

As the data in Table 2 suggest, there are a number of characteristics that are indicative of formulaicity, though not all are equally applicable to different populations. All three checklists, however, do reference phonology and complexity. Phonological traits of formulaicity can include phonological coherence, reduction, or distinctive phonological patterns. Phonological reduction can involve phonological fusion, reduction of syllables, or deletion of schwa (Wood, 2010). Complexity refers to a sequence that stands out for being noticeably more advanced or less advanced than the individual's typical language use. In Wray and Namba (2003), this criterion is applied in the analysis of child language, like Peters (1983), or non-native speakers, like Wood (2006, 2009, 2010), but not to adult native speakers.

Wood's (2006, 2009, 2010) is the only checklist to reference form, specifically, Nattinger and DeCarrico's (1992) taxonomy. However, Wood (2006) considers it a "guide to possible formulaicity" (p. 21). In this respect, it is similar to Wray and Namba's (2003) concession that form may "have an impact on the identification of likely candidates" (p. 33). Frequency, which was discussed earlier, is also considered by Wray and Namba (2003) and Peters (1983) to be a mark of formulaicity. However, frequency in

this context refers to frequent use by the speaker, not an arbitrary threshold for identification set in corpus research. Wood (2006, 2009, 2010) does not consider frequency alone to be a criterion for identification in relation to the type and amount of data collected. It is also interesting to note that both Peters (1983) and Wray and Namba (2003) allow for the two social extremes – idiosyncratic uses and community-wide uses – of formulas. Wood (2006, 2009, 2010) does not consider idiosyncratic uses a mark of formulaicity, though they are accepted given the incomplete language acquisition of non-native speakers participating in the studies. Wood (2006, 2009, 2010) makes the same concession regarding inappropriate use of formulas. Inappropriate use of formulas can refer to either incorrect form or incorrect usage in a given context. Wray and Namba's (2003) checklist is unique in that it is divided according to criteria that can be applied to the correct form and those that can be applied to the inappropriate one (see Appendix B). Additionally, Wray and Namba's (2003) checklist is the only one to consider local repetitions, including reading, derivations from formulas, and functional uses in communication or discourse as potential indicators of formulaicity. The remaining criteria are not addressed here as they have been described in Section 2.3 in relation to characteristics of formulaic sequences.

Wray and Namba's (2003) checklist is particularly helpful for the identification of formulas in autistic speech. First, by considering repetition to be a sign of formulaicity, it accommodates perseveration and echolalia. Perseveration is defined as cyclical repetition of speech while echolalia refers to non-cyclical, immediate or delayed repetition of speech (see Section 2.1.3; Prizant & Rydell, 1993). Furthermore, in addition to pure echolalia, Wray and Namba's (2003) criterion for derived formulas allows for the

inclusion of mitigated echolalia, in which the repetition features minor structural changes with respect to the original model (Prizant & Rydell, 1993). Finally, criteria such as idiosyncratic uses, situational dependence, and pragmatic function can be used collectively to justify the inclusion of idiosyncratic, non-institutionalized, sequences as formulas in the idiolects of participants with ASD, for whom speech is often idiosyncratic (APA, 2013).

Clearly, all three checklists place considerable importance on the native speaker's intuition in determining whether a sequence is formulaic or not when compared to measures of frequency, processing time, or acoustic analysis. Wray and Namba (2003) and Wood (2006, 2009, 2010) indicate that native speaker intuition should be applied prior to the use of the checklists to find sequences that are likely to be formulaic. In ASD, a priori identification is even more challenging than in other populations as native speaker intuition may not suffice as a preliminary screening method for idiosyncratic sequences. Additional measures, such as having access to contextual information in video recordings or knowledgeable informants, are required to avoid mistakes such as: mislabelling utterances that appear to be novel but are delayed repetitions; not recognizing utterances that are in fact associated with specific situations; or not recognizing those that are the speaker's habitual way of conveying an idea. Alternately, longitudinal data may help overcome these difficulties.

2.6. Categorizing Formulaic Language.

Section 2.1.2 proposed that the term formulaic language describes a wide range of language behaviour. Attempts to divide the phenomenon into subcategories have approached the task from various perspectives, including function (e.g., Nattinger and

DeCarrico, 1992, described in Section 2.4.2), form (e.g., Nattinger and DeCarrico, 1992, described below), and a novel-reflexive continuum (e.g., Van Lancker Sidtis, 2012b, see Figure 1 in Section 2.1.2). Other categorization schemes have been developed for specific populations (e.g., Van Lancker Sidtis & Postman, 2006, described below), though it appears that none to date have been developed expressly for the analysis of formulaic language in ASD. Nattinger and DeCarrico's (1992) form taxonomy and the categories used by Van Lancker Sidtis and Postman (2006) for formulas in aphasia are discussed here.

2.6.1. Nattinger and DeCarrico (1992). Nattinger and DeCarrico's (1992) form taxonomy aims to categorize lexical phrases, which they define as "form/function composites, lexico-grammatical units that occupy a position somewhere between the traditional poles of lexicon and syntax" (p. 36). They divide lexical phrases into four categories on the basis of structural criteria, though they suggest it may be necessary to consider them as a continuum. The four categories they identify are: (a) polywords, (b) institutionalized expressions, (c) phrasal constraints, and (d) sentence builders. Polywords are fixed, continuous phrases that function as a single lexical item and that may be canonical (e.g., *in a nutshell*) or non-canonical (e.g., *all in all*) – non-canonical meaning grammatically irregular. Institutionalized expressions allow no variability, are mostly grammatically regular as well as continuous, and are of sentence length. Thus, they tend to function as utterances (e.g., *give me a break*). While they are named *institutionalized* expressions, Nattinger and DeCarrico indicate, "others may be more idiosyncratic phrases that an individual has found to be an efficient and pleasing way of getting an idea across" (p. 40). Thirdly, phrasal constraints are analogous to polywords but they differ in that

they allow variation of lexical and phrasal categories (e.g., *see you__*, as in *see you later*) and may be discontinuous (e.g., *the __er the __er*, as in *the bigger the better*). Finally, sentence builders are analogous to institutionalized expressions, though like phrasal constraints they allow variation. They "provide the framework for whole sentence" (p. 42). Examples include: *I think (that) X*, as in *I think that you should try it*; *the __er* X, *the __er Y*, as in *The sooner all this work is finished, the sooner we will all be able to go home*. The last example is similar to the example provided for phrasal constraints, although it differs because it is "expanded to encompass clausal categories symbolized by X and Y" (p. 44). All lexical phrases must have a pragmatic function, which distinguishes them from collocations as defined by Nattinger and DeCarrico (1992). A further restriction imposed by the taxonomy is that all expressions must necessarily involve a combination of word though they do consider words like *nevertheless*, or *moreover*, to be a "special class of polywords" (p. 39) that were historically phrasal but that are now written and perceived as single units.

2.6.2. Van Lancker Sidtis and Postman (2006). Van Lancker Sidtis and Postman (2006) propose a total of nine categories for the analysis of formulaic language in participants with left- and right-hemisphere brain damage. They include:

> (1) Idioms (e.g., ''lost my train of thought''); (2) conventional expressions (e.g., ''as a matter of fact''); (3) conversational formulaic expressions (e.g., ''first of all'', ''right''); (4) expletives (e.g., ''damn''); (5) sentence stems (e.g., ''I guess''); (6) discourse particles (e.g., ''well''), and (7) pause fillers (e.g., ''uh'')…(8) numerals in any form…(9) familiar proper nouns (those personally known to the speaker). (p. 417)

Thus, their categories include both formal and functional categories, such as sentence stems and conversational formulaic expressions, respectively. Additionally, their categories permit the inclusion of one-word formulaic expressions such as *right* or *well*. On the other hand, their categorization scheme does not recognize collocations or semi-productive expressions with slots. The inclusion of categories eight and nine, numerals and familiar proper nouns, was justified according to prior research on the remaining language abilities of patients with right- and left-hemisphere damage. Nonetheless, they relate to lists and proper nouns, respectively, two categories proposed in Van Lancker Sidtis's continuum (2012b). The categories established by Van Lancker Sidtis and Postman (2006) have been used, with some modifications, in studies of formulaic language in populations with various disorders (e.g., schizophrenia, see Karibis et al. as cited in Van Lancker Sidtis, 2012a; Alzheimer's disease, see Bridges & Van Lancker Sidtis, 2013; Parkinson's disease, see Rogers, Sidtis & Sidtis as cited in Van Lancker Sidtis, 2012a).

Classification of formulas is complicated by the fact that a formulaic expression may meet the criteria for several categories (Van Lancker-Sidtis & Rallon, 2004). For example, a given formula may have "a function other than and additional to its primary one" (Moon as cited in Wray & Perkins, 2000, p. 8), which Moon refers to as "cross-functioning" (as cited in Wray & Perkins, 2000, p. 8). The same is true of unconventional verbal behaviour in ASD. Prizant and Rydell (1993) propose the example of perseveration of a delayed echo, in which a segment of speech that was previously heard is repeated persistently without any functional goal. Thus, the utterance would be considered both an example of perseveration and of delayed echolalia. Despite these

problems, descriptive categorization schemes can facilitate the identification of formulaic language; Wood (2006, 2009, 2010), for example, included Nattinger and DeCarrico's (1992) form taxonomy in his criteria for identification.

2.6.3. Classifying formulaic language in ASD. In tailoring a classification system to language use in ASD, several factors must be taken into consideration. The first is that the classification scheme should allow for the inclusion of unconventional verbal behaviour. Wray (2008) comments, "because of the likelihood that linguistic behaviour in autism is a manifestation of a broader tendency to behave formulaically, formulaic language in autism needs to be viewed in inclusive terms in order to catch everything" (p. 187). The previous recommendation also applies to the inclusion of one-word utterances in a classification system for formulaic language in ASD. Dobbinson et al. (2003) set this precedent in their analysis of formulaicity in adults with ASD, including one-word discourse markers such as *yeah* in their analysis. Finally, a classification scheme that aims to survey formulaic language use in ASD should include both formulas with and without pragmatic functions. As one of the core deficits in ASD is social communication and interaction, it is possible that formulaic language with pragmatic functions is impaired in ASD. However, formulaic language also includes expressions like collocations or multi-word verbs that have not been assigned a pragmatic function by the grammar, and so these types of formulas might be comparatively unimpaired. In order to fully understand whether formulaic language as a whole or solely formulaic language with pragmatic associations is impaired in ASD, we need to be able to distinguish between the two in analyses.

2.7. Summary

Formulaic language has been contrasted here with novel language on the basis of whether or not it has been newly produced (Van Lancker Sidtis, 2012b). While formulaic language is associated with a holistic mode of language processing, novel language is associated with an analytical mode of language processing (Dobbinson et al., 2003). The balance between the two modes depends on various factors such as age (Wray, 2002), interlocutor (Wray, 2009), topic of conversation (Van Lancker Sidtis, 2004), cognitive stress (Wray & Perkins, 2000), cognitive preference (Wray, 2002), etc.

The phenomenon of formulaic language use in ASD is an understudied area, though several characteristics of ASD (e.g., preference for holistic mode of language processing, strong rote memory skills, social interaction and communication impairments, etc.) suggest that it may differ quantitatively and qualitatively from formulaic language use by speakers without ASD. Two studies, Dobbinson et al. (2003) and Tager-Flusberg and Calkins (1990), suggest that formulaic language is found in the speech of persons with ASD, although the prevalence of the phenomenon across the spectrum remains contested (cf. Van Lancker Sidtis, 2012a).

Similarly, the subclasses of propositional speech that are found in ASD have yet to be confirmed, although several additional subclasses, including immediate and delayed echolalia, or scripting, as well as perseveration, have been proposed here. While there is evidence that conventional formulaic language is used for functional purposes (e.g., Sirota, 2004; Volden & Sorenson, 2009), findings suggest that idiosyncratic forms may also be prevalent in ASD (e.g., Prizant & Rydell, 1984; Stribling et al., 2007). It remains to be seen whether formulaic language in ASD serves the full range of purposes seen in

speakers without ASD. To date, no methods have been proposed for the identification or classification of formulaic language in ASD. However, the prevalence of idiosyncrasy and repetition in autistic speech signify that traditional identification methods and classification systems in formulaic language research cannot be applied successfully without modifications. The identification method and categories proposed in this study are based on and informed by the studies discussed in this literature review.

3. Theoretical Framework

This study is grounded in the view that language is a complex adaptive system, as characterized by The Five Graces Group (2009) in their position paper. According to The Five Graces Group (2009), language emerges through interactions over time and is influenced by situational factors surrounding each instance of use. This chapter defines *complex adaptive system*, compares the paradigm's assumptions to those of the nativist paradigm, and discusses the characteristics of language as a complex adaptive system in relation to their implications for the study of formulaic language and clinical populations. The methodological considerations for research grounded in this paradigm are also addressed.

3.1. Defining Complex Adaptive System

The following definitions of complex, adaptive, and system can be abstracted from The Five Graces Group's (2009) description of the features of language as a complex adaptive system (LaCAS):

1. System: "multiple agents interacting with one another" (Blythe & Croft, 2009, p. 47)
2. Adaptive: "agents' behaviour is based on their past interactions, and current and past interactions together feed back into future behaviour" (Blythe & Croft, 2009, p. 47)
3. Complex: "an agent's behaviour is the consequence of competing factors from a wide range of environmental affordances and constraints" (Blythe & Croft, 2009, p. 48)

These definitions of a complex adaptive system can be applied to language to determine the features of LaCAS. “Speakers in the speech community” (The Five Graces Group, 2009, p. 1) represent the multiple agents that make up the system. Thus, the linguistic system is a description of the language behaviour of the speech community (Blythe & Croft, 2009). Language behaviour, or production of “tokens of linguistic structure” (Blythe & Croft, 2009, p. 48), involves replication of linguistic structures previously heard, or learned. Replication, however, does not have to be exact and can involve “novel combinations and sometimes altered form” (Blythe & Croft, 2009, p. 48). Speakers’ production is influenced by multiple factors, such as the organization of memory, perception, social motivations, etc. (Blythe & Croft, 2009). The existence of patterns in the system, or the structures of language, can be explained as emerging from “interrelated patterns of experience, social interaction, and cognitive processes” (The Five Graces Group, 2009, p. 2).

3.2. Assumptions of the Framework

Approaching language as a complex adaptive system entails a number of assumptions that differ from traditional nativist accounts of language. According to the nativist paradigm, acquiring language is an innate capacity that is not influenced by factors external to the linguistic system, which is modelled as an abstract set of rules and representations (Abbeduto, Evans & Dolan, 2001). As most research on language and communication in atypical populations is grounded in this paradigm (Abbeduto et al., 2001), it is important to understand the differences in the two frameworks with regards to their approach to language. The main assumptions of the nativist view of language can be summarized in two points:

1. "The child is born with the capacity to acquire language, a capacity that consists of tacit knowledge of a universal grammar...which makes language learnable with minimal input from the environment" (Abbeduto et al., 2001, p. 47).
2. "Language is a domain-specific system of context-free deterministic rules that operate on abstract representations, which means that language is only imperfectly represented in the acts of speaking and listening and is independent of other dimensions of the mind and personality" (Abbeduto et al., 2001, p. 47).

These assumptions include a set of beliefs about the initial state of the learner, the role of input and interaction in language acquisition, the specialization of language acquisition processes, the nature of linguistic representations and their organization, the distinction between linguistic knowledge and use, and the impact of individual learner characteristics.

This set of beliefs can be summarized in a similar manner with respect to LaCAS assumptions:

1. The child is born with the capacity to acquire language (Abbeduto et al., 2001), a capacity that depends "heavily on brain areas fundamentally linked to various types of conceptual understanding, the processing of social interactions, and pattern recognition and memory" (The Five Graces Group, 2009, p. 18). These areas make language learnable through "real-time communicative interactions" (Abbeduto et al., 2001, p. 51).

2. An idiolect emerges from “numerous domain-general capacities” (The Five Graces Group, 2009, p. 17). In this system, the “units of grammar are constructions, which are direct form-meaning pairs” (The Five Graces Group, 2009, p. 4); the “grammar is a network built up from the categorized instances of language use” (The Five Graces Group, 2009, p. 4). “Each idiolect is the product of the individual’s unique exposure and experiences of language use” (The Five Graces Group, 2009, p. 15) and its structure “is fundamentally moulded by the preexisting cognitive abilities, processing idiosyncrasies and limitations, and general and specific conceptual circuitry of the human brain” (The Five Graces Group, 2009, p. 17).

The main point of agreement between the two frameworks is the proposal that children are born with the capacity to acquire language. They differ in their beliefs regarding the nature of said capacity, the processes and factors involved in language acquisition, and the representation and organization of the linguistic system.

Both LaCAS and the nativist paradigm divide language into two components. For nativists, the distinction is between competence and performance (Abbeduto et al., 2001). In the LaCAS paradigm, the distinction is between idiolect and communal language (The Five Graces Group, 2009). Nativists’ assumptions regarding the nature of language are most directly comparable to those of LaCAS that deal with the nature of idiolect. Hence, the second point in the above comparison of assumptions focuses exclusively on idiolect. Idiolect emerges from a speaker’s interactions with other speakers (The Five Graces Group, 2009). It combines nativists’ competence and performance into one level. According to nativists, language use, or performance, is considered a deficient

representation of language knowledge, or competence (Abbeduto et al., 2001). In the LaCAS paradigm, knowledge and use are indivisible (The Five Graces Group, 2009). Every instance of language use leads to reorganization of the individual's system of language knowledge, or idiolect (The Five Graces Group, 2009).

Communal language as defined in the LaCAS paradigm is concerned with patterns at the collective level (The Five Graces Group, 2009). The structures of the communal language emerge through the interaction of idiolects (The Five Graces Group, 2009). In the nativist framework, language in the community of users is not a distinctive level from language in individuals' mental lexicons because patterns at the collective level come from innate "top-down principles and parametric constraints on language universals" (The Five Graces Group, 2009, p. 15). The LaCAS paradigm proposes a bottom-up view, in which universal patterns are the result of "long-term local interactions between individuals" (The Five Graces Group, 2009, p. 15).

Both the nativist paradigm and LaCAS agree that the two components of language are not mirror images. The nativist paradigm considers performance to be a flawed version of competence (Abbeduto et al., 2001). According to the LaCAS paradigm, no idiolect is a perfect representation of the communal language (The Five Graces Group, 2009). The implications of considering language as two "distinctive but interdependent levels" (The Five Graces Group, p. 14) are discussed in Section 3.3.1.

At the level of linguistic representation, the two paradigms differ in level of abstraction. In the LaCAS approach, "adult language knowledge consists of a continuum of linguistic constructions of different levels of complexity and abstraction" (Ellis, 2013, p. 2). In the nativist approach, language representations are abstract (Abbeduto et al.,

2001). Consequently, this difference leads to an important distinction between the two paradigms: in LaCAS, "no rigid separation is postulated to exist between lexis and grammar" (Ellis, 2013, p. 2). This assumption also implies that the relationship between novel and formulaic language at the level of idiolect is a continuum rather than a division wherein a given formulaic sequence may be "simultaneously represented and stored in multiple forms at various levels of abstraction" (Ellis, 2013, p. 3).

3.3. Characteristics of Language as a Complex Adaptive System

In their position paper, The Five Graces Group (2009) underscores seven characteristics of LaCAS. These characteristics have implications for theory constructs and research design. Each of the characteristics are defined and discussed in relation to formulaic language and/or clinical populations.

3.3.1. Distributed control and collective emergence. Language exists at two interdependent levels: (a) idiolect, which "is emergent from an individual's language use through social interactions with other individuals in the communal language" (The Five Graces Group, 2009, p. 15); and (b) communal language, which "is emergent as the results of the interaction of the idiolects" (The Five Graces Group, 2009, p. 15).

Because language exists at two levels, "we need to identify the level of existence of a particular language phenomenon of interest" (The Five Graces Group, 2009, p. 15). Taking formulaic language as an example, it is clear that as a language phenomenon, it exists at both the level of the idiolect and the level of the communal language. Corpus linguistics researchers, for example, investigate formulas in the communal language using markers such as frequency to identify formulas (see Section 2.5.1). They analyze large collections of texts to "show how there are recurrent patterns of words, collocations,

phrases, and constructions" (Ellis, 2013, p. 4). On the other hand, psycholinguistics researchers interested in formulaic language examine the characteristics of formulas in the idiolect using various psycholinguistic measures such as reaction time or eye movement (see Section 2.5.2). Therefore, in designing a study to investigate formulaic language, it is important to determine which level of language is relevant to the study and to define formulaic language accordingly. Defining formulaic language in terms of a sequence that is "stored and retrieved whole from memory at the time of use" (Wray & Perkins, 2000, p. 1), for example, would be appropriate at the level of the idiolect; it would not be suited to the study of formulas in the communal language. In this study, the level of language of interest is the idiolect and so it is appropriate to define formulaic language as that which is "not novel – not newly created" (Van Lancker Sidtis, 2012b, p. 343).

3.3.2. Intrinsic diversity. Each individual's grammar is constructed through instances of use (The Five Graces Group, 2009). Therefore, each speaker's system of linguistic representations will be different to the extent that their experiences have differed (The Five Graces Group, 2009).

This suggests that among clinical populations, "younger children's profiles will appear more similar than older children's profiles. This is the result of the fact that over time children's developmental trajectories will evidence greater inter-individual variability" (Abbeduto et al., 2001, p. 53). In relation to formulaic language, it suggests that studies at the idiolect level are unlikely to find evidence for holistic storage of the same formulaic sequences across a range of individuals; what is processed or stored whole by one individual may be dealt with analytically by another. Indeed, the findings

of a study by Schmitt, Grandage and Adolphs (as cited in Conklin & Schmitt, 2012) confirmed this proposition (see Section 2.5.1). Methodologically, this property of language prevents researchers from successfully confirming formulaicity at the idiolect level based solely on frequency results at the communal level. While patterns at the communal level emerge from interacting idiolects, no speaker will be an "ideal representing agent for the system" (The Five Graces Group, 2009, p. 15).

3.3.3. Perceptual dynamics. An inherent characteristic of communal languages and idiolects is that they are constantly changing and reorganizing (The Five Graces Group, 2009).

At the level of idiolect, chunking, categorization, and generalization are examples of processes of reorganization (Beckner & Bybee, 2009). Chunking in particular is relevant to formulaic language and was discussed in relation to Wray's (2002) model of the balance of holistic and analytic processing (see Section 2.1.1). In this process, individual units of representation are combined into a longer construction as a result of repetition (Beckner & Bybee, 2009).

With regards to formulaic language, the property of perceptual dynamics suggests that the formulaicity of a given sequence of words in an individual's idiolect changes over time. Indeed, Wray's (2002) model proposes that the formulaic continuum is in a constant state of flux as the analytic mechanism engages in "deciding whether a given item is unique, or else shares sufficient properties in common with other items to justify subsequent collapsing and re-storage as a single, partly productive formulaic frame" (Wray & Perkins, 2000, p. 21) (see Section 2.1.1). Variability in the replication of formulaic sequences by individuals will ultimately lead to changes in the communal

language (Beckner & Bybee, 2009); thus formulaic variants will fall in and out of favour over time.

3.3.4. Adaptation through amplification and competition of factors. LaCAS consists of "multiple interacting elements, which may amplify and/or compete with one another's effects" (The Five Graces Group, 2009, p. 16).

The Five Graces Group (2009) proposes the following example of elements that compete with one another: in an interaction, "speakers prefer production economy, which encourages brevity and phonological reduction, whereas listeners want perceptual salience, explicitness, and clarity, which require elaboration" (p. 16). Formulaic language may provide a compromise between the speaker's preference for simplified production and the listener's preference for comprehensibility (Wray & Perkins, 2000). Not only is production facilitated for the speaker, but also "a hearer is more likely to understand a message if it is in a form he/she has heard before, and which he/she can process without recourse to full analytic decoding" (Wray & Perkins, 2000, p. 18). Thus, the phonological reduction associated with formulaic sequences, including phonological fusion, reduction of syllables, and deletion of schwa (Wood, 2010), can simplify production without sacrificing comprehension.

Other factors that may compete with one another to influence formulaic language use include those described in Section 2.2 that relate to the prevalence of formulaic language, such as language knowledge (Wray & Perkins, 2000), the interlocutor (Wray, 2009), communicative context (Wray, 2009), the topic (Van Lancker Sidtis, 2004), and interactional goals (Wray & Perkins, 2000). In ASD, a preference for the holistic mode of language processing (Prizant, 1983) combined with a relatively lower contribution of

global cognitive processing to language (Noens & Van Berckelaer-Onnes, 2004) may interact to amplify the use of formulaic language (see Section 2.1.1).

3.3.5. Nonlinearity and phase transitions. In LaCAS, "small quantitative differences in certain parameters often lead to phase transitions (i.e., qualitative differences)" (The "Five Graces Group", 2009, p. 16).

With respect to ASD, this characteristic may help explain the wide range of linguistic abilities observed both between participants (Tager-Flusberg et al., 2005) and within participants in different communicative contexts (Prizant & Rydell, 1993). Small differences in specifiers such as developmental pattern, sex, clinical phenotype, cognitive profile, genetics, or environmental risk factors (for a longer list, see Lai, et al., 2013) may lead to differences in language abilities between participants. Until reliable subgroups on the autism spectrum can be identified (see Section 1.2), it is important to include information about as many specifiers as possible for each participant so that patterns of interaction between these factors and language can be better understood. In this study, this was done by elaborating participant profiles describing aspects of participants' development, language abilities and difficulties, and their home and school life.

With respect to differences observed within participants' language use in different communicative contexts, small changes in the cognitive or social demands of situations may be associated with changes in language use (Prizant & Rydell, 1993). Thus, it is also important to record relevant aspects of the context of language use to understand how situational factors can impact language behaviour. In this study, this was addressed through an analysis of situational factors.

3.3.6. Sensitivity to and dependence on network structure. Interactions between individuals in the CAS are not random; "they are constrained by social networks" (The Five Graces Group, 2009, p. 17). Within a given social network there is an internal structure, such as a hierarchy of roles, which puts further constraints on the potential for interactions between agents of the system (The Five Graces Group, 2009).

This characteristic suggests that social networks of a communal language, as well as the divisions within the network, will lead to the emergence of different formulaic sequences. Divisions within the network could be based on any number of factors such as age, profession, gender, ethnic group, etc.

The constraints imposed by network structure explain why idiosyncratic sequences produced by speakers with ASD might not be recognized by members of the speech community at large though they might be known to the speaker's family members, friends, etc. (see Section 2.3.1). Methodologically, this means that using native speaker intuition to verify the formulaicity of idiosyncratic formulas used by speakers with ASD requires a special kind of native speaker intuition (see Section 2.5.4). That is, it requires the intuitions of a native speaker familiar with the individual's speech, also known as a knowledgeable informant. Hence, in this study, parents of participants acted as knowledgeable informants to help identify formulas a priori.

3.3.7. Change is local. Language emerges in a bottom-up fashion through social interaction (The Five Graces Group, 2009). It is shaped by "preexisting cognitive abilities, processing idiosyncrasies, and general and specific conceptual circuitry of the human brain" (The Five Graces Group, 2009, p. 17). On a large time scale, this leads to the conclusion that language adapts to the mind rather than the brain adapting to an innate

grammar (Christiansen, 1994 as cited in The Five Graces Group, 2009; Christiansen & Chater, 2008 as cited in The Five Graces Group, 2009; Deacon, 1997 as cited in The Five Graces Group, 2009; Schoenemann, 2005 as cited in The Five Graces Group, 2009).

With regards to clinical populations, the implications of this characteristic are extremely important for assessment of linguistic abilities and intervention. Novel language behaviours, many of which are "labelled as 'deviant' from a Nativist perspective, may have adaptive communicative functions" (Abbeduto et al., 2001, p. 53). One such example is echolalia, both immediate and delayed, which is considered an unconventional verbal behaviour and yet can have a number of functions in the speech of persons with ASD (see Sections 2.4.3.1 and 2.4.3.2). Thus, this propensity for adaptation must be considered before undertaking abatement therapies aimed at eliminating so-called pathological language behaviours.

3.4. Methodological Implications of the Framework

Adopting the language as a complex adaptive system framework has a number of methodological implications. The first issue is related to the characteristic of adaptation through amplification and competition of factors, which states that multiple elements are in interaction in the system, amplifying and competing with one another (The Five Graces Group, 2009). As a consequence of these interactions, attempts to identify simple cause-effect relationships between isolated variables are likely to be inadequate in most situations (Dörnyei, 2009). Therefore, not only do research questions need to be carefully formulated, but also approaches to investigation need to be selected to emphasize the system as a whole. Hence, this study seeks not only to answer questions pertaining to the

prevalence of formulaic language, but also to look at the situational factors influencing formulaic language use.

Dörnyei (2009) suggests that a qualitative approach is preferable to a quantitative one in studies grounded in the idea of language as a complex adaptive system because of:

> (a) The emergent nature of data collection and analysis, (b) the thick description of the natural context, (c) the relative ease of adding longitudinal aspects to the research design, and (d) the individual-level analysis that helps to avoid the potential problem that the results derived from a group of learners are unlikely to correspond to the unique dynamic patterns characterizing the individual participants. (p. 242)

Alternatively, a mixed methods approach is also appropriate in complex adaptive systems studies because it allows researchers to analyze multiple levels of the system (Dörnyei, 2009). "Words can be used to add meaning to numbers and numbers can be used to add precision to words" (Dörnyei, 2007, p. 45). While a qualitative approach is well suited to understanding the nature of formulaic language use, a quantitative approach can complement these findings by providing a measure of the prevalence of formulaic language use. In this study, a mixed methods approach was selected as both the prevalence and the nature of the phenomenon were of interest. The methodology of this study is further discussed in Section 4.1.

Unlike in the nativist approach, wherein language is believed to be static, language in LaCAS is in a constant state of flux and is impacted by a range of factors at any given moment (The Five Graces Group, 2009). Thus, studies designed with a longitudinal component are best suited to capture these aspects of language (Dörnyei,

2009). While the speech samples were not collected longitudinally in this study, knowledgeable informants provided longitudinal information about the participants' language use. This is elaborated in Section 4.1.1.

3.5. Summary

This chapter has defined *complex adaptive system* and explained how language can be characterized in those terms. A number of differences between the assumptions and beliefs of the traditional nativist view and LaCAS were discussed. The two paradigms were found to have very few points of agreement with regards to the nature of language and language acquisition. Seven characteristics of LaCAS were described, each of which has implications for the study of formulaic language and language in clinical populations, whether in terms of method, theory, or predictions. Most importantly, it was suggested that language behaviours seen only in clinical populations might be beneficial adaptations rather than examples of unsuccessful language acquisition or inappropriate language use (Abbeduto et al., 2001). Several methodological considerations for research grounded in this paradigm were also addressed. The upcoming chapter discusses the methodology and method adopted in this study in greater detail.

4. Study Design

This study is best described as a mixed methods multiple case study. This chapter briefly discusses the mixed methods methodological paradigm and its implementation in this study. The remainder of the chapter is dedicated to the method of the study, including multiple case study design, participants, data collection and analysis.

4.1. Methodology

This study is grounded in the mixed methods paradigm, which combines research methods and/or paradigm characteristics of qualitative and quantitative research (Dörnyei, 2007). As discussed in Section 3.4, the mixed methods paradigm is aligned ideologically with the theoretical framework of language as a complex adaptive system, wherein it has been suggested that mixed methods research provides a more comprehensive means of analyzing multiple levels of a system (Dörnyei, 2009). The research questions of this study reflected an interest "at the same time in both the exact nature (i.e. QUAL) and the distribution (i.e. QUAN) of a phenomenon [i.e., formulaic language]" (Dörnyei, 2007, p. 45), as well as an interest in the context of use. Hence, this study addressed multiple levels of formulaic language use in the speech of children with ASD and was consequently well suited to mixed methods research.

The integration of qualitative and quantitative research can occur at one or multiple stages of a research project (Dörnyei, 2007). This study integrated qualitative and quantitative methods in data collection and data analysis. Both data collection and data analysis were predominantly qualitative with a quantitative component.

Cresswell (as cited in Dörnyei, 2007) and Cresswell, Plano Clark, Gutmann, and Hanson (as cited in Dörnyei, 2007) proposed that there are three purposes of integrating

the two paradigms: triangulation, explanation, or exploration. In this study, the primary purpose of integration at the level of data collection was to provide multiple sources of evidence to triangulate the findings. The purpose of data integration at the level of analysis was exploratory.

4.1.1. Mixed methods data collection: Triangulating evidence. Qualitative sources of data included: (a) audio-video recordings, (b) researcher observations, and (c) parent observations. Predominantly quantitative data collection instruments included: (a) the Child Participant Profile Questionnaire and (b) the *Cambridge University Behaviour and Personality Questionnaire for Children* (Auyeung, Baron-Cohen, Wheelwright, Allison, 2007a). It is worth noting that the Child Participant Profile Questionnaire did include short-answer questions, which are considered a means of qualitative data collection (Dörnyei, 2007).

The data collection methods' strengths and weaknesses complement each other. On-site observations and the audio-video recordings provide rich, contextualized data for analysis. However, data collected in a single observation session is susceptible to a number of external factors. The Hawthorne effect, in which the mere presence of an observer impacts the behaviour or participants, is often cited in this respect (Dörnyei, 2007). Of even greater concern for this study is Abbeduto et al.'s (2001) proposal that it is possible that "'sudden' onset-type disorder profiles" (p. 53) may emerge as a result of changes in the child's habitual language environment. Thus, while a one-hour recording may provide in-depth information of the phenomenon, it may not be representative of the child's abilities across a multitude of contexts. On the other hand, the data from the questionnaire are decontextualized. Therefore, the questionnaire results are less likely to

be affected by temporary variations in the child's language environment. For example, the range of restricted and repetitive behaviours exhibited by a child may not manifest itself in a one-hour recording session, but is likely to be identified by a familiar adult in the questionnaire. Thus, together, the sources of data and data collection instruments triangulate the participants' language profiles.

The observation sheets, audio-video recordings, and quantitative data from the transcripts provide a means of triangulating evidence for the participants' use of formulaic language. Together, the observation sheets and the transcripts give an indication of formula frequency and preferred structures. The parent observation sheets and notes from conversations between the researcher and the parents provide longitudinal evidence of formulaic language use; conversely, the transcripts are limited to frequency of use during the play session. Additionally, the audio-video recording supports the analysis of the transcript because it allows the researcher to access information regarding the context of use to determine whether an utterance had a function in communication, was semantically transparent given the context, or was accompanied by an action indicative of its status as a unit. Furthermore, it permits the researcher to examine prosodic evidence such as pauses and distinctive phonological patterns that might mark a given utterance as a unit.

4.1.2. Mixed methods data analysis: Exploring the phenomenon. Qualitative data analysis was used to examine the context of participants' formulaic language use and to construct a narrative profile based on the Child Participant Profile Questionnaire results. Interpreting quantitative data such as the Child Participant Profile Questionnaire results qualitatively is considered legitimate when the goal "is not so much the

contextualization of the respondents' account (i.e. examining the data in the light of the additional quantitative information) as to develop a fuller understanding of a particular person, a group, or an institution" (Dörnyei, 2007, p. 271). Quantitative data analysis was conducted on the *Cambridge University Behaviour and Personality Questionnaire for Children* (Auyeung et al., 2007a) results. Furthermore, segments of the audio-video recording transcripts were *quantified* for further analysis. This involves converting qualitative data into codes that can be processed using descriptive or inferential statistical methods (Dörnyei, 2007). The transcript, a source of qualitative data, was quantified to complete the participant profiles by applying descriptive statistics, such as mode and median, to word counts of speaker turns. With respect to the quantitative analysis of formulaic language, formulaic expressions from different categories were identified and then analyzed based on measures such as frequency and type-token ratios.

The mixed methods analysis of formulaic language is superior to a qualitative or quantitative method alone for the purpose of exploring the nature and prevalence of the phenomenon. A bottom-up qualitative analysis of formulaic language functions would lead to a rich description of formulaic language use even if formulas only occurred sparingly in the speech sample. However, it would not accurately portray the prevalence of formulaic language use. Conversely, a top-down quantitative analysis of formula distribution would provide detailed information regarding the prevalence of formulaic language, but would indicate neither of the functions of formulaic language nor of its successful or unsuccessful application in communication.

Thus, combining quantitative and qualitative methods at the level of data collection and data analysis provides increased confidence in the results through data

triangulation, as well as a more comprehensive examination of formulaic language in the speech of children with ASD. The upcoming section discusses the study design and protocol in greater detail.

4.2. Method

4.2.1. Study design. This study approaches the investigation of formulaic language in the conversational speech of children with ASD from a multiple case study design. In a multiple case study, "a number of cases are studied jointly in order to investigate a phenomenon or general condition" (Stake as cited in Dörnyei, 2007, p. 152). The cases in this study are children with ASD while the phenomenon of interest is formulaic language use. "Although case studies are typically discussed under the label of qualitative research (because a single case cannot be representative of a population), actual case studies often include quantitative data collection instruments as well" (Veschuren as cited in Dörnyei, 2007, p. 152). Duff (2008) points out that mixed methods data analysis is also appropriate in case studies.

Gall, Gall and Borg (2005) provide a list of 11 points for evaluating case studies, which are summarized in the table below. A column has been added to describe the action that was taken in this study in order to meet these goals.

Table 3
Criteria for Evaluating Case Studies

Criterion	Case study tactic	Action taken in this study
Sensitivity to readers' needs	Strong chain of evidence	Detailed description of sources of data, data collection instrument development and data collection procedures (see Sections 4.2.3 to 4.2.7) Questionnaires included (see Appendix D and Appendix E) Sample of completed observations charts (see Figure 2) Coding charts with definitions, examples and

Criterion	Case study tactic	Action taken in this study
		counter-examples (see Appendix G, Appendix H, and Appendix I) Representative samples of coding (see Figure 7, Figure 8, Figure 9, and Figure 10)
	Truthfulness	Chapter 5 Participant Profiles and Chapter 6 Findings and Discussion draw on examples from the transcripts and on comments from the parents
	Usefulness	Addresses a gap in the research body (see Section 1.4) Allows the parents of the participants and the SLP who collaborated with the researcher to better understand the participants' language use Provides a starting point for future research in this field
Use of sound research methods	Triangulation	Use of quantitative and qualitative data collection methods to corroborate formulaic language identification and findings on participants' language abilities (see Section 4.1.1)
	Coding checks	Quantitative segments were coded collaboratively by the researcher and a trained native speaker; a second native speaker coded the segments in their entirety and negotiated the identification and categorization with the researcher until full agreement was reached (see Section 4.2.9.6) Wray & Namba's (2003) criteria for identifying formulaic sequences was applied to formulas in qualitative analysis by the researcher and corroborated by the SLP (see Section 4.2.10.2)
	Disconfirming case analysis	Participants with a range of language abilities were included in the study (see Chapter 5)
	Member checking	Parents and the SLP were given the opportunity to review participant profiles (see Section 4.2.7.1) The SLP was consulted regarding all three findings components (see Sections 4.2.8 to 4.2.10)
Thoroughness of data collection and analysis	Contextual completeness	Participant profiles (see Chapter 5) Analysis of contextual factors (see Section 6.1)
	Long-term observation	Parents acted as informants to provide the researcher with access to longitudinal

Criterion	Case study tactic	Action taken in this study
		information (see Section 4.2.4.1) Child Participant Profile Questionnaire includes items that refer to past history (see Appendix D)
	Representativeness check	Parent comments regarding their child's typical behaviour Familiar setting for participants (see Section 4.2.5.1.1)
	Researcher's self-reflection	Self-reflection in Preface (see page xv)

Note. Adapted from *Applying Educational Research: A Practical Guide* by Gall et al., 2005, pp. 319-323. Copyright 2005 by Pearson Education.

Thus, action was taken to ensure that all 11 criteria were addressed in the research design.

4.2.2. Participants. A total of five participants took part in the recording sessions. However, this study only reports on the findings pertaining to four of the participants; the fifth participant's questionnaires were not completed and so the sources of data were deemed insufficient to proceed with analysis. Nonetheless, the final number of participants remains within an acceptable range for this study design; Duff (as cited in Dörnyei, 2007) indicates that multiple case studies with four to six participants allow for attrition resulting in three to four cases being included in analysis. The remainder of the paper refers exclusively to the four participants whose data was included in the analysis.

All participants were male, ages 9 to 11, and had been diagnosed with an autism spectrum disorder by a professional. As all were diagnosed under DSM-IV-TR (APA, 2000), the labels of their individual diagnoses may have varied. However, DSM-5 (APA, 2013) indicates that "individuals with a well-established DSM-IV diagnosis of autistic disorders, Asperger's disorder, or pervasive developmental disorder not otherwise specified should be given the diagnosis of autism spectrum disorder" (p. 51). Therefore, in this study, all participants are considered to have a diagnosis of ASD. The table below

summarizes the participants' key demographic information. Throughout this paper, the following convention is used when referring to age: year;month (i.e., 1 year and five months would be written as 1;5) (e.g., Sterponi & Shankey, 2014). Furthermore, pseudonyms have been assigned to child participants, their family members, friends, and speech-language pathologist (SLP). The participants' medical history, school and family life, and language use is discussed in further detail in Chapter 5.

Table 4
Summary of Demographic Information for Participants

Pseudonym	Sex	Age at time of recording	Age at ASD diagnosis
Joey	Male	10;3	2;6
Luke	Male	9;9	1;10
Sean	Male	11;0	3;3
Louis	Male	9;5	2;4

Participants were selected using criterion sampling (Dörnyei, 2007). The key characteristics of interest were age and ASD diagnosis. Additionally, all participants were currently or had previously been clients of the SLP who collaborated with the researcher throughout the entire research project. Not only did this create a point of contact between potential participants and the researcher, but also it ensured that participants would be comfortable interacting with the SLP during the play session. No restrictions were made based on sex, but given that ASD affects three to four times more males than females (CDC as cited in Kim & Lord, 2013), it was expected that there would be more male participants.

Parents of eligible participants received a letter of introduction from the SLP on behalf of the researcher. The letter explained the nature of the collaboration between the SLP and the researcher. It emphasized that the study was entirely optional and that

participation or non-participation would in no way impact their child's treatment. On the researcher's instructions, the SLP invited participants with a range of language abilities, thus introducing maximum variation sampling to the multiple case study design (Dörnyei, 2007). Parents wanting to take part in the study with their children were asked to contact the researcher by email or telephone to express their interest in participating. The SLP did not give the researcher her clients' names or their parents' contact information, in accordance with the code of ethics of her profession. As five parents expressed interest during the first round of recruitment, no further action was taken. Once parents had confirmed their intent to participate, recording sessions were scheduled based on mutual availability of the child participants and their parents, the SLP, and the researcher.

4.2.3. Sources of data.

4.2.3.1. Audio-video recording. For each participant, a one-hour play session with his current or former SLP was audio-video recorded. The SLP, rather than a parent, was selected as an interlocutor to minimize variations in interpersonal factors across participants. The researcher did not participate as an interlocutor during the play session because previous research has shown that the rate of echolalia tends to increase in interactions with unfamiliar interlocutors (Charlop, 1986).

The audio-video recording device was a Samsung HMX-W3000 Pocket Camcorder. The video settings were: 1080/30 Full HD, 1920x1080 pixels, 25 frames per second, H.264/MEPG-4 AAC compression. The back-up audio recording device was a Zoom H1 Handy Portable Digital Recorder. The audio recording settings were: WAV at 96Hz at 16Bit. The audio recording device was mounted on a SLIK F143 Lightweight Aluminium Tripod.

The video recording equipment automatically breaks up recordings longer than 20 minutes into 16-minute segments. At each break in the video, approximately 30 seconds of recording is lost. This problem was not discovered until transcription was underway. With regards to transcription, this was not problematic as the back-up audio recording was used to fill in the blanks.

4.2.3.2. Researcher observations. Throughout the play session, the researcher monitored the interaction through a one-way mirror and wrote down her observations. These observations included information obtained in conversation with the participants' parents, who also observed the play session.

4.2.4. Instruments.

4.2.4.1. Parent Observation Chart. Parents of participants were given several copies of the Parent Observation Chart to fill out based on the interaction between their child and the SLP. The chart included a time stamp, the type of repetition observed, and keywords for the researcher to be able to identify the relevant topic or sentence. On some occasions, parents wrote out the entire sentence rather than keywords. Figure 2 (see page 84) is an example of a completed Parent Observation Chart in which both sentence-level and topic-level repetitions were noted.

The purpose of this instrument was to corroborate the identification of formulaic sequences. As no longitudinal audio-video data was collected, parent knowledge was used to overcome the limitations of a single recording session for identifying formulas based on frequency or idiosyncratic formulations.

Time Stamp	Type of Repetition		Keyword(s)
	Sentence	Topic	
10:25		X	Murray ppl (Wiggles)
10:30	X		I want the (blank) pls
10:31	X		No thanks
10:31		X	Hi there Daisy/Goofy → Mickey Mouse
10:32		X	signs (street signs)

Murray
Jeff
Anthony
Greg
Sam
Math Club

Figure 2. Sample Parent Observation Chart. This figure illustrates a portion of Louis's completed Parent Observation Chart.

4.2.4.2. Child Participant Profile Questionnaire. The Child Participant Profile Questionnaire (CPPQ) was an 11-page parent report questionnaire, including a detachable sheet with contact information for follow-up questions. It is provided in Appendix D. The CPPQ contained 44 items divided into four sections: demographic information (8 items), medical history (21 items), communicative abilities (4 items), and home and school life (10 items). The purpose of the CPPQ was to obtain information to create a comprehensive participant profile. To this effect, several question types were incorporated, including: multiple choice, Likert scale, short-answer questions, clarification questions, and specific open questions.

The questionnaire was developed in ExamView Test Generator 6.2.2 [software] (eInstruction Corp, 2008). The software, which is typically used to prepare worksheets or quizzes, allowed the researcher to create a question database, layout the questionnaire and reorder questions, and assign descriptive information for each item.

A database of 69 potential questions was created, of which 44 were included in the questionnaire. Three questionnaires were referenced in creating the CPPQ: the *Questionnaire for Children with Autism & Related Developmental and/or Attention*

Problems (Baker, 2002), the *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d.), and the *Autism Questionnaire* (Irlen Institute, 1995).

For each question in the database, a minimum of four descriptors was entered: the questionnaire section, the topic (and subtopic, where appropriate), the source of the question (article, pre-existing questionnaire, etc.), and whether it was developed by the researcher or based on a previously developed questionnaire (modified or duplicated). Along with the CPPQ, Appendix D, provides the descriptors for each item included in the questionnaire. Figure 3 provides an example of descriptive information for one of the items included in the questionnaire.

Difficulty:	
Reference:	Irlen Institute
Learning Objective:	Medical history
National Standard:	
State Standard:	
Local Standard:	
Topic:	Communication
Keywords:	Speech
Miscellaneous:	Modified
Notes:	Added "Augmentative and Augmentative Communication Device" as per SLP

Figure 3. Descriptors for Questionnaire Item 31. The figure illustrates the codes assigned to the Item 31 of the questionnaire as well as additional notes pertaining to the development of the item.

From the information in Figure 3, it can be determined that the question was included in the section on medical history, and that the topic and subtopic of the question were communication and speech, respectively. Additionally, Figure 3 indicates that the item was a modified question based on the *Autism Questionnaire* (Irlen Institute, 1995).

The questionnaire was revised on three occasions in accordance with the SLP's recommendations. The fourth version was piloted by one reader, who was asked to

complete the questionnaire, take note of the total duration, and indicate whether any questions were repetitive, hard to understand, or confusing. The final version was based on the reader's comments.

4.2.4.3. Cambridge University Behaviour and Personality Questionnaire for Children (Auyeung et al., 2007a). The *Cambridge University Behaviour and Personality Questionnaire for Children* (Auyeung et al., 2007a), hereby referred to as AQ-Child, is a 50-item parent-report questionnaire that "aims to quantify autistic traits in children 4-11 years old" (Auyeung, Baron-Cohen, Wheelwright, Allison, 2007b, p. 1230). The questionnaire consists of five sets of ten "descriptive statements designed to assess five areas associated with autism and the broader phenotype: social skills, attention switching, attention to detail, communication and imagination" (Auyeung et al., 2007b, p. 1231). The questions are not grouped together by topic. Each item is scored on a 4-point Likert scale; the range of scores is from 0-150, with higher scores indicating more "autistic-like behaviour" (Auyeung et al., 2007b, p. 1231). The questionnaire and the scoring guide are freely available online for research purposes. The questionnaire items and the scoring guide are included in Appendix E. The questionnaire was not piloted for this study as it had been validated in previous research (Auyeung et al., 2007b).

This questionnaire was included to obtain additional information about the autistic phenotype of each participant. Because the participants were diagnosed under DSM-IV-TR (APA, 2000), there were no descriptors in their diagnosis that could be used to specify their autistic phenotype as per DSM-5 (APA, 2013). Additionally, as the AQ-Child (Auyeung et al., 2007a) has been previously validated and is freely available, it

provides a reliable means of comparing the characteristics of participants in this study with those of participants in future research projects.

4.2.5. Procedures.

4.2.5.1. Audio-video recording.

4.2.5.1.1. Research site. The recording sessions took place at the SLP's workplace, where child participants currently or had previously attended speech-language therapy. In addition to being familiar to the participants, the research site was equipped with a number of toys for the play session. Both factors played a role in determining the research site as the goal of the recording was to obtain naturalistic data of children playing in a familiar environment.

Figure 4 (see page 88) illustrates the setup of the office for the recording sessions. Note that the illustration is not drawn to scale.

The office consisted of two rooms. The first room, or the office proper, was set up for the researcher and the participant's parent. Two chairs were placed facing the one-way mirror, which is represented by the arrows over the window in Figure 4. The lights in the room were turned off so that the researcher and the parents could see inside the playroom. The door to the hallway was closed. The door separating the playroom from the office was wedged open so that the parents and the researcher could hear the conversations between the child participants and the SLP.

The playroom was set up with a small table and two stools and preselected toys on the table or on the floor space. The toys had been picked out by the SLP based on each child's preferences. Though the preselected toys varied across participants, they all had access to the same toys with the exception of Joey, for whom a computer, a tablet, and an

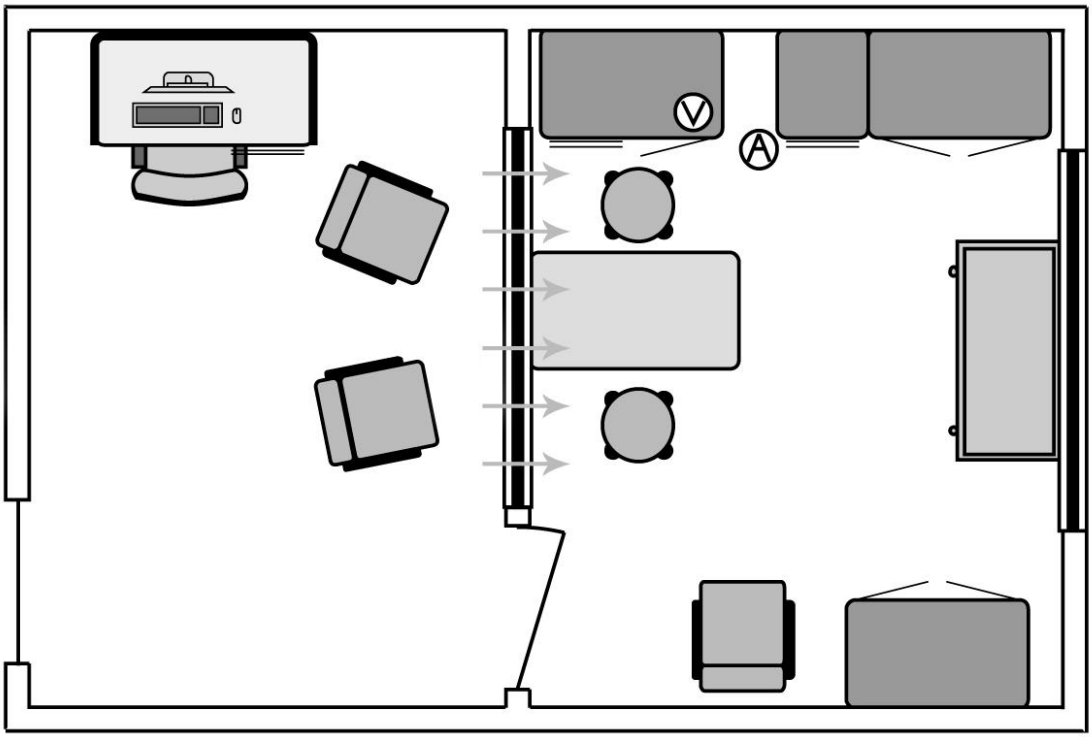


Figure 4. Layout of Research Site. The figure illustrates the setup of the main office and playroom, as well as the position of the audio and video recording devices. Created with Lucidchart (http://www.lucidchart.com).

mp3 player were brought into the room. This exception was made because both his mother and the SLP indicated to the researcher that Joey did not play with toys, nor had he throughout his childhood. A smartphone was also brought into the room for Sean so that he could show pictures to the SLP. A complete list of the toys the participants chose and the games they played is included in Appendix C. The video camera, which is indicated by a V in a circle in Figure 4, was placed on a shelf and aimed at the table and floor space. The video camera was placed on a small, six-inch tripod. Less than one minute into Luke's recording session, the tripod was knocked over and repositioned. However, the camera was placed facing the wall and so no viable video data was obtained for his session. The back-up audio recorder, which is indicated by an A in a circle in Figure 4, was placed on a large tripod next to the video camera. From the inside

of the playroom, participants could not see through the one-way mirror if the lights in the office were turned off. However, as the door between the office and the playroom was not fully closed, it was possible for the participants to hear noise from the office.

4.2.5.1.2. Recording protocol. The SLP and researcher jointly determined that it would be easiest to have the video camera and audio recorder turned on prior to the arrival of the participants. Thus, the recording sessions began the moment that both the SLP and the child participant entered the playroom. This minimized both the time demands for participants and the researcher's interruptions of the play session. The SLP was instructed to play with the participants and to try to engage them as much as possible in conversation. No limitations were placed on the topic of discussion, the type of play, or any other aspect of the interaction. With the exception of Sean, the play sessions ended after approximately one hour of recording. A joint decision between the parent and the researcher was made to end Sean's session five minutes early, as he was visibly tired from the play session. The play session ended when the researcher entered the playroom and indicated to the SLP that the recording session was over. The recording equipment was subsequently turned off.

Some parents also brought the child participant's sibling to the recording session. In this case, siblings remained with the parents in the office and were given toys to play with on their own.

4.2.5.2. Parent observations. During the play session, parents sat with the researcher in the observation room. They were asked to take note of any utterances or topics that came up in the interaction between the SLP and their child that also recurred frequently in their child's speech. Some parents additionally made note of expressions or

usage that were unusual. One parent chose not to write down these observations but to indicate them to the researcher instead. Consequently, that parent's observations were included in the researcher's notes instead of on a Parent Observation Chart.

4.2.5.3. Researcher observations. Throughout the play session, the researcher took general notes regarding the toys being used, interesting language use, and overall impressions. In addition, the researcher and the parent interacted throughout the play session. Notes from these conversations were included on the researcher's observation sheets. This allowed the researcher to ask questions as they arose and to get a better idea of the participants' language abilities and day-to-day life.

4.2.5.4. Questionnaires. Parents were given the two questionnaires in a prepaid, preaddressed Expresspost envelope. The researcher discussed the purpose and the layout of the questionnaires with the parents beforehand and indicated that the parents were welcome to contact the researcher if they had any questions or concerns. Parents brought the questionnaires home and filled them out in a single or multiple sessions. The questionnaires were returned to the researcher in the envelope provided so that both the researcher and the parents could track the location of the envelope throughout the mailing process. When the questionnaires were received, confirmation emails were sent to the parents.

4.2.6. Data preparation.

4.2.6.1. Observations. Parent and researcher observations for each participant were combined in a single Microsoft Excel 2008 for Mac version 12.3.6 [Software] document to facilitate cross-referencing. The source of the observation was indicated.

The spreadsheet also included a time-stamp column and a description of the ongoing activity.

4.2.6.2. Transcription. All four audio-video recordings were transcribed in their entirety using Express Scribe Version 5.50 [Software] (NCH Software, n. d.), software that allows the listener to slow down, pause, rewind, and fast-forward audio files using hotkeys on a keyboard without exiting the word processing application. The transcription was typed in Microsoft Excel 2008 for Mac version 12.3.6 [Software].

The preliminary transcription was undertaken for the purpose of comparing participant and SLP word counts, coding contextual factors, and having access to frequency data for formulaic sequences. Preliminary transcription was done at a high level of granularity. A sample taken from Joey's transcript is provided in Figure 5.

SLP	@@ It started again. Wait you can't see it.
Joey	Oh. Do you know what that is?
SLP	That there? It's for - information- that thing? Um
Joey	######

Figure 5. Preliminary Transcript Sample. This figure illustrates a number of the key features of the preliminary transcription.

As illustrated above, drawn out syllables, pauses, and intonation contours were not marked. Punctuation was based on written sentence structure and the intonation of the delivery. Words were transcribed according to conventional spelling, with the exception of reduced forms such as *wanna* (*want to*), *gotta* (*got to*), *hafta* (*have to*), and *cos* (*because*) (Carter and McCarthy, 2006). Pause fillers were transcribed (see Level 2: Basic, Du Bois, 2006). Sentence fragments and incomplete words were indicated with a dash (Sirota, 2004). Animal sounds were placed in double brackets unless the speaker was referring to the sound in a verb form, such as *the cow moos*; humming and singing

were considered metatranscription commentary and were also placed in brackets (see Level 2: Basic, Du Bois, 2006). Laughter was indicated with the symbol @ (see Level 4: Interaction, DuBois, 2006) and incomprehensible words with the symbol # for every syllable (see Level 2: Basic, Du Bois, 2006). No indications of overlap were included in the transcript (see Level 1: Preliminary, Du Bois, 2006).

For the purpose of analyzing formulaic sequences, a more fine-grained approach to transcription was selected. The complete list of conventions adopted is listed in Appendix F; some are described below. Only the segments that were randomly selected for the quantitative analysis were transcribed using fine-grained transcription conventions. The detailed information provided by the transcription conventions, such as the use of the voice of another or the length of pauses, can facilitate the identification of formulaic sequences. Furthermore, these conventions better represent the participants' speech and the temporal nature of the interaction between the interlocutors, thus increasing the truthfulness of representation.

According to the fine-grained transcription conventions adopted in this study, pauses longer than 0.2 seconds were marked in the transcript and all pauses were rounded to the nearest tenth of a second (Sirota, 2004). Waveforms were used to identify and measure the duration of pauses in Audacity version 2.0.3. [Software] (Audacity Team, 2013) using visual and auditory information. However, only pauses of 0.3 seconds or longer were considered relevant in analyzing formulaic sequences; "anything less that 0.3 is easily confused in a spectrogram with other speech phenomena such as the stop phase of a plosive sound" (Wood, 2010, p. 107). Figure 6 provides an example of the

application of these transcription conventions taken from Luke's quantitative analysis segment.

SLP	[I:-]
Luke	[$_2$A tri]cycle, (0.3) the jungle, (0.8) or, (0.3) a bathtub? (0.5)
SLP	Hm I think he lives in a bathtub. (0.4)
Luke	NO:: >no no no no it's,< (0.2) IN THE JUNGLE! =
SLP	=O::[:h!]

Figure 6. Sample Fine-Grained Transcription. This figure illustrates a range of prosodic and temporal features included in the fine-grained transcript.

Figure 6 illustrates a number of the prosodic features that were included in the transcript. Square brackets, [ ] and [$_2$], indicate a set of overlapping segments (Du Bois, 2006) while the equal sign, =, indicates that there was no break between the two speakers (Sirota, 2004). Words written in capital letters are noticeably louder than the surrounding speech (Sirota, 2004). Words on the inside of greater than and less than signs (i.e., > words <) are uttered at a faster rate than the surrounding speech (Sirota, 2004). Lengthened syllables are indicated with colons, the number of which is proportional to the length of the syllable (Sirota, 2004). Underlined words or syllables indicate emphasis (Sirota, 2004). Additionally, the different punctuation markers correspond to the intonation contour of the segment (Sirota 2004).

4.2.6.3. Word count. The text in the preliminary transcript was further treated for word count calculations in Microsoft Excel 2008 for Mac version 12.3.6 [Software]. All special symbols and words inside parentheses were removed. A speaker turn was considered an uninterrupted run of speech, regardless of the length of pauses within that turn (see Level 1: Basic, Du Bois, 2006).

4.2.6.4. Questionnaires. No action was taken to prepare the questionnaires for analysis. Although items in the AQ-Child (Auyeung et al., 2007a) included both

regularly-scored (e.g., “S/he doesn’t know how to keep a conversation going with her/his peers,” scored from 3 to 0) and reversed-scored items (e.g., “S/he is good at social chit chat,” scored from 0 to 3), no adjustments were made for reverse-scored items. The scoring guide applied to the questions in their presented format.

4.2.7. Data analysis.

4.2.7.1. Participant profile. The participant profiles were created through analysis of the questionnaires and transcripts, and supplemented by the data on the observation sheets. Parents of participants and the SLP were given the opportunity to review the profiles.

4.2.7.2. AQ-Child (Auyeung et al., 2007a). The items in the AQ-Child (Auyeung, et al., 2007a) were scored as per the scoring chart. Missing values were subtracted from the total score, such that a child’s maximum tally could be less than 150. Decreased total scores and the subscales affected were indicated in the profiles. For the purpose of comparing participant totals, raw scores were converted to percentages.

4.2.7.3. Word count. Word count was calculated using Microsoft Excel 2008 for Mac version 12.3.6 [Software]. The formula =IF(LEN(TRIM(A1))=0,0,LEN(TRIM(A1))-LEN(SUBSTITUTE(A1," ",""))+1) was used, wherein A1 was replaced by the cell to be counted. Using this formula, contractions and interrupted words were counted as single words. Word counts were used to compare the distribution of speech amongst the interlocutors. Each speaker’s sum of words, as well as the overall sum including the interlocutor’s speech and interruptions by parents and the researcher, was tallied. Participants’ word counts were divided by total word counts to calculate a percentage score for each participant, thus providing an estimate of

their contribution to the interaction. The word count values were also used to calculate the mean, mode, and highest word count for the participants and the SLP. According to the transcription conventions, a turn was defined as an uninterrupted run of speech, wherein the duration of pauses within the turn was irrelevant (see Level 1: Basic, Du Bois, 2006).

4.2.8. Complex adaptive system factors coding. The transcripts and combined observation sheets were coded to identify situational factors that may have influenced participants' language use in order to provide a contextually complete description of formulaic language use. Addressing these factors is important as "in complex non linear systems, the behaviour of the whole emerges out of the interaction of its parts" (Larsen-Freemen as cited in Duff, 2008, p. 32).

A template of factors was created based on existing literature and a preliminary scanning of the data (Dörnyei, 2007). Initially, 4 categories and 11 subcategories were proposed. However, revisions to the coding tree were made throughout the coding process (Dörnyei, 2007) and a total of 4 categories and 8 subcategories emerged in the final coding scheme. Figure 7 (see page 96) demonstrates the relationship between the categories and subcategories of the final coding scheme.

Subcategories from Figure 7 (see page 96) that were proposed based on preexisting literature include: observer's presence (e.g., Hawthorne effect, see Dörnyei, 2007), toys and games (e.g., Charlop, 1986; Southwood & Russell, 2004), interlocutor (e.g., Charlop, 1986), high/low constraint utterances (e.g., Peck, 1985; Rydell & Mirenda, 1991; Rydell & Mirenda, 1994), interaction style (e.g., Rydell, 1989), and age (e.g.,Wray,

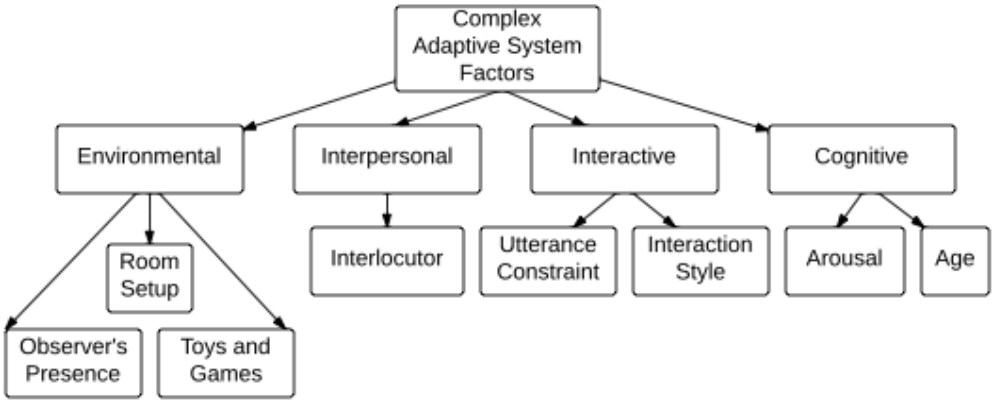


Figure 7. Complex Adaptive System Factors Coding Tree. This figure illustrates the categories and subcategories of codes applied in qualitative coding of transcripts and combined observation sheets. Created with Lucidchart (http://www.lucidchart.com).

2002). Room setup and arousal were considered to be important factors based on observations of the play session.

4.2.8.1. Topic-based coding. With the exception of high/low constraint utterances and interaction style, codes were applied to the full transcripts and combined observation sheets. Codes were topic-based and were assigned to a segment of any size that exemplified the topic. Importantly, not every utterance in the transcript or comment in the observation sheets had to be assigned a code. Additionally, segments could be assigned

Time Stamp	Activity	Parent's Notes	Researcher's Notes
2:03	Sean clarifies the rules of Blockus. SLP and Sean talk while playing.	toys and games	
observers' presence & room setup 3:15	Sean looks out the one-way mirror.	He doesn't like having his mom there watching. He may be "acting" a bit as a consequence.	observers' presence
3:37	Mom interjects to ask if the window is making him nervous. We turn the lights off in the observation room and leave the door propped open.	observers' presence & room setup	Lights were initially turned on while the researcher explained the protocol for observation sheets. room setup

Figure 8. Topic-Based Coding Sample. The figure illustrates topic-based coding of Sean's combined observation sheet.

multiple codes if applicable. Figure 8 (see page 96) provides an example of topic-based coding. It is taken from Sean's combined observation sheet. Because of the low-inference nature of these codes, coding checks were not carried out.

4.2.8.2. High/low constraint utterance coding. Constraint refers to "the degree of obligation placed on a listener by the form of a speaker's utterance" (Prizant & Mirenda, 1991). Thus, a high constraint utterance such as a direct command or an attention device is more restricting than a low constraint utterance such as feedback for verbalizations in terms of the action, linguistic or otherwise, that it demands. Coding of utterance type was based on the categories and definitions in Rydell and Mirenda (1991). A list of codes and definitions is provided in Appendix G.

Three 2-page segments of each participant's transcripts were selected and coded. The segments were selected by identifying three major types of play per participant. Within each episode, the 2-page segment was randomly chosen. Only the SLP's utterances were coded. The sum of low and high constraint utterances was calculated for each segment. The scores of each participant's three segments were combined to compute an overall low to high constraint utterance ratio.

Figure 9 gives an example of a coded segment from Sean's transcript. Figure 9 includes examples of both high and low constraint utterances. Feedback for verbalizations and verbal reflective questions are examples of low constraint utterances while real questions are examples of high constraint utterances. Note that in the below example, the SLP's repetition of Sean's previous utterance was coded as a low constraint verbal reflective question. Peck (1985) considers these types of responses to be high

feedback (Low)

Sean	But the- it's only two games. I mean two- only two people. You can't have four of them on the portal.
SLP	Oh okay. So who plays with you? → real question (high)
Sean	Uh. I can either play with my dad or my brother. My dad normally wants to play with me for some reason my brother does not want to play with a person he wants to have control.
SLP	Okay okay. → feedback (low)
Sean	He likes- he likes the control.
SLP	He likes the control? → verbal reflective question (low)
Sean	Yeah, he does.

Figure 9. High and Low Constraint Utterance Coding Sample. The figure provides an example of high and low constraint utterance codes in Sean's transcript.

constraint forms. Decisions in this project were made on a case-by-case basis. If the participant had mispronounced the utterance or the SLP had rephrased it, it was considered a high constraint repair. On the other hand, as illustrated above, if the question functioned similarly to questions such as *He does?* or *He does, doesn't he?* (Rydell & Mirenda (1991), it was considered a low constraint verbal reflective question. These types of questions repeat or paraphrase the previous utterance and pass the turn back to the hearer (Rydell & Mirenda, 1991). The video recordings were used to facilitate coding.

While no coding checks were carried out, the SLP was consulted to ascertain her agreement with the assessment of her use of high and low constraint utterances.

4.2.8.3. Interaction style coding. Adult styles of interaction can be categorized as directive or facilitative (Prizant & Rydell, 1993). These two styles differ on several points: "a) adult responsiveness of adherence to the children's social-communicative agenda, b) demands and obligations placed upon the children to participate in the social-communicative exchange in a particular manner, and c) the degree of opportunity for child initiation and social control of the interaction" (Prizant & Rydell, 1993, p. 275). While a directive style allows the adult to control the agenda and the interaction, a facilitative style allows the child to do so. Based on the characteristics summarized above

and those listed in Prizant and Rydell (1993, p. 276, Table 4), the following variables were coded in the transcript: high/low responsiveness, high/low demand, child/adult initiation, child/adult control. Definitions are provided in Appendix H.

Two 2-page segments representing different types of play were randomly selected from each participant's transcript and coded according to the previous variables. Codes were applied to speaker turns, wherein a turn was defined as an uninterrupted run of speech (see Level 1: Basic, Du Bois, 2006). If a turn placed both high and low demands on the participant (i.e., used high and low constraint utterances), the segment was coded according to the variable that was most frequent in that given turn. In the event that there were an equal number of high and low constraint utterances in a turn, the segment was coded as high demand. The SLP's utterances were coded for all four factors. Additionally, the participants' utterances were coded for initiation and control. In combination, the codes were used to support an overall impression of the SLP's predominant interaction style with each participant.

An example of interaction style coding from Louis's transcript is provided in Figure 10.

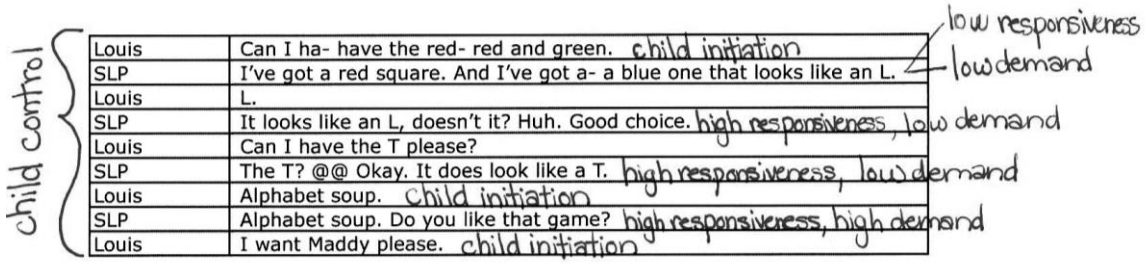


Figure 10. Interaction Style Coding Sample. The figure illustrates a segment of Louis's transcript that was coded in terms of interaction styles.

The figure above illustrates a segment of Louis's transcript that was analyzed in terms of interaction styles. In this segment, Louis is in control of the interaction. Overall,

the SLP's turns are highly responsive as she responds to his requests and elaborates on his comments. Her first turn is an exception in that she does not directly respond to Louis's request. For the most part, her utterances place low demands on interaction, though her final turn provides an example of a high demand yes-no question that would be considered a high constraint utterance. As Louis redirects the topic instead of answering her question, he remains in control of the interaction. Overall, the SLP's interaction style in this segment is best described as facilitative.

The SLP was consulted to corroborate the findings regarding her overall interaction style.

4.2.9. Formulaic language: Distribution. The first analysis of formulaic language was carried out for the purpose of determining whether or not all participants were using formulas in their speech. If they did use formulas, the secondary goal was to examine whether the formulaic language they used solely consisted of unconventional formulas, or speech that would be characterized as "disordered". For each participant, a segment of approximately 250 words was randomly selected and transcribed according to the fine-grained conventions described previously (see Appendix F). The segments were randomly selected to avoid intentional and subconscious selection of excerpts that appeared a priori to have quantities of formulaic sequences that would confirm the researcher's expectations.

Coding was based on twelve types of formulas grouped into four categories. Categories and subcategories were largely based on those in Nattinger and DeCarrico (1992) and Van Lancker Sidtis and Postman (2006). However, a category for unconventional formulas was added to tailor the coding scheme to language use by

persons with ASD. The final categories were decided after piloting them on randomly selected segments of the transcripts to ensure that all suspected formulas could be classified. The formulaic language categories are summarized below, though a full description with examples and counter-examples is provided in Appendix I.

4.2.9.1. Discourse formulas. Discourse formulas include pause fillers and pragmatic markers. They represent a class of formulas used in spoken discourse.

4.2.9.1.1. Pause fillers. These formulas are "vocalizations or words used to fill gaps in conversations" (Carter & McCarthy, 2006 p. 903). They differ from pragmatic markers in that they have no pragmatic function. Examples include: *um*, *er*, and *uh*.

4.2.9.1.2. Pragmatic markers. Pragmatic markers "operate outside of the structural limits of the clause…and encode the speaker's intentions and interpersonal meanings" (Carter & McCarthy, 2006, p. 208). This class of formulas combines Van Lancker Sidtis and Postman's (2006) conversational expressions and discourse particles into a single category. Pragmatic markers are also taken to include items elsewhere classified as discourse particles (Aijmer, 2002), interactional signals and discourse markers (Stenström as cited in Aijmer, 2002), pragmatic expressions (Andersen as cited in Aijmer, 2002), connectives (Anderson as cited in Aijmer, 2002), and discourse markers (Andersen as cited in Aijmer, 2002). Examples include: *first of all*, *and then*, *I mean*, *actually*, *kind of, uh huh*, and *wow*.

4.2.9.2. Non-lexicalized formulas. Non-lexicalized formulas are those that are "chunked sets of lexical items with no particular pragmatic functions" (Nattinger & DeCarrico, 1992, p. 37). They include multi-word verbs, collocations, and idioms.

4.2.9.2.1. Collocations. Collocations are "strings of specific lexical items…that

co-occur with a mutual expectancy greater than chance" (Nattinger & DeCarrico, 1992, p. 36). Examples include: *accidental death* ("Accidental", 2014), *background information* ("Information", 2014), and *pie chart* ("Chart", 2014). Also included in collocations were multiword items from popular culture such as the names of media figures such as Kermit the Frog, movie titles such as *Gone With the Wind*, and television series such as *Sesame Street*.

4.2.9.2.2. Idioms. Idioms are "complex bits of frozen syntax, whose meanings cannot be derived from the meaning of their constituents, that is, whose meanings are more than simply the sum of their individual parts" (Nattinger & DeCarrico, 1992, p. 33). Examples include: *to have to eat your words*, *to have the last laugh*, and *to skate on thin ice*.

4.2.9.2.3. Multi-word verbs. Multi-word verbs, also called phrasal verbs, are a combination of a lexical verb with an adverbial or prepositional particle that "behaves as a single unit of meaning" (Carter & McCarthy, 2006, p. 429). Examples include: *look into* meaning, "to try to find the truth about something" (Courtney, 1983, p. 370), and *farm out* meaning, "to send work for other people to do" (Courtney, 1983, p. 179).

4.2.9.3. Lexicalized formulas. Lexicalized formulas differ from non-lexicalized formulas in that they have pragmatic functions (Nattinger & DeCarrico, 1992). Lexicalized formulas may or may not allow substitution of specific lexical items (Nattinger & DeCarrico, 1992). Lexicalized formulas include conventional expressions, idiosyncratic expressions, and taboo words and expletives.

4.2.9.3.1. Conventional expressions. Conventional expressions are based on the category of the same name in Van Lancker Sidtis and Postman (2006). They "are

collocations…that have been assigned pragmatic function" (Nattinger & DeCarrico, 1992, p. 36). Conventional expressions include Nattinger & DeCarrico's (1992) polywords, institutionalized expressions, and phrasal constraints. Nattinger and DeCarrico (1992) provide the following examples: *a __ ago*, *see you __, at any rate*, and *have a nice day*.

4.2.9.3.2. Idiosyncratic expressions. Nattinger and DeCarrico (1992) consider idiosyncratic expressions to be a subset of conventional expressions. They define them as "idiosyncratic phrases that an individual has found to be an efficient and pleasing way of getting an idea across" (Nattinger & DeCarrico, 1992, p. 52). This grouping is similar to Pawley and Syder's (1983) memorized and lexicalized forms, which distinguishes between formulas that are idiosyncratic and those that are known to a community, or institutionalized. Here they are considered separately from conventional expressions given the tendency for idiosyncratic speech in ASD (see APA, 2013).

4.2.9.3.3. Taboo words and expletives. According to Carter and McCarthy (2006), "most taboo words and phrases in English exist under two main headings of religion and parts of the body and bodily processes, especially those associated with either sexual activity or with using the toilet" (p. 225). Included in this category are softened expletives such as *shoot* and *darn*.

4.2.9.3.4. Sentence builders. Sentence builders differ from conventional expressions and phrasal constraints in particular in that they operate at the sentence level (Nattinger & DeCarrico, 1992). Their content is highly variable (Nattinger & DeCarrico, 1992). Sentence builders "provide the framework for whole sentences…[and] contain slots for parameters or arguments for expression of an entire idea" (Nattinger &

DeCarrico, 1992, p. 43). Nattinger and DeCarrico (1992) list the following as examples: *the __er X, the __er Y* as in, *the sooner all this work is finished, the sooner we will all be able to go home*; *Modal + you + Verb Phrase* as in, *would you help me?*; and *do you know X?*.

Sentence builders also include a category called sentence stems by Van Lancker Sidtis and Postman (2006). They are the "frequently and conventionally utilized initial portions of sentences in a given language…first described as conventionalized formulaic language in normal speakers by Pawley and Syder" (Van Lancker Sidtis & Postman, 2006, p. 412). The underlying structure of sentence stems is "Pronoun + Modal/Auxiliary Verb" (Code, 2005, p. 322). Modals are used to suggest, advise, request, offer, etc. Core modals as well as other verbs with modal uses are accepted. Examples include: *I want* (expresses a request), *I guess* (expresses possibility), and *you can't* (expresses a prohibition).

4.2.9.4. Unconventional formulas. Unconventional formulas are those that appear in disordered language. They include perseveration, immediate echolalia, and delayed echolalia. For a discussion of the rationale for considering these types of speech to be formulaic, see Chapter 2.

4.2.9.4.1. Perseveration. Perseveration is defined as repetition that is "produced in a cyclical, recurring manner…with no evidence of communicative intent or expectation of a response from the partner" (Prizant & Rydell, 1993, p. 264).

4.2.9.4.2. Immediate echolalia. Echolalia "involves exact repetition…or minimal structural change…[and] is produced either following immediately or within two turns of original production" (Prizant & Rydell, 1993, p. 264). It may or may not have a

pragmatic function (Prizant & Rydell, 1993).

4.2.9.4.3. Delayed echolalia. Repetition of speech that involves exact repetition or minimal structural change of a segment of media such as a book, television show, movie, etc. is categorized as delayed echolalia, also known as scripting. Note that delayed repetitions of speech from a non-media source are not considered here. There are no maximum constraints on the time between the original exposure and the production of the script. Scripts may have pragmatic functions.

4.2.9.5. Preliminary coding. The preliminary coding and coding check were based on the method outlined in Van Lancker Sidtis and Postman (2006). Initial identification and classification of formulaic language was done in collaboration with another native speaker. The collaborator was a former teacher with a background in linguistics. Prior to coding the four 250-word excerpts, the collaborator read a series of background articles on formulaic language and discussed the coding scheme with the researcher. The collaborator was provided a detailed coding chart with formal lists as well as in-context examples and counter-examples similar to Appendix I. In addition, the collaborator was given access to both the fine-grained transcripts and the relevant segment of the audio recording. Only formulas that the researcher and the collaborator jointly agreed upon were considered in the subsequent coding check.

The formulas in the preliminary coding were identified using a combination of approaches, similar to those taken in Van Lancker Sidtis and Postman (2006). Certain formulas were identified based on formal criteria (e.g., pause fillers, pragmatic markers, phrasal verbs, idioms, and taboo expressions). Others had to meet temporal, frequency, or syntactic requirements (e.g., sentence stems, perseveration, and immediate echolalia). For

pragmatic markers, idiosyncratic expressions and perseveration, function, or lack thereof in the case of perseveration, was also taken into account. *And*, for example, was coded as a pragmatic marker when it functioned as a means of organizing the discourse. On the other hand, it was considered a pause filler when it had no apparent function other than to fill a void. Native speaker intuition was used to identify collocations, conventional expressions, sentence builders, and delayed echolalia.

For all types of sequences, identification was also supported by prosodic information from the audio, behavioural data from the video, parent observations, and frequency within each participant's complete transcript. Prosodic information and the parents' observations proved to be especially helpful in identifying delayed echolalia and idiosyncratic expressions.

4.2.9.6. Coding check. Following the preliminary coding, another native speaker was given a copy of the fine-grained transcripts and the detailed coding chart. The native speaker did not read any background articles nor did she have access to prosodic information beyond that which was encoded in the transcript. The native speaker and the researcher discussed the coding chart and then the native speaker coded all four 250-word transcript excerpts. Afterwards, the researcher and the native speaker compared their coded transcripts. Disagreements were resolved by discussing discrepancies and verifying formulas using a number of external sources. The researcher and native speaker came to a complete agreement on all formulas identified.

Formulas that were identified based on their form were confirmed using lists (e.g., pause fillers and pragmatic markers), dictionaries (e.g., phrasal verbs, idioms, and taboo expressions), and strict exclusive criteria for identification (e.g., sentence stems,

perseveration, and immediate echolalia). Intuitions about collocations and sentence builders were confirmed using collocation dictionaries and frequency and mutual information scores from *The Corpus of Contemporary American English* (Davies, 2008-). Suspected instances of delayed echolalia were verified using the parent's notes, *YouTube* videos, and online transcripts of movies and television series. The parent's notes were also used to confirm the identification of idiosyncratic expressions.

The coded transcripts and the final list of formulas that arose from these efforts are included in Appendix J. They were reviewed by the SLP.

4.2.9.7. Distribution by word counts. Word counts for three types of speech were calculated: novel, conventional formulas, and unconventional formulas. Unconventional formulas included perseveration, and immediate and delayed echolalia; conventional formulas included all other types of formulas identified. For formulas with fillable slots, such as *I want X*, the words in the slots were counted as novel words unless they themselves were a separate formula. For example, *I want cheese* would be counted as two formulaic words and one novel word. Conversely, *I want Kermit the Frog* would be counted as five formulaic words and no novel words.

The word count for each speech type was divided by the total word count to determine the percent distribution of speech types for each speaker. The number of words in unconventional formulas was also considered with respect to the number of words in all other types of speech (i.e., novel utterances and conventional formulas) grouped together. The purpose of this second measure was to compare the prevalence of unconventional verbal behaviour with respect to all other types of speech across expressive language abilities.

4.2.9.7.1. Expressive language abilities. Two measures were used to triangulate the ranking of the participants by expressive language abilities. First, items 31 and 34 in the Child Participant Profile Questionnaire were used to rank children based on their parents' reports. The first item pertains to sentence structure (one-word, simple, compound, and complex) with increasing complexity indicating increased expressive ability. Item 34 asked parents to report the frequency with which their children had poor expressive language on a four-point Likert scale ranging from *never* to *always*.

Then, the SLP was consulted and asked to rank the participants according to their expressive language abilities based on her professional experience working with the four participants and her assessment of their language use in the recording session.

4.2.9.8. Distribution by conventionality and function. Given the small sample size and the lack of exemplars in certain categories, the categories of formulaic expressions were combined for the purpose of comparing the prevalence of expressions. The function and conventionality combinations are described in Table 5.

Table 5
Groupings of Formulaic Language Categories by Function and Conventionality

	Conventional	**Unconventional**
Pragmatic Function	Conventional expressions, expletives, idiosyncratic expressions, pragmatic markers, and sentence builders	Delayed and immediate echolalia
Other/No Function	Collocations, idioms, multi-word verbs, and pause fillers	Delayed echolalia, immediate echolalia, and perseveration

Perseveration by definition has no communicative function, while delayed and immediate echolalia functions vary from one instance to the other. Thus, instances of immediate echolalia and scripting were coded on a case-by-case basis while for the

remaining formulas, membership in a given category implied pragmatic function or lack thereof based on the definition of the category itself.

For each participant, the total number of formulas in each category was calculated based on tokens, the total number of times the exemplars appear.

The ratio of tokens for formulas with a pragmatic function to formulas with another or no function was calculated for each participant.

4.2.9.9. Variability of formulas. For each participant, the total number of formula types, or different exemplars, and tokens, or total number of times the exemplars appear, were calculated. The total number of formula types and tokens excluding unconventional verbal behaviour was also calculated.

For each participant, the number of formula types was divided by the number of formula tokens to provide a type-token ratio for overall formulas and for formulas excluding unconventional verbal behaviour. Type-token ratios were calculated to provide a measure of formula variability, where a score close to one indicated high variability and a score close to zero indicated low variability.

4.2.10. Formulaic language: Nature. The second analysis of formulaic language was carried out in order to examine whether participants used formulas with forms and functions comparable to those of the communal language. In the case that they differed, a secondary goal was to understand in which respect – form, function, or both.

Four possible combinations were considered: idiosyncratic form with no function, idiosyncratic form with a function, conventional form with an idiosyncratic function, and conventional form with a conventional function. Of these, only the last three were included in the analysis. Idiosyncratic form refers to a wordstring that would not be

recognized as formulaic by a naïve native speaker, where a naïve native speaker refers to someone unfamiliar with an individual's idiolect. For example, the naïve native speaker would not be able to correctly fill in a blank in an idiosyncratic formula, as per Van Lancker-Sidtis and Rallon's (2004) protocol for confirming the formulaicity of sequences. Additionally, formulas with an idiosyncratic form would not meet the criteria of institutionalization or frequency with respect to the communal language. In a corpus such as *The Corpus of Contemporary American English* (Davies, 2008-), for example, the wordstring would not reach the minimum benchmarks of 10 to 40 occurrences per million words used in frequency-based studies of formulaic language (Simpson-Vlach & Ellis, 2010). Conversely, formulas with a conventional form would be familiar to a naïve native speaker from the participant's speech community. That is, speakers unfamiliar with an individual's idiolect would nonetheless be able to fill in the blank of a conventional formula, thus confirming its formulaicity according to Van Lancker-Sidtis and Rallon's (2004) protocol. Formulas with a conventional form may further be subdivided according to the conventionality of their functions; they may be conventional or idiosyncratic. A conventional formula with a conventional function is one that a naïve native speaker would recognize and use in a comparable context. Coding of sequences according to these categories involved identifying formulaic wordstrings and then determining the function of the sequence. The steps followed are described below.

4.2.10.1. Form. The preliminary transcripts and videos were scanned for the purpose of selecting sequences of interest. Salient utterances included those that were notable for: their lack of coordination between the interlocutors, their successful communication, their repetition of a previous utterance, their familiarity to the researcher,

their frequency in the transcript or their distinctive prosodic quality. The purpose of this delimitation was to increase the possibility of finding segments of speech containing formulaic sequences. In total, 171 segments were selected. The segments were then compared with the categories established for the quantitative analysis. Unclear and duplicate examples were eliminated, as the purpose was not to determine the total count of sequences but to provide illustrative examples of conventional and idiosyncratic sequences being used for various purposes.

The remaining 161 sequences were then sorted into conventional and idiosyncratic form. Those coded as having an idiosyncratic form included immediate and delayed echoes, and idiosyncratic expressions. A total of 111 conventional and 50 idiosyncratic forms were identified. None were eliminated.

4.2.10.2. Function. The sequences from the previous step were then coded according to function. Within the category of conventional forms, the sequences were grouped according to conventional or idiosyncratic functions in the context of the surrounding utterances. A sequence with a conventional function was used in the same context and for the same purpose as a naïve native speaker. A conventional form with an idiosyncratic function was used in a different context or for a different purpose than a naïve native speaker. Idiosyncratic wordstrings were coded as either having a function or having no function – by definition all unconventional forms that have communicative functions have idiosyncratic functions, as the form-function pairing only occurs in the speaker's idiolect, not in the communal language. Coding was facilitated by watching the videos and examining the accompanying behaviour of the SLP and the participant.

Additionally, parents' observations were referenced. Table 6 summarizes the total counts for each possible form-function combination.

Table 6
Total Number of Formulaic Sequences by Form-Function Pairings

Conventional Form			**Idiosyncratic Form**		
Conventional Function	Idiosyncratic Function	Eliminated	Function	No Function	Eliminated
91	20	0	30	19	1

Within the subgroups established by the function coding, a more in-depth analysis was conducted to examine the specific functions of each formula, such as requesting, ordering, organizing discourse, buying time etc. Initial categorization was based on the list of functions outlined in Wray and Perkins (2000) and Nattinger and DeCarrico (1992). However, the list was adapted as necessary. Furthermore, multiple functions could apply to a single formula. From these groups of formulas, nine formulas from each participant were selected with the goal of representing a range of functional uses of conventional and idiosyncratic formulas.

Given the lengthy identification and elimination process for the sequences selected for qualitative analysis, a coding check was not performed. However, all of the 36 sequences included in the qualitative analysis were rated with respect to Wray and Namba's (2003) criteria for identifying formulaic sequences using native speaker intuition (see Appendix B). They propose 11 criteria that are associated with formulaic language and that allow the researcher to determine which indicators of formulaicity apply to a given sequence. The ratings for the 36 sequences are included in Appendix L. The 36 sequences and their ratings were corroborated by the SLP.

4.3. Summary

This study combined quantitative and qualitative data collection and analysis methods for the purpose of triangulating findings and providing a richer description of the prevalence and nature of formulaic language use. The study design adopted was a multiple case study, which allowed the researcher to examine the situated nature of the phenomenon. A number of analyses were conducted on the data collected for the purpose of providing substantial background information on the participants and the context of language use. Then, a quantitative and a qualitative analysis of formulaic language were conducted. The quantitative analysis examined the distribution of five categories of formulaic language: discourse formulas, non-lexicalized formulas, lexicalized formulas, sentence builders, and unconventional formulas. Conversely, the qualitative analysis was concerned with the characteristics of form-function pairings of the formulas used by the participants such that three combinations were examined: idiosyncratic form with a function, conventional form with an idiosyncratic function, and conventional form with a conventional function. While the first two combinations are best described as idiosyncratic uses of language, the last is an example of alignment between the participants' idiolects and the communal language.

The following two chapters summarize and discuss the findings of this study. The participant profiles in Chapter 5 are followed by the findings and a discussion of contextual factors, the prevalence of formulaic language, and the nature of formulaic language use in Chapter 6.

5. Participant Profiles

This chapter provides background information for each of the participants as well as a brief description of their recording session. The toys and games mentioned throughout this chapter, as well as popular culture references, are listed in Appendix C.

5.1. Joey

Joey was aged 10;3 at the time of the recording. He was diagnosed with ASD at 2;6. However, his parents noticed various symptoms that emerged gradually when he was 2 years old. These symptoms included language delay and strange vocalizations such as screeching, as well as intense fears and obsessive interests. His gross motor skills development, on the other hand, was typical. Joey spoke his first words at 2;6 and his first phrases 10 months later. He began speaking clearly at 6;0. He has also been diagnosed with intellectual impairment, attention deficit hyperactivity disorder (ADHD), anxiety, and synaesthesia. Joey is fascinated by sounds, spinning, and moving stimuli. However, certain sounds and odours are occasionally painful or bothersome.

Joey's past therapies include: applied behavioural analysis (ABA) therapy, speech therapy from 3;6 to 5;6, occupational therapy from 6;0 to 10;0, and medication for attention from 6;6 to 7;0. His ongoing therapies include: sensory diet from 4;0 and therapy riding from 7;6.

On the AQ-Child (Auyeung et al., 2007a), Joey scored 101 overall out of 144; two of the questions, pertaining to the communication and imagination subscales, were unanswered. On the subscales, his scores were divided as follows: 19 on social skills, 23 on attention switching, 15 in attention to detail, 24 on communication, and 20 on imagination. Scores for communication and imagination were out of 27 instead of 30.

According to the parent reports on DSM-5 (APA, 2013) descriptors, his restricted and repetitive behaviours and his social communication present a level one severity "requiring support" (APA, 2013, p. 52). Definitions for severity level descriptors are provided in Appendix A.

Joey has problems with both receptive and expressive language. Nonetheless, he has good articulation and generally uses complex sentences, though he occasionally points to objects instead of naming them. During the recorded play session, Joey frequently answered the SLP's questions with another question, making it difficult to triangulate his level of comprehension based on the transcript. The following is an example of Joey's use of questions as responses.

(1) The SLP and Joey are discussing his plans for the evening.

Joey	Know what I'm gonna watch tonight?
SLP	What are you gonna watch tonight?
Joey	What?
SLP	A movie?
Joey	Which movie?
SLP	I don't know. Which one- what movies do you like to watch?
Joey	Um. Let me see. What do you think they have in- down here? Um.

In Example (1), Joey initially introduces a topic using a question, and then uses another question at the end to redirect the conversation to another topic of his choice. As illustrated above, the success of this strategy depends on the questions formulated. While his mother indicated that he rarely asks questions, for the past year Joey has been very interested in three scenes from the film *Live and Let Die* and asks the same set of questions every time he watches them. Many of the questions in the transcript were related to these scenes. In addition to answering a question with a question of his own, Joey also answers by repeating questions.

When formulating questions, Joey frequently inverts the pronouns *I* and *you*. This was observed in the transcript. However, Joey self-corrected the reversal without any prompting from the SLP.

Joey also has some word retrieval problems. For example, he confused similar words: *porcupine* for *pinecone*, *John Wayne* for *Jean Luc Picard*, and *trick* for *pick*. Joey self-corrected to *pinecone* when prompted by the SLP and spontaneously self-corrected to *pick*. In addition, it appears that on one instance he blended two words, *YouTube* and *eBay* when he asked the SLP to open *YouBay*.

Joey's mother indicated that he frequently scripts, babbles, and talks to himself. During the play session, perseveration at the sentence and at the topic level was observed. He repeated *I'm gonna do it* 11 times in a row, and *So this, this, this, this, and this* and *take a movie of me* five times each, despite getting a positive response and action from the SLP. His mother pointed out that the last of the above examples is a sentence that recurs frequently in Joey's speech. At the topic level, Joey brought up his favourite scenes from *Live and Let Die* on various occasions even though it was not necessarily related to the ongoing topic of discussion. With regards to physical restricted and repetitive behaviours, several instances of hand flapping and rocking where observed when Joey was watching clips of moving vehicles on the tablet.

In his interactions with other children, Joey will often follow or touch them, or laugh at inappropriate times. He tends to use mostly inappropriate social bids. Both with adult and child interlocutors, Joey has been noted to make strange comments. Additionally, when he interacts with adults, Joey tends to stare and repeat questions.

Both at home and at school, Joey is immersed in a monolingual English environment. Joey has two siblings, neither of whom has been diagnosed with ASD. He lives with his parents and younger brother. Joey has a passion for music and enjoys singing, watching music videos, and listening to music in his spare time. He also likes going online and is interested in James Bond, *The Rocky Horror Picture Show*, and Elvis. Additionally, Joey is really interested in making up sign language.

At school, Joey is currently in grade five in a class for children with ASD. He has well-developed music skills. Joey has perfect musical pitch and can remember songs perfectly after a single exposure. He is a beautiful singer and is also able to impersonate a wide variety of singing voices and accents. Joey is involved in singing lessons, skiing, and therapeutic riding.

The recording for Joey's play session lasted a total of 61:44 minutes. Joey produced 1614 words during the session. The modal value of the word count for Joey's uninterrupted utterances is 1; the median is 3. His maximum consecutive run is 32 words long. The SLP's longest uninterrupted run of speech was 120 words long. The SLP's utterances account for 6068 of the words; Joey's mother's account for 77. Thus, Joey uttered 20.8% of the total word count, 7759.

Joey's play session began with a laptop laid out on the table. Throughout the session, other electronics, such as a tablet and an mp3 player were brought in. Joey and the SLP looked at scenes from *Live and Let Die* and *Mighty Machines*, video clips, music, games, and pictures on the electronic devices. In addition, they read a book, practiced sign language, and looked at picture cards. They also played with sheep and Kermit the Frog puppets, a funny faces kit, and plastic food.

5.2. Luke

Luke was aged 9;9 at the time the play session was recorded. He was diagnosed with ASD by a specialist at a major children's hospital at the age of 1;10. Luke's parents first noticed the gradual onset of his symptoms between 1;0 and 1;3. His gross motor skill development was typical. However, he made minimal eye contact, was not speaking, and had repetitive play. Luke lost eye contact at 1;3. He said his first words at 2;6 and his first sentences at 4;0. He spoke clearly at 2;6. Luke has also been diagnosed with language impairment. He has acute hearing and is frequently bothered by sound, though he also finds sounds mesmerizing on occasion.

Luke's past therapies include: ABA from 2;6 to 5;6 and occupational therapy between the ages of 2 and 7. His speech therapy is ongoing.

On the AQ-Child (Auyeung et al., 2007a), Luke scored 96 overall. His scores on the subscales were: 18 on social skills, 16 on attention switching, 18 on attention to detail, 21 on communication, and 23 on imagination. According to his parents' report, none of the restricted and repetitive behaviours severity levels describe Luke adequately. The level of severity of his social communication is level three, "requiring support" (APA, 2013, p. 52). Definitions for severity level descriptors are provided in Appendix A.

Luke has difficulties with both expressive and receptive language. However, he has difficulties maintaining auditory attention to language, which makes estimating his receptive and expressive abilities challenging. Luke uses oral single and compound sentences. Luke has good pronunciation; however he occasionally uses one word for

another. For example, when describing a stick used to play bells, Luke stated, “It’s full of wood” rather than *it’s made of wood*.

Luke always uses *I* when talking about himself. However, when asking questions, he occasionally uses *you* instead of *I*. A variation on the latter was also observed in the transcript. While playing hide-and-seek with puppets, Luke was searching for the SLP’s puppet and asked, “Are I in this bed?” In this case, the pronoun *you* was replaced incorrectly with *I*.

Other agreement difficulties were seen throughout the transcript. Tense concordance seemed to be particularly problematic. For example, when playing with Elmo, Luke said, “I thought Elmo can help us”. In this example, there is a lack of agreement between the tense of the two verbs. The structure is further discussed in Section 6.3.2.

Luke occasionally does not answer simple questions. According to his mother, *how*-questions in particular are problematic. Luke’s mother indicated that he does not know how to use *how* in sentences, nor how to respond appropriately to a question formulated with this word. Furthermore, she stated that if he answers a *how*-question, it’s usually by coincidence. During the play session, Luke used one *how*-question when playing with the phonics desk. He asked the SLP, “How do I turn on?” While he was missing the direct object in this question, the use of *how* as question word was appropriate. However, his mother indicated that this was a modification of an utterance borrowed from *Sesame Street*. Later on in the play session, Luke used another *how*-question, but the question word was inappropriate given the context. When asking for a stick to play the bells, he said, “How can we use a stick?” as opposed to a question such

as *Do we have a stick?* or *Can I have a stick?*. His mother indicated that even these minimal instances of *how* in his speech were out of the ordinary; she suggested he was starting to work through the uses of *how*.

In the past, Luke tended to babble and to answer by repeating questions. Now, Luke's speech is characterized by scripting. He will often script while walking down the street. He will take scripts from books, movies and *YouTube*. In the play session, Luke structured the play with *Sesame Street* puppets according to segments from episodes of the TV show. This is an example of alternate language behaviour taking on communicative functions, as proposed by LaCAS. Luke is also aware of the sources of his scripts. On one occasion, he used the script to engage the SLP in conversation by first asking her, "Do you know this?" He followed up with a number of scripts, and then explained that they were from a book called *The Mixed-Up Chameleon*. When playing with trains, Luke also volunteered the source of his pun without any prompting from the SLP. After quoting, "Honest engine, I want choo for my valentine," he told the SLP, "It's from 'Punny Valentine'…It's from – It's a *Mighty Book*."

Luke has difficulties interacting with other children because of his language delay, but he does enjoy playing with them. His strength is interacting with adults; it is easier for him to understand the language they use. However, his parents often have to remind him to use politeness sequences.

Luke's parents are monolingual English speakers. Luke lives with his parents and older brother, Sean, who also participated in this study and has been diagnosed with ASD. Luke's favourite pastimes are listening to music, going on the computer, playing on

a tablet, and playing video games. Animals are one of his favourite topics; he knows their habitat, climate, sounds, etc. In addition, he is very interested in trains.

Luke is currently in grade four in an English-speaking school. At school, tasks are broken down and the language is simplified to facilitate comprehension. He has been given a laptop as well. Luke loves music and is involved in the singing club at school. He has perfect musical pitch and can make life-like animal and bird sounds. While he has never taken music lessons, he can hear a song and play it on the piano by ear. Luke knows symphonies, composers, and can pick out individual instruments from a song. In addition, Luke is interested in learning other languages, including French, some Russian and some Mandarin.

Luke's play session with the SLP lasted a total of 57:41 minutes. Luke produced 1366 of the 5940 words counted during the play session; 4534 were attributed to the SLP and 40 to Luke's mother. Therefore, Luke produced 23.0% of the total word count during the play session. The modal value for word counts in Luke's uninterrupted speech was 1; the median was 4. His longest consecutive speech was 30 words long. The SLP's maximum uninterrupted run was 107 words long.

Upon his arrival, Luke requested a game called *Find That Action Verb! Listening Lotto*. Luke and the SLP started the session with that game, but also played with animal figures, Grover, Elmo, and Kermit the Frog puppets, Big Bird and Cookie Monster finger puppets, a phonics desk, *Sesame Street* figures, a train set, musical bells, and *Marble Run*. His mother indicated that they played with all his favourite toys during the session.

5.3. Sean

At the time of the recording session, Sean was aged 11;0. He was the oldest participant in this study. When he was 3;3, Sean was diagnosed with ASD by a specialist at a major children's hospital. The onset of his symptoms was gradual, though when he was 0;9, his parents noticed that he would bang his head rhythmically to get to sleep. Additionally, Sean had been making minimal eye contact and eventually stopped entirely at 1;0. Sean also had delayed language. His gross motor skills development was typical, with the exception of engaging in toe walking. From his first words at 2;0, Sean spoke clearly. He began using sentences a year later. Sean has also been diagnosed with language impairment and attention deficit hyperactivity disorder (ADHD). He displays anxiety although he has not received a confirmed diagnosis. Sean is occasionally bothered by smells, sounds, and textures.

Sean has been taking medication for attention since 8;11. He also attends speech therapy on an ongoing basis.

On the AQ-Child (Auyeung et al., 2007a), Sean scored 67 out of 144. Two questions, one relating to attention switching and the other to imagination, were not included in the final tally because they were answered on the same row. His scores on the subscales were as follows: 12 on social skills, 14 on attention switching, 12 on attention to detail, 20 on communication, and 9 on imagination. The scores for attention switching and imagination were out of a possible total of 27. No descriptors for the severity level of Sean's social communication and restricted and repetitive behaviours were available based on the responses in the questionnaire. Sean's mother indicated that none of the

descriptors for social communication apply to Sean. The question about restricted and repetitive behaviours was not completed.

Sean has strong receptive and expressive language. He communicates orally without any pronunciation problems. He constructs complex sentences and always uses the pronoun *I* appropriately. Sean occasionally talks to himself.

On the other hand, Sean has difficulties engaging interlocutors in conversation. Additionally, Sean's mother stated, "he has difficulties filtering 'thought' bubbles from 'speech bubbles.'" Whether he is interacting with other children or with adults, he will frequently monopolize the conversation without realizing it. His mother indicated, "Sean is often unaware that he talks 'at' people not 'with' people." He also is apt to interrupt other people and is a poor listener. These conversational difficulties were observed in the play session. For over 13 minutes, Sean and the SLP talked about video games. Over the course of that entire conversation, Sean did not ask the SLP any questions.

In Sean's speech, there was also evidence of topic-level perseveration in the form of topics being repeatedly reintroduced despite their lack of connection to the topic at hand or without adding any new information (Murphy & Abbeduto, 2007). A notable example occurred in Sean's dialogue about *Skylanders*. Sean mentioned early on that several companies are copying the concept of *Skylanders*. When the SLP followed up with questions such as *What Disney ones have they done though*?, Sean sometimes began to answer but then redirected the topic with sentences such as *so they're, that's practically a copy of Skylanders*; *The Disney ones is practically just a copy*; and *It's a complete copy*. While topic-level perseveration was most evident when Sean was discussing *Skylanders*, it was also noted in his conversation about *Jenga* strategy.

Sean lives at home with his parents and younger brother. His brother, Luke, was also a participant in this study. At home and at school, English is spoken. Sean's favourite pastimes are reading and videogames. Additionally, he is interested in robotics and *Lego*. From a young age, Sean built *Lego* models far beyond his years.

Sean is currently in sixth grade. No special accommodations are made for him at school. Sean is very good at math and problem solving. When playing theory games, he is usually planning a few moves ahead. Sean is involved in soccer, basketball, and running.

Sean's play session lasted 54:27 minutes. It ended early because he showed several signs of fatigue. A total count of 8403 words was obtained based on the transcript. Of these, 3439 were produced by Sean and 4912 by the SLP. The remaining words, 52, were interjections by Sean's mother. Thus, approximately 40.9% of the word count can be attributed to Sean. The modal value of Sean's word count for uninterrupted utterances was 1; the median was 5. His maximum uninterrupted run was 49 words long. Conversely, the SLP's maximum uninterrupted run was 69 words long.

When Sean entered the playroom, *Blockus* had been set out on the table. Additionally, Sean and the SLP played the following games: *Jenga*, bowling, and *Marble Run*. They also looked at pictures on Sean's mother's phone.

5.4. Louis

Louis was the youngest participant, aged 9;5 at the time of the recording session. At 2;4, he was diagnosed with ASD at a major children's hospital. His parents first noticed his symptoms when he was 1;6. At that point, his gross motor skills such as sitting up, crawling, and walking had progressed typically, but he still was not talking and

would bang his head on the floor in frustration. Louis spoke his first words at 3;2 but only began speaking clearly at 5;0. Louis has also been diagnosed with a delay in articulation. He has acute hearing and is frequently bothered by sound stimuli and textures. However, certain patterns and moving stimuli have a mesmerizing effect on him.

Louis received interventions both before and after his diagnosis: floortime from 2;5 to 4;4, occupational therapy from 2;6 to 4;4, and ABA from 4;4; to 6;1. His ongoing therapies include: auditory training from 2;0, speech therapy from 2;0, and medication for behaviour from 7;9.

On the AQ-Child (Auyeung et al., 2007a), Louis scored 117 overall, out of 150. He obtained scores of 25 on social skills, 21 on attention switching, 20 on attention to details, 24 on communication, and 27 on imagination. According to DSM-5 (APA, 2013) descriptors, the level of severity of both his restricted and repetitive behaviours and his social communication is level two, "requiring substantial support" (APA, 2013, p. 52). Definitions for severity level descriptors are provided in Appendix A.

Louis has difficulties with both receptive and expressive language. He communicates orally, though he occasionally mispronounces words. Louis predominantly uses one-word utterances though longer utterances were also observed in the transcript. Overall, the tendency to produce one-word utterances was observed in his responses to the SLP's questions. Another strategy Louis uses to answer questions is to repeat the original question. However, the use of the latter strategy may be related to the formulation of the question. When the SLP asked, "Don't you want Jeff's dog?" Louis repeated her question word for word, an example of immediate echolalia. However, when she rephrased and asked, "Do you? Do you want Jeff's dog?" he answered "No."

Louis's mother indicated that when Louis formulates his own questions, he always inverts pronouns and uses *you* instead of *I*. In the transcript, only one question pattern was observed: *Can I have __ (please)*. However, Louis consistently used *I* in this context. One reason why the pronoun is not reversed in this example is that it is part of a formula. This sequence is discussed in Section 6.3.3. Grammatical negation using the auxiliary do, on the other hand, was inconsistent. Unless prompted by the speech-language pathologist, he used *No X*.

Louis's speech is also characterized by scripting. According to his mother, anything he says in a voice other than his own is likely to be a repetition of something he has heard. He mostly repeats utterances from movies or computer games. He will only quote people if something about the utterance caught his attention; most of the time, other people's speech is not "flashy" enough according to his mother. In the recording, most of the scripting was sourced from a Mickey Mouse computer game. While most scripting was non-conversational, his mother said that he has started using pieces of scripts functionally over the past year. Examples of functional script use are provided in Section 6.3.1. Additionally, Louis shows awareness of the source of the scripts. After Louis repeated *Look at all these wonderful places* several times, the SLP asked him where the utterance was from. He replied, "Reader Rabbit." In the play session, some of his scripted utterances were not clearly articulated, but could nonetheless be identified based on the prosody alone.

Louis also sings, hums, and occasionally talks to himself. His mother indicated that humming tends to be a sign that he is overwhelmed or is not sure what is happening.

When Louis interacts with other children, he gets frustrated easily. He tends to observe rather than engage children in conversation. In his interactions with adults, he is quick and to-the-point. He will address adults when he wants something. In the play session, he most frequently spoke to the SLP when she held a toy that he wanted to have or to stop her from doing something. In both of these cases, his utterances were usually longer than his answers to questions.

Louis lives with his parents, monolingual English speakers, and his younger brother, who has also been diagnosed with ASD. Louis is very interested in transit, including school buses, street signs, and public transit routes. Two of his favourite pastimes include watching elevators and taking long walks.

At school, Louis is in a segregated ASD program. He is currently in fourth grade. He has advanced skills in math and pattern recognition. Additionally, Louis has perfect musical pitch and can repeat music with limited exposure. He takes piano, drum, and guitar lessons with a therapist. He also plays hockey and soccer, and skis in ASD programs.

The recording for Louis's play session is 62:27 minutes long. The total word count for the session is 7163. Of these, Louis's utterances account for 1720 words, or 24.0% of the recording. The SLP produced 5437 words; the remaining 6 can be attributed to the researcher. The modal value of the word count of Louis's uninterrupted utterances was 1; the median was 3. His maximum uninterrupted run of speech was 21 words long. The SLP's longest uninterrupted speech was 67 words long.

Before Louis's session began, a playhouse and a small box of toys had been laid out on the floor. During the play session, Louis played with a number of toys, including:

Elmo and Grover puppets, *Wiggles World* figures, street signs, the playhouse, Mickey Mouse figures, a Mickey Mouse train set, *Blockus*, a puppet of a sheep and Kermit the Frog, a ukulele, and plastic food.

6. Findings and Discussion

This chapter presents and discusses the findings of three analyses: contextual factors, quantitative analysis of formulaic expressions, and qualitative analysis of formulaic expressions. The toys and games mentioned throughout this chapter, as well as popular culture references, are presented in Appendix C.

6.1. Contextual Factors

In language as a complex adaptive system, individuals do not operate in a vacuum; their language use at any given moment is influenced by a range of situational factors (The Five Graces Group, 2009). This section addresses eight environmental, interpersonal, interactive, and cognitive factors that may have impacted the language behaviour of participants in the study. Evidence for the existence of these factors was drawn from parent and researcher observations, audio-video recordings, and transcripts. The potential ways in which these situational factors may have promoted or inhibited the use of formulaic language use are discussed throughout the section. It is followed by the findings and discussion of the quantitative analysis of formulaic language in Section 6.2.

6.1.1. Environmental factors.

6.1.1.1. **Observers' presence.** The impact of the parents' and researcher's presence was three-fold: first, they interjected in the play sessions on a few occasions; second, the participants went to their parents for information; and third, their mere presence was distracting to one of the participants.

The door between the playroom and the observation room was a flexible barrier between the two spaces. Joey's play session was most disrupted by interruptions. His younger brother entered the room on two occasions. Furthermore, his mother brought in

his mp3 player and interjected on two occasions to provide the SLP with additional information regarding Joey's interests. Approximately halfway through the recording session, the researcher also entered the playroom to propose different activities that had been recommended by Joey's mother to the SLP. Like Joey's mother, Sean's mother entered the room during the play session to give her son an electronic device that he could show to the SLP. She did so on two occasions, as he returned the phone to her the first time. Sean's mother also entered the room near the end of the recording session to let the SLP know that her other son, Luke, had arrived for his recording session. Finally, Louis's play session was briefly interrupted by the researcher. Louis looked up at the researcher when she entered the room, but continued playing. Thus, Joey and Sean were most distracted by intrusions from observers while Louis and Luke were minimally impacted.

In addition to being most impacted by interruptions, Joey and Sean also were the only two participants to address their mothers directly during the play session. Joey asked his mother about their plans for that evening when she was already in the playroom. However, when his mother replied that he knew the answer to that question, he ignored the SLP's prompts to tell her and moved on to a new game. Sean sought out an answer to one of the SLP's questions regarding his extra-curricular activities, and then conveyed the information his mother provided to the SLP.

Despite bringing in his mother as an additional interlocutor, Sean was not comfortable with her presence in the observation room. As illustrated in Figure 4 (see Section 4.2.5.1.1), the playroom and the observation room were separated by a one-way mirror. When the lights in the observation room were turned off, the window appeared to

be a mirror from the brightly lit playroom. However, when the lights in the observation room were turned on, the window was semi-transparent and participants in the playroom could more or less see through the one-way mirror. During Sean's recording sessions, the lights were left on in the observation room while the researcher went over protocol with his mother. Sean glanced back at the window on numerous occasions. When his mother noticed his behaviour, she asked whether it was making him nervous. The lights were turned off in the observation room and Sean and the SLP had a conversation regarding the purpose of the one-way mirror. He continued to glance at the window on several occasions despite not being able to see through it. Sean's mother also commented that he does not like having her watching him play. This is an example of two situational factors – the mother's presence and the participant's affective state – interacting together and in turn, potentially influencing the participant's language behaviour. As a result of being distracted by his mother's presence and presumably paying less attention to his ongoing conversation with the SLP, Sean may have relied on formulaic language to reduce the cognitive load of language processing.

Sean's mother also indicated that he may have been "acting" at the beginning of the session as a consequence of being hyperaware of her presence. This awareness may also have been reflected in Sean's use of formulaic expressions. It is possible that Sean may have selected his words and formulas more intentionally, perhaps even choosing formulas from a more formal register than he might have otherwise. Politeness sequences, for example, are often taught explicitly and reinforced by parents (Wray, 2002); in the context of a interaction with an adult supervised by his mother, Sean may have felt compelled to use "proper" polite forms.

Sean was the only participant to demonstrate unease as a result of his mother's presence in the observation room. Nonetheless, the presence of the researcher and the mothers distracted the participants in other ways as a result of the room setup.

6.1.1.2. Room setup. Figure 4 (see Section 4.2.5.1.1) also reflects that the door between the playroom and the observation room was propped open. This allowed the researcher and the parent to overhear the participants' and the SLP's conversations. However, as a consequence of this setup, noise from the observation room could also be heard inside the playroom. Noise from the observation room distracted Joey and Sean in particular. As mentioned previously, being distracted may have led the participants to rely on formulaic language to compensate for fewer attentional resources being allocated to language processing. As Joey's younger brother was playing in the observation room throughout the recording session, there was additional outside noise during Joey's play session. Joey tried to close the door whenever his brother was humming, singing, or laughing loudly, which suggests that he found the noise distracting. Sean, on the other hand, did not try to close the door between the playroom and the observation room. However, when he overheard his mother and the researcher laughing, he leaned back in his chair, opened the door wider, and called out, "What are you guys laughing at?" Neither Louis nor Luke demonstrated any signs of being distracted by noise in the observation room. As their siblings were not present during their recording sessions, there was less noise overall compared to Joey's. While the background noise level of their recording sessions was comparable to that of Sean's, it is possible that Sean was more attuned to the noise in the observation room than Louis or Luke were because Sean dislikes being observed by his mother. His increased reactivity to aural stimuli might the

result of an increased level of arousal, suggesting an interaction between environmental and cognitive factors.

Thus, all participants were affected by the observers' presence and the fluid setup of the observation and playroom to a certain extent. However, based on frequency and the nature of their effects, these environmental factors likely had a greater influence on Joey and Sean's language behaviour than on Louis or Luke's.

6.1.1.3. Toys and games. In the recording session, participants were allowed to choose from a wide variety of toys in the playroom. Consequently, the games or toys that participants selected may have influenced their speech in different ways.

A particularly interesting feature of most of the participants' play was taking on the voice of another. Some of their interpretations were extremely accurate, such that the researcher was able to identify the source of the imitation without any cues from the toys. Louis and Luke both took on the voice of another when they played with toy figures. Louis most frequently used voices from Mickey Mouse. When Luke was playing with animal figures, he used a game-show voice to quiz the SLP and introduce facts about animals, as well as a reading voice when quoting from an animal book. Luke also made realistic animal noises, such as squealing and snorting instead of saying *oink* when he was playing with a pig. Louis, Luke, and Joey also used the voice of another when they were playing with puppets from *Sesame Street*.

The participants' recall of the voice quality, intonation patterns, and quotes of segments read from books or produced by characters in television shows and computer games is suggestive of a combination of detail-focused cognitive processing tendencies and holistic language processing. As discussed in Section 2.1.1, both are characteristic of

ASD. Not only have the lexical items been recalled, but also the details of their phonological delivery have been retained and reproduced with sufficient accuracy to be identifiable to listeners familiar with the original speakers. While previous research (e.g., Pronovost, Wakstein, & Wakstein as cited in Fay & Schuler, 1980; Ricks and Wing as cited in Fay & Schuler, 1980) suggests that echolalic speech is better articulated than non-echoed speech, the clarity of articulation was found to be dependent on the original model more so than on the participant's articulatory abilities. Notably, Louis's repetitions of utterances produced by Donald Duck were noticeably less clearly articulated than those uttered in his own voice as a result of being faithful to Donald Duck's articulation patterns. In this particular example, Louis's detail-focused repetition had a conversational cost because the interlocutor frequently misunderstood his quotes, based on her incorrect repetitions of his utterances.

In addition to using voices from various television programs or computer games, Louis and Luke used scripts and sequences from those same sources. Louis's mother indicated that he likes to act out parts of the programs using toy figures. Both Louis's and Luke's scripts and echolalic sequences were related to the toys they were playing with. Louis scripted from *Disney's Mickey Mouse Preschool*, a computer game, when playing with Mickey Mouse figures. In this context, the delayed echoes had a self-directive noninteractive function (see Prizant & Rydell, 1984) as Louis's play matched the content of the script. He also quoted a short Spanish sentence, "Hola, soy Diego" (Hello, I'm Diego, in Spanish), from *Dora the Explorer* with perfect pronunciation when the SLP pulled out the corresponding figure. Luke scripted from an animal book, *The Mixed-Up Chameleon*, when playing with animals, and from *Elmo's World*, a segment of *Sesame*

Street, when playing with the associated puppets. Luke's mother indicated her surprise that he remembered voices and quotes from *Sesame Street* since he had not watched the program since he was approximately four years old. Some associations between the toys and scripts were more indirect, as in the case of Luke's "Punny Valentines" from *Mighty Book*. Luke quoted, "Honest Engine, I want choo for my valentine" on several occasions while playing with trains. Furthermore, not all scripts were contextually appropriate; he also insisted on calling the engine they were playing with *Engine number nine*, from a nursery rhyme, even though it had the number three written on it.

In every example listed above, the original model is removed temporally from the repeated utterance. In the case of Luke's *Elmo's World* scripts, up to five years had passed from the original exposure to the utterances. Despite the considerable time span between the original utterance and the repetition, the repetitions were extremely faithful to the original. Where the source of the original model was known, all scripts produced by the participants were compared with the original, be it a book, computer game, television program, or movie. In every case, the repetitions were identical lexically to the corresponding utterance in the model. This provides justification for the inclusion of scripts as a class of formulaic language because a newly generated repetition would result in a paraphrase of the original as opposed to a direct quote. Additionally, Louis's quote from *Dora the Explorer* is particularly strong evidence for holistic language processing; neither he nor his parents speak Spanish, and yet he was able to produce a grammatical Spanish sentence without an English accent. This would not have been possible using analytical processing, as Louis presumably has neither the Spanish lexical items nor the combinatory or phonological rules to combine them into a spoken sentence. Despite the

fixity of lexical form observed, there appears to be some flexibility in applying the scripts; sometimes participants repeated the entire model while other times they selected certain utterances that applied to the particular context, severing the model into smaller segments. As a result of the potential length of original models and the prospective reuse of select segments, the occurrence of scripts in the participants' speech is likely to have a considerable impact on the proportion of formulaic language relative to novel language by word count.

Beyond influencing speech through topic-based associations, the toys and games the participants chose also had an effect on their language use based on the demands they place on speakers to use language. Some toys, such as musical bells or a tablet are relatively solitary activities; Joey's mother indicated that he gets fixated on screens, whether computer, tablet, or other, and is more likely to engage in conversation if they are taken away. On the other hand, *Marble Run* is a collaborative activity that requires cooperation between the players. Even games that pit the players against each another can be conducive to conversation; Sean, for example, discussed strategy with the SLP throughout their rounds of *Blockus* and *Jenga*. Conversely, the rules of games like hide-and-seek discourage use of language. When Luke and the SLP were playing hide-and-seek with the puppets, his mother pointed out that he was reluctant to answer the SLP's calls because the rules of the game prohibit it.

The effects of toys and games on the elicitation of participants' speech have been observed elsewhere (e.g., Bloom & Lahey as cited in Sealey & Gilmore, 2008; Gallager as cited in Sealey & Gilmore, 2008; Stockman as cited in Sealey & Gilmore, 2008). In freeplay activities, playing with puppets, for example, has been found to increase

language production compared with other toys (Atkins & Cartwright as cited in Southwood & Russell, 2004; Evans & Craig as cited in Southwood & Russell, 2004; Stalnaker & Creaghead as cited in Southwood & Russell, 2004; Wren as cited in Southwood & Russell, 2004).

In summary, the types of toys and games that participants selected in the play session likely impacted the type and the amount of language they produced.

6.1.2. Interpersonal factors.

6.1.2.1. Interlocutor. The SLP was selected as an interlocutor for the participants because of their pre-existing relationship. Louis, Luke, and Sean were currently undergoing speech therapy with the SLP. Their ease was evident in their familiarity with protocol – removing their boots and coats at the door – and their beeline for the playroom. Joey, on the other hand, was a former client of the speech-language pathologist's. His last appointment with her was 2 years prior to the recording session. In a follow-up email, his mother stated, "He's usually more of a chatterbox. I think he was shy seeing [the SLP] again. He really likes her."

Therefore, while action was taken to standardize the effects of the interlocutor across all four participants, Joey's language use in particular was likely impacted by the choice of interlocutor.

6.1.3. Interactive factors.

6.1.3.1. Low and high constraint utterances. Utterances can place varying levels of obligation on the child to produce language (Prizant & Rydell, 1993). High constraint forms include commands, *wh*- questions used to elicit specific responses, attention-eliciting devices, etc. (Prizant & Rydell, 1993). Conversely, low constraint utterances

include comments, repetitions or paraphrases of the hearer's previous utterance, report questions, etc. (Prizant & Rydell, 1993). Compared to low constraint utterances, high constraint utterances place higher communicative demands on the child (Prizant & Rydell, 1993). The extent to which an interlocutor uses these two types of utterances in conversation ultimately influences the types of replies produced by the respondent (Prizant & Rydell, 1993). Echolalia in particular increases with the use of high constraint utterances (Prizant & Rydell, 1993). Prizant and Rydell (1993) suggest that the strategy of using "less labour-intensive communicative utterances" (p. 277) is a means of compensating for the high demands imposed by the interlocutor. In this respect, it is possible that the prevalence of various classes of formulaic language, and not only echolalia, would be impacted by the interlocutor's use of high and low constraint utterances; like echolalia, formulaic expressions are "less labour-intensive communicative utterances" (Prizant & Rydell, 1993, p. 277) than novel utterances of the same length (Reuterskiöld & Van Lancker Sidtis, 2012). The ratio of low and high constraint utterances used by the SLP varied by situation and participant. Furthermore, the types of utterance forms that were predominant also differed.

In her interactions with Sean, Luke, and Louis, the SLP used predominantly low constraint utterances. For all three participants, approximately one-third of coded utterances were high constraint while the remainder was low constraint. On the other hand, in her interactions with Joey, there was an almost equal division of low and high constraint utterances, low being slightly more prevalent. Low constraint forms that appeared in all four transcripts include positive feedback and declaratives used to describe actions or answer questions. Questions that repeated a previous utterance

without adding new information were also frequent across all four participants and were often followed by elaboration or commentary.

High constraint forms were more variable across participants and situations. While the SLP used a number of information-seeking questions in conversation with Luke, Sean, and Joey, she mainly used test questions such as *What colour is Anthony?* when speaking with Louis. With Louis, the SLP also used direct commands such as *Wait* or *Say I don't want to stop*, but with Joey and Luke, indirect commands were used more frequently. Finally, attention devices such as *Look at that* were used with Louis and Joey, but very infrequently with Sean and Luke. Beyond eliciting speech, different high constraint forms may have had varying impacts on the use of formulaic language. For example, information-seeking questions might have been more likely to elicit formulaic language as a compensatory device for processing limitations while test questions might not have the same effect, as a single word was often sufficient to answer the question. There was also a difference in the prevalence of high constraint forms across situations. For example, in conversation with Luke the SLP used a number of information-seeking questions; however, when explaining the rules of a game, she used various indirect commands. Thus, the SLP's use of high constraint forms was related both to differences between participants and to the toys and games that they selected; again, several contextual factors interacted to potentially have various effects on the participant's language use.

6.1.3.2. Interaction styles. In conversation, adult interaction styles differ on three main variables: degree of responsiveness, the amount of demands on communication, and opportunity for initiation or control (Prizant & Rydell, 1993). The two opposing styles

are called facilitative and directive interaction (Prizant & Rydell, 1993). Facilitative interaction places low demands on communication through low constraint utterances, is highly responsive to the child's agenda, and puts the child in control of the interaction (Prizant & Rydell, 1993). A directive style of interaction represents the opposite end of the spectrum and allows the adult to control the conversation the majority of the time (Prizant & Rydell, 1993).

In the excerpts examined, the participants initiated most of the topics by a variety of different means. Louis tended to name objects or request them, to which the SLP responded by elaborating a description of the object or acknowledging his request. Joey also used requests to introduce new topics, but he additionally asked several questions, which the SLP consistently answered. Conversely, Sean hardly asked any questions and instead tended to introduce new topics through tangents in conversation. Luke directed the topic of conversation through comments and play. A salient feature of the SLP's responses was the prevalence of imitations or elaborations of all participants' utterances. Her topic initiation strategy frequently involved information-seeking questions, though participants did not consistently go along with the new topics.

As alluded to in the previous paragraph, the SLP was highly responsive to participants' social-communicative agenda and their play. When participants redirected the topic of conversation rather than answer her questions, for example, she went along with the new focus of the conversation. Joey in particular tended to answer questions with questions. Rather than insist that he answer her initial question, the SLP answered Joey's query. The SLP's utterances were less likely to be responsive if participants were scripting or trying to prevent her from joining them in play. When Luke was playing with

the train track, she asked to join the puppets in the car to which he replied, “oh no.” Nonetheless, she followed up by repeating her intention to join them in the car.

Responsiveness was also related to the use of techniques such as pivotal response therapy (PRT). PRT is a technique used to motivate language use (Koegel, Koegel, & Brookman, 2003). Responsiveness using PRT is intentionally low such that the child is motivated to use language to achieve a desired response. For example, the SLP sometimes kept a toy the participant wanted and did not return it until the participant asked for it. PRT tended to be used as a means of reducing withdrawal from interaction. Additionally, the use of PRT may have been related to the goal of maximizing speech samples.

Based on the previous description of adherence to topics and topic introduction patterns, it is clear that participants were frequently in control of the conversation. The SLP tended to briefly take control of the conversation in two contexts: non-responsive participants and teaching. Non-responsiveness was sometimes related to the type of play, such as when Joey was focused on the tablet screen, or to withdrawal from interaction, as when Louis was humming or mumbling to himself. Similarly, teaching could involve explaining the rules of a game or insisting on the production of a specific linguistic form. In the previous examples, interaction style, an interactive factor, was influenced by arousal, a cognitive factor, and by toys and games, an environmental factor.

Therefore, as with her use of low and high constraint utterances, the SLP’s interaction style varied between participants and across situations. This pattern is coherent with the association between interaction styles and utterance forms whereby use of low constraint forms is associated with a facilitative style of interaction and high

constraint forms are associated with a directive style of communication (Prizant & Rydell, 1993). While the SLP tended to use a facilitative interaction style, certain circumstances were associated with a more directive interaction style that placed higher demands on participants to respond in conversation. The overall balance between facilitative and directive styles was likely related to the objective of the play session, which was to elicit speech, and the instructions given to the SLP to engage the participants in conversation however she saw fit. If the SLP had not resorted to a more directive style on certain occasions to prompt the participants to interact, a smaller speech sample would have been obtained.

6.1.4. Cognitive factors.

6.1.4.1. Arousal. Arousal refers to the state of being reactive to stimuli ("Arousal", 2014). Participants' level of arousal fluctuated throughout the recording sessions. The most noticeable decrease in level of arousal occurred in Sean's play session. When compared with his utterances at the beginning of the session, Sean's comments towards the end were markedly shorter. He frequently responded with minimal responses such as *yeah*, *kind of*, or *maybe* and did not elaborate as much. The topic of *Skylanders*, for example, was discussed at length during approximately 13 minutes at the beginning of the session. At the end of the play session, however, it hardly lasted 2 minutes and each subtopic was less expanded. His mother indicated that the short answers are a telltale sign that he is getting tired. Joey also said that he was tired at the end of the play session and asked that they take a nap. However, as his behaviour and language use was not markedly different than at other points throughout the play session, this was interpreted as a new type of play rather than as evidence of a decrease in arousal.

While neither Luke nor Louis showed signs of being tired at the end of the play session, their amount of reaction to stimuli throughout the play session varied. Both participants appeared to go into themselves for brief periods of time. While playing with a parking meter, Louis stopped humming, responding to the SLP, and scripting for approximately one minute. He began attending to stimuli again when the SLP cranked a toy dinosaur, a toy he dislikes because of the sound the motor makes. This is another example of the implementation of PRT. Eventually, he responded by throwing the dinosaur in the box and saying, "No jump. No dinosaur." Thus, the PRT technique was successful in motivating language use. This occurrence is an example of an environmental factor, toys, influencing a cognitive factor, level of arousal. It is also an example of directive styles influencing arousal. Ultimately, this interaction between situational factors had an impact on language production as Louis might not have come out of the withdrawn state as quickly if he had not been triggered by the toy; less speech would have been elicited.

Luke had a similar non-responsive episode when playing with the train set. For approximately one minute, he stopped making train sounds and responding to the SLP. His mother indicated that it is unusual for him to be that quiet. She also pointed out that when he is thinking intensely about something, the SLP has to "pull him back." Luke's mother noted that, of all toys, trains are most likely to cause him to "go into himself". Again, this incident is evidence for the interaction of toys and level of arousal. However, it represents the opposite effect from that seen in Louis's example as the toy decreased, rather than increased, arousal and therefore interaction.

6.1.4.2. Age. According to Wray's (2002) developmental model of holistic and analytic processing, all four participants were in the third stage of development based on their ages. In the third stage, the proportion of holistic processing, and therefore formulaic language, gradually increases with respect to analytic processing (Wray, 2002). Accordingly, it is possible that Louis and Luke would be less inclined to use formulaic language than either Joey or Sean, who were one to two years their senior.

While both level of arousal and age may have impacted formulaic language use, level of arousal may have had more immediate, local, effects than age. The effects of age would likely be better understood by examining several samples for each participant rather than brief episodes. By analyzing language use in several different contexts, the impact of moment-to-moment variations in other contextual factors is reduced so that the global effects of age on formulaic language use are more prominent.

6.1.5. Summary of contextual factors analysis. This section has provided evidence for the presence of eight situational factors that may ultimately have influenced the participants' formulaic language use. These included: the presence of observers, the setup of the rooms, the toys and games, familiarity with the SLP, utterance types, interaction style, arousal, and age. Environmental factors and interpersonal factors affected participants throughout the entire recording session, as did age. Conversely, the impact of interactive factors and cognitive factors, excluding age, tended to be more variable and to fluctuate over the course of the recording session. Participants were affected to differing degrees by each of these factors.

The following section presents the findings of a quantitative analysis of formulaic sequences in a short segment of each participant's transcript. The findings are discussed in relation to previous literature as well as the contextual factors identified in this section.

6.2. Quantitative Analysis of Formulaic Language

This section provides the results of a quantitative analysis of formulas in 250-word excerpts that were randomly selected from each participant's transcript. This section presents and discusses: (a) the distribution of formulaic and non-formulaic speech by word count, (b) the distribution of formulaic expressions across categories, (c) the distribution of formulaic expressions by function, and (d) the variability of formulaic expressions.

Excerpts selected for quantitative analysis were chosen randomly to prevent biases that would confirm or disconfirm the researcher's expectations. They ranged from 250 to 254 words each. Word counts were based exclusively on participants' utterances, and so the length of the recorded excerpt corresponding to 250 words varied considerably depending on the verbosity of the speakers. The excerpts varied between 2:03 and 11:18 minutes in duration. Coded transcripts for the selected segments are included in Appendix J, along with a description of the ongoing activity. Each coded transcript is followed by a list of formulaic expressions organized by category.

6.2.1. Distribution of formulaic and novel language. As the actual length of excerpts varied from 250 to 254 words, the distribution by word count of formulaic and novel language between participants was compared using percentage scores (WC%) as opposed to raw scores. Figure 11 illustrates the overall distribution of novel and formulaic language, which has been subdivided into unconventional verbal behaviour

(UVB) formulas, and conventional formulas. Unconventional verbal behaviour formulas include immediate and delayed echolalia, as well as perseveration. Conventional formulas include all other types of formulaic expressions.

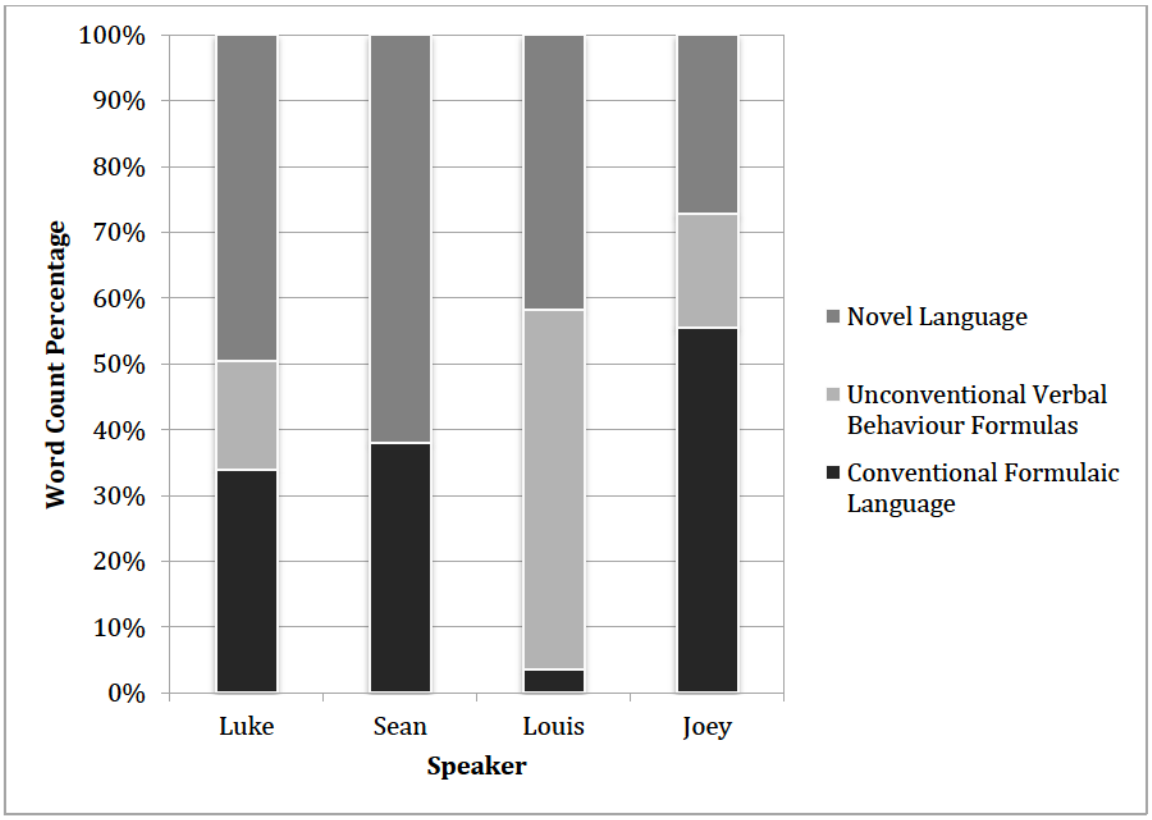


Figure 11. Distribution by word count percentage of novel and formulaic language, by speaker. This figure compares the distribution by percentage of words of novel and formulaic language in excerpts ranging in length from 250 to 254 words. Formulaic language word counts have been subdivided into two categories: unconventional verbal behaviour formulas and conventional formulas.

Based on the data in Figure 11, the total WC% of formulaic language, including both UVB and conventional formulas, varied between 38% and 83% in the excerpts selected. Thus, while all speakers used formulaic language, they did not use it to the same extent. Furthermore, the figure above indicates that Sean did not use any formulas that were classified as UVB in the excerpt selected for analysis.

According to Wray's (2002) model of the balance of holistic and analytic processing, it would be expected that the older participants, Sean and Joey, would use more formulaic language than the younger participants, Luke and Louis. However, Figure 11 illustrates that this was not the case in the excerpts selected for analysis. Joey used the most formulaic language as measured by WC%, but Sean used the least of all four participants.

This variability across speakers is not surprising as the excerpts for analysis were randomly selected. Thus, the contextual factors for each segment varied considerably. As discussed in Sections 2.2 and 6.1, contextual factors influence the prevalence of formulaic language in conversational speech. In terms of ongoing activity, the participants engaged in a number of activities in the segments, including playing with trains, animal figures, and puppets, watching videos on *YouTube*, and participating in conversation without any play. The cognitive and conversational demands placed on the participants in each segment varied according to the type of play, and so the distribution WC% of formulaic language likely reflects these differences in situational factors. If more segments had been analyzed for each participant, age trends may have been clearer.

Although there is a relationship between overall number of formulaic expressions and WC% of formulaic and novel language, this measure of formulaicity does not distinguish between the length of sequences and their frequency. By measuring formulaic language use according to WC%, the length of formulas may be a confounding factor in the relationship between formulaic language use and age. Discrepancies such as the difference between Louis and Joey in their respective WC% of conventional formulas are highly related to the length of sequences. While Joey's conventional sequences included

a number of phrase- and sentence-long exemplars, Louis's longest conventional sequence in the excerpt was 5 words long, while the rest were 3 words or less. The frequency of sequences and its relationship to WC% of formulaic and novel language is addressed later in this chapter in Section 6.2.3.

Another aspect of the distribution of WC% of formulaic and novel language that was of particular interest was the WC% of unconventional verbal behaviour compared with all other types of speech. In Section 2.2.1 of the literature review, an alternate explanation was proposed for Van Lancker's (2012a) observation-based account of formulaic language in ASD. Van Lancker (2012a) put forward the notion that the speech of high-functioning persons with ASD is lacking in formulaic language while the speech of low-functioning persons with ASD is high in formulaic language. In this study, the distinction between diagnostic labels such as Asperger's disorder, high-functioning and low-functioning autism was not made, as it is not part of the DSM-5 (APA, 2013). However, in school-aged children, the distinction between high-functioning and low-functioning autism in school-aged children is based on expressive language abilities, such that strong expressive language is associated with high-functioning autism (Tager-Flusberg et al., 2005). Therefore, expressive language abilities can be used to approximate the distinction between high- and low-functioning autism made by Van Lancker Sidtis (2012a).

Van Lancker Sidtis's (2012a) observations regarding the prevalence of formulaic language do not align with previous research findings (cf. Dobbinson et al., 2003; Tager-Flusberg & Calkins, 1990), which indicate that formulaic language appears to be characteristic of the entire verbal ASD spectrum. Therefore, it was suggested that Van

Lancker's (2012a) impressions were potentially the result of equating formulaic language with UVB and novel language with all other speech, including conventional formulas. These operational definitions have been observed elsewhere in ASD research (see Section 2.1). Thus, according to a revised set of definitions, it was proposed that Van Lancker Sidtis (2012a) in reality was observing that UVB, and not formulaic language as a whole, decreases with an increase in expressive language abilities.

As shown in Figure 11, all participants in this study, regardless of language abilities as described in Chapter 5, used formulaic language. Thus, it is worth investigating the hypothesis discussed above and in the literature review (see Section 2.2.1) to attempt to reconcile conflicting accounts of formulaicity in ASD.

As the distinction between high-functioning and low-functioning autism in school-aged children is based on expressive language (Tager-Flusberg et al., 2005), participants were ranked in terms of their expressive language abilities to approximate the distinction made between persons with ASD using the previously-mentioned labels. Using this ranking, it was possible to determine whether the participants' WC% of novel and formulaic language as defined in formulaic language research coincided with Van Lancker Sidtis's (2012) observations. If they did not, then the proposal that the observations were based on different operational definitions of formulaic and novel language could be tested.

Participants were initially ranked according to their expressive language abilities based on the CPPQ. Based on these measures, Sean had the strongest expressive language skills, as his mother indicated he never has poor expressive language and uses complex sentences. Conversely, Louis had the weakest expressive language skills based

on these measures, as his mother indicated that he uses one-word utterances and frequently has poor expressive language. Luke and Joey were more closely matched; while Luke uses compound sentences and Joey uses complex sentences, Joey always has poor expressive language while Luke occasionally does. Thus, based on the questionnaire items, the participants were ranked from strongest to least strong expressive language skills as follows: Sean, Luke, Joey, and Louis.

The SLP was also asked to rank the participants according to their expressive language abilities based on her professional experience working with the participants and her observations during the recording sessions. Her assessment agreed with the ranking established using the CPPQ. She also indicated that Luke and Joey were difficult to rank as they have different strengths. Therefore, it is with a certain degree of confidence that we can rank the participants based on their expressive language abilities as follows: the strongest is Sean, followed by, Luke, Joey, and Louis.

With this ranking established, the first step in testing the application of Van Lancker Sidtis's (2012a) observations in this study was to compare the ranking by expressive language abilities with the ranking by WC% of formulaic language presented in Figure 11. Based on WC% of formulaic language, Joey used the highest proportion of words in formulaic expressions, followed by Louis, Luke, and Sean. Conversely, according to Van Lancker Sidtis's (2012a) observations and the participants' expressive language skills, they should have been ranked according to their WC% of formulaic language as follows: Sean, Luke, Joey, and Louis. As the expected ranking and the actual ranking of participants based on WC% of formulaic language did not coincide, it was

concluded that the use of formulaic language was moderated by factors other than or in addition to expressive language abilities.

As participants' use of formulaic language did not coincide with Van Lancker Sidtis's (2012a) account of formulaic language in ASD, the proposal that the observations were based on different operational definitions of formulaic and novel language was tested. To this effect, Figure 12 below illustrates the relationship between the WC% of UVB and all other types of words, including those in novel utterances and those in conventional formulas, across speakers. This operational definition of formulaic and novel language was based on the division established in ASD research (e.g., Howlin, 1982; see Section 2.1).

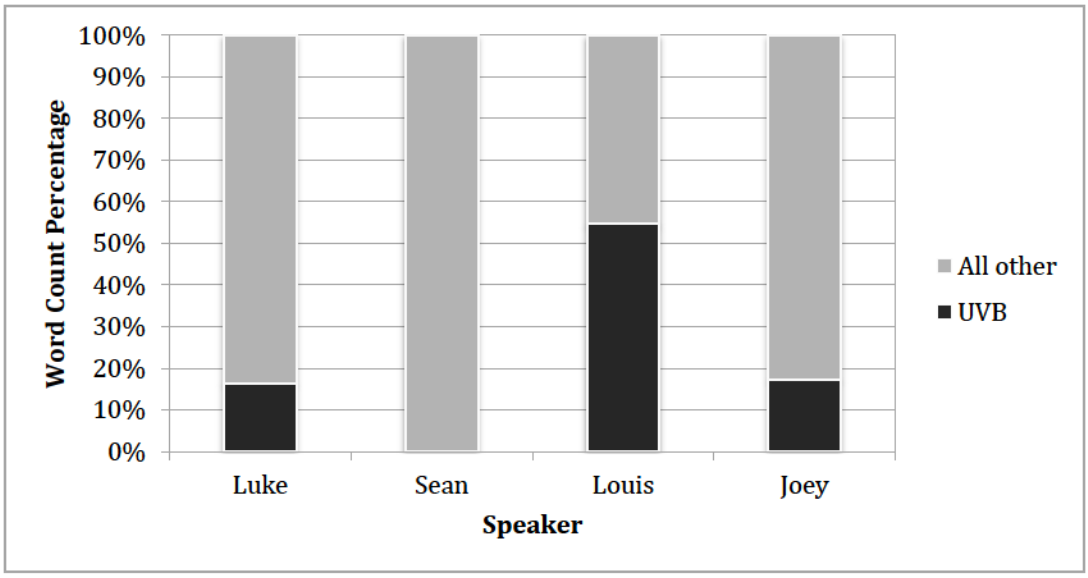


Figure 12. Distribution by word count percentage of unconventional verbal behaviour (UVB) and all other types of speech, by speaker. This figure compares the distribution by word count percentage of UVB and non-UVB speech in excerpts ranging in length from 250 to 254 words.

In relation to the WC% trends in Figure 12, the expressive language ability ranking coincided with the ranking of participants' based on WC% of UVB. That is to

say, the stronger the participants' expressive language abilities the lower their WC% of UVB with respect to all other types of speech.

It is also interesting to note that the ranking of participants by expressive language skills coincided with their ranking by AQ-Child (Auyeung et al., 2007a) scores converted to percentages. AQ-Child (Auyeung et al., 2007a) scores distinguish between participants on the basis of the degree of autistic-like behaviour that they exhibit. In this respect, participants with higher AQ-Child (Auyeung et al., 2007a) scores might be more likely to exhibit verbal behaviours such as perseveration, echolalia and scripting, while those with lower AQ-Child (Auyeung et al., 2007a) scores might be less likely to do so. As echolalia correlates with expressive language abilities (McEvoy, Loveland and Landry cited in Tager-Flusberg et al., 2005; Prizant, 1983), this further supports the proposition that Van Lancker Sidtis (2012a) was actually observing that UVB, and not formulaic language as a whole, decreases with an increase in expressive language abilities.

Therefore, the findings of this study support the proposition that Van Lancker Sidtis's (2012a) observation-based account of formulaic language use in ASD may potentially be based on different operational definitions of formulaic and novel language. If Van Lancker Sidtis's (2012a) observations are taken at face value, they do not align with the findings of this study or previous research. However, when reformulated according to definitions established in ASD research, the observations agree with both the findings of this study and previous research (e.g., Dobbinson et al., 2003; Perkins et al., 2006; Tager-Flusberg & Calkins, 1990) that suggests that formulaic language is a characteristic of speech across the autism spectrum. However, as Van Lancker Sidtis (2012a) did not provide any definitions or examples to support her observations, it is

impossible to determine with absolute certainty that operational definitions were the cause of the discrepancy between her observations and research findings. It is also possible that her observations were based on assumptions or a few anecdotes rather than evidence-based, for example.

6.2.2. Formulaic expression distribution by category. Given the short length of the segments that were analyzed quantitatively, the distribution of formulaic expressions across categories is only provided in Appendix K for illustrative purposes to demonstrate that expressions were found across a range of categories. It is also worth noting that lack of exemplars in a given category does not imply inability to use that type of sequence nor lack of knowledge about said category. In some cases, the fact that there were few or no examples was likely related to the type of sequence. For example, idioms, which occur infrequently in the general population's speech (Wray, 2011), also occurred infrequently here. In a sample of this size, the small number of idioms should not be taken as support for previous research that has identified difficulties in idioms use and comprehension in persons with autism (e.g., Noens & Van Berckelaer-Onnes, 2004; Vogindroukas & Zikopoulou, 2011); a much larger sample would be required to draw this conclusion. Rather, it is likely related to the low frequency of idioms seen in speech across the general population (Wray, 2011). Another example is the lack of expletives in the speech samples. Again, this does not indicate that the participants did not know or use expletives. In fact, examples such as *shoot* and *darn* were found elsewhere in the transcripts. However, given the context in which the data was collected, it was unlikely that these types of sequences would emerge frequently; the participant's interlocutor was an adult and the participant's parent was watching in an adjacent room. Perhaps if the

data had been collected by recording interactions between participants and their peers or if the participants had been under stress, the frequency of expletives would have increased. Thus, the key conclusion to be drawn from Appendix K is that all four participants used a wide range of formulas from a number of different categories.

6.2.3. Formulaic expression tokens by conventionality and function. As the sample size of the excerpts was small and certain categories lacked any exemplars, the categories of formulaic language were combined according to their conventionality and function such that four combinations were possible: conventional formulas with a non-pragmatic function or no function at all, unconventional verbal behaviour (UVB) formulas with a non-pragmatic function or no function at all, conventional formulas with a pragmatic function, and UVB formulas with a pragmatic function. Groupings were based on category attributes, not on functional analyses of individual formulas, with the exception of immediate and delayed echolalia. Instances of immediate and delayed echolalia were coded for function on a case-by-case basis as membership in that category did not automatically imply a function or lack thereof. The sum of formulaic expression tokens for the combined categories is provided in Figure 13 (see page 155).

In relation to formulaic language use as measured by formulaic expression tokens, the age trend proposed by Wray (2002) is supported by these findings. That is, Sean and Joey, the oldest participants, used more formulaic expression tokens than Louis or Luke, the youngest participants. Wray's (2002) proposal did not coincide with prevalence of formulaic language use as measured by WC%. The fact that the prevalence of formulaic language differs according to the means of measuring formulaic language suggests that

studies may not be directly comparable unless formulaic language is measured using the same system.

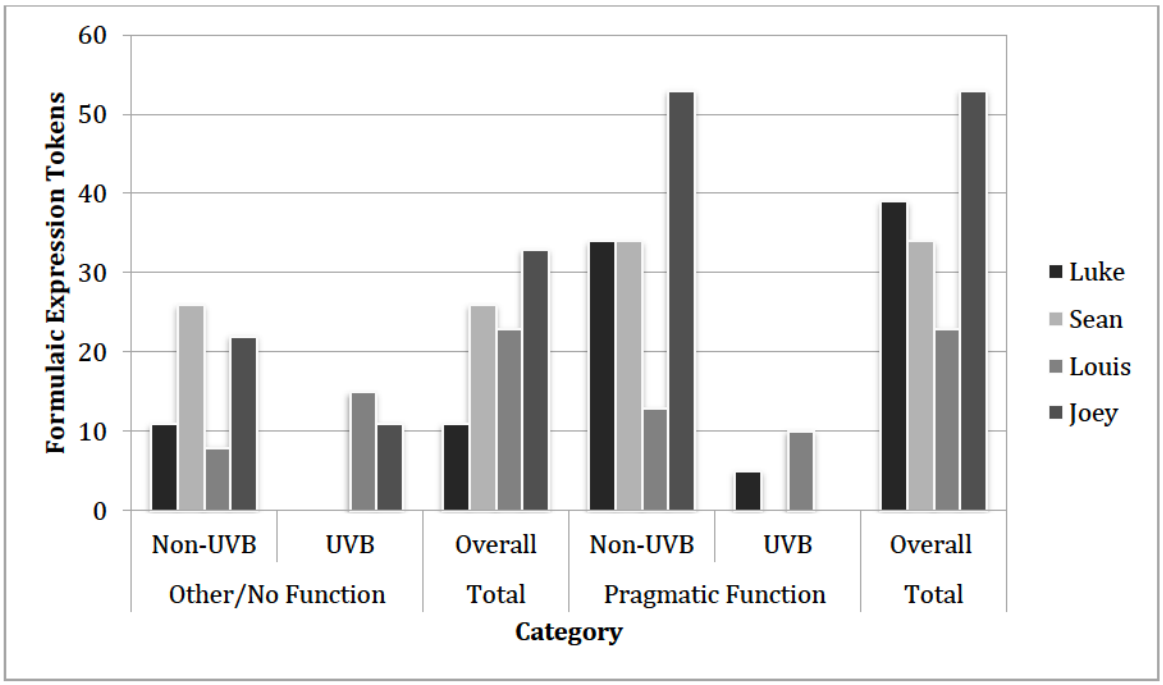


Figure 13. Formulaic expression tokens for each speaker, subdivided by conventionality and function. This figure illustrates the total number of formulaic expressions for each participant found in excerpts ranging in length from 250 to 254 words, grouped according to conventionality and function. Unconventional verbal behaviour (UVB) includes delayed and immediate echolalia and perseveration.

Conversely, the trend in the prevalence of UVB use with respect to expressive language abilities remains the same when measured by WC% and by UVB tokens. From fewest to most UVB tokens, participants were ranked as follows: Sean, Luke, Joey, Louis. This ranking coincides with the ranking of expressive language abilities and formulaic language use as measured by WC% established in Section 6.2.1. This finding provides additional support for the proposition that Van Lancker Sidtis (2012a) was observing trends in UVB use, not formulaic language use.

As mentioned earlier, the data in Figure 11 was not conducive to determining whether variation in formulaic language use across participants was a measure of formula length or a difference in the frequency of formula use. However, the variation in frequency counts in Figure 13 illustrates that the proportion of WC% of formulaic to novel language was influenced by differences in rates of formulaic language use in addition to formula length. To use the same comparison given in Section 6.2.1, whereas Joey used a total of 86 sequences in his excerpt, Louis only used 46. Thus, not only did Joey tend to use longer sequences than Louis (see Section 6.2.1), he also used more sequences overall, thus leading to a higher percentage of his word count being formulaic.

In the 250-word excerpts, each participant's overall use of formulaic expressions with a pragmatic function (e.g., conventional expression *sorry*) equalled or exceeded their overall use of formulaic expressions without pragmatic function (e.g., collocation *polar bears*) or with no apparent function at all (e.g., perseveration *I'm gonna do it*). While all of Luke's UVB sequences were attributed a pragmatic function in the context of use, none of Joey's UVB sequences were. Louis's UVB sequences were split between both function categories, though fewer had a pragmatic function. As the participants' overall use of formulaic expressions varied, ratios of formulaic expression tokens by function are provided in Figure 14 (see page 157) to facilitate comparisons.

As illustrated in Figure 14, between 50% and 78% of all formulaic expressions used by the participants were expressions associated with pragmatic functions. Wray and Perkins (2000) establish two functional categories of formulas: social devices and cognitive devices. Formulas with cognitive functions such as overcoming memory limitations, providing memory shortcuts and buying time, are represented in Figure 13

and Figure 14 as formulas with other or no functions. Formulas as social devices are comparable to formulas with pragmatic functions. As impairment in social communication and interaction is at the core of ASD (APA, 2013), it could be expected that formulas with social functions would be less prevalent than formulas with cognitive functions (see Section 2.4.3)

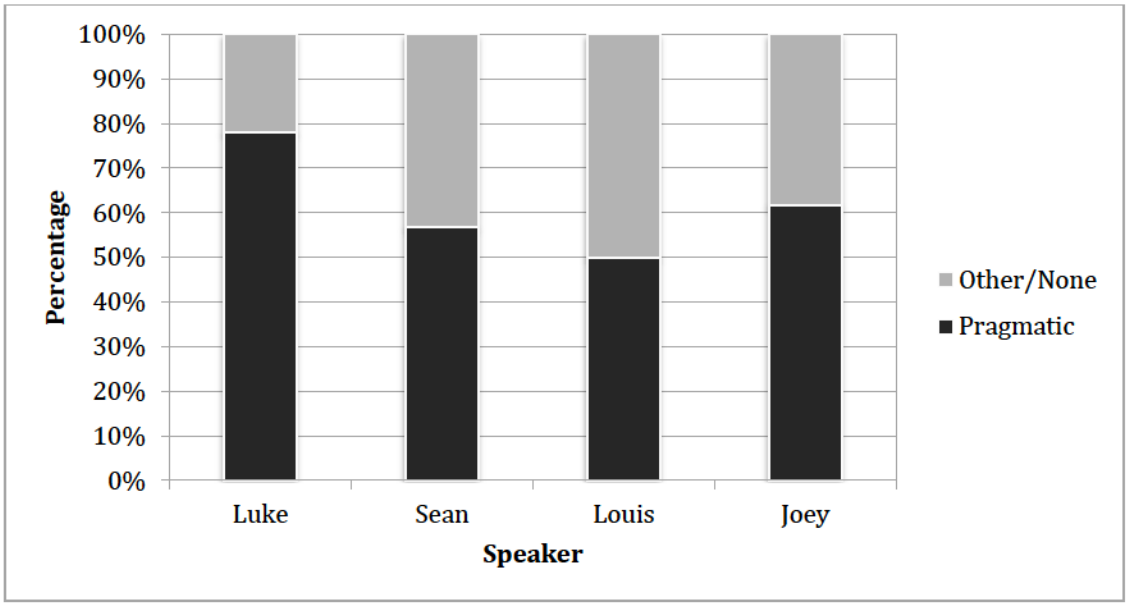


Figure 14. Ratio of the function of overall formulaic expression tokens by speaker. This figure compares the ratio of formulaic expressions with pragmatic function to formulaic expressions with another or no function, across participants.

However, as illustrated in Figure 14, participants used formulaic expressions associated with pragmatic functions at the same or greater frequency than formulaic expressions with another or no function. While there is likely to be some overlap between the two types of functions in that using a formula for socio-interactive purposes may simultaneously reduce processing strain, for example, the prevalence of formulas with pragmatic purposes in these findings is suggestive of socio-interactive motivation. The prevalence of formulas associated with pragmatic functions alone does not confirm pragmatic abilities, as they may have been used without any functional intent. However,

the ratios illustrated in Figure 14 combined with the breakdown of UVB by function presented in Figure 13 do suggest that some formulas are used as social devices in ASD. In this respect, the findings resonate with previous research (e.g., Prizant & Duchan as cited in Prizant & Rydell, 1993; Sirota, 2004; Vogindroukas & Zikopoulou, 2011) that indicates that pragmatic abilities in ASD may be deficient but are not completely nonexistent. It suggests that the participants not only have a social agenda, but also that they use formulaic language to meet their social needs.

6.2.4. Variability of formulaic expressions. While the above data suggests pragmatic abilities beyond those that are generally attributed to persons with ASD in the research literature, it does not reveal the variability in formula use. That is to say, solely based on the measure of token frequency, it is possible that participants are making extensive use of a single or small set of formulas as opposed to using the large variety of formulaic expressions typically acquired by non-ASD speakers. To distinguish between these two situations, a type-token analysis was carried out.

The results of type-token ratios for all four participants are provided in Figure 15 (see page 159). Type-token ratios are provided for the overall formula counts and for formula counts excluding UVB for the purpose of illustrating the impact of UVB on measures of variability.

The figure below indicates that type-token ratios for overall formulaic expressions was greater than 0.5 for all speakers. That is to say, the participants tended to use a range of formulas and comparatively few repetitions. The relationship between type-token ratios for overall formulaic expressions and type-token ratios for formulaic expressions excluding UVB (i.e., immediate and delayed echolalia and perseveration) varied from

participant to participant. Note that no measure of type-token ratio for formulaic expressions excluding UVB was provided for Sean, as he did not use any UVB formulas in the 250-word excerpt. For Luke and Louis, excluding UVB resulted in a comparatively lower type-token ratio, while for Joey, excluding UVB from type-token calculations resulted in a comparatively higher ratio.

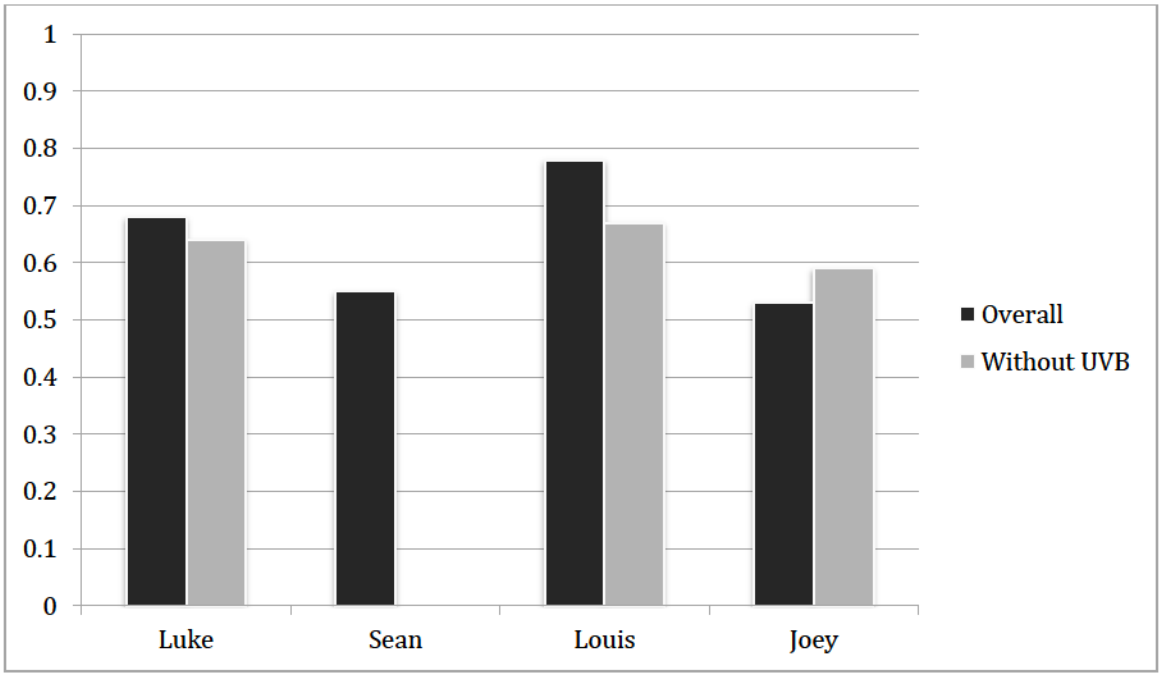


Figure 15. Type-token ratios of formulaic expressions by speaker and conventionality. This figure compares type-token ratios for overall formulaic expressions and formulaic expressions excluding unconventional verbal behaviour (UVB), by speaker.

This trend can be attributed to the categories of UVB that were identified in each participant's segments. The most frequently appearing UVB in Joey's excerpt was perseveration, while the most frequent UVB in Luke and Louis's excerpts were immediate and delayed echolalia. Perseveration in particular is likely to impact type-token ratios by decreasing the score because it consists of a single utterance (type) being repeated on several occasions (tokens). In this case, Joey's utterance was repeated eleven times. Conversely, immediate echolalia and delayed echolalia, while being examples of

repetition, do not entail cyclical production (Prizant & Rydell, 1993). Therefore, it is more likely that an echolalic utterance will give a type-token ratio closer to one because each echo (type) is only produced once (token). This generalization was true with respect to immediate echoes, although Louis did repeat some delayed echoes on a few occasions throughout the excerpt. Therefore, while immediate and delayed echolalia tend to increase overall type-token ratio, perseveration tends to decrease the overall type-token ratio. Thus, the variability in the participants' use of formulaic expressions was tied to the types of UVB observed in their speech. This, in turn, is likely to impact impressions of the degree of formulaicity of their speech.

6.2.5. Summary of quantitative analysis. The quantitative findings indicate that all four participants, regardless of expressive language ability, used a range of formulaic expressions both with and without pragmatic functions. Not only did they use formulaic expressions frequently, but also they used several types of formulas instead of repeating the same formula. While there was considerable variation across speakers in terms of the categories of formulas and their frequencies, this was attributed to the differences in contextual factors observed in each recording session.

The quantitative findings indicate that formulas with pragmatic functions were used, but say nothing of what those functions were or whether they coincided with the form-function pairing of the sequence. Sequences with pragmatic functions might have been instrumental or self-serving, such as those used to manipulate others. Conversely, they might have been relational in nature, such as formulas that assert group identity and establish a relationship with the interlocutor. The latter would be indicative of higher-

level social interaction and communication skills than the former. The quantitative analysis was not sufficiently fine-grained to make this distinction.

With the exception of immediate and delayed echolalia, which were coded on a case-by-case basis, all other sequences were grouped according to function without further analysis based on category membership. Consequently, up to this point, the descriptor *associated with a pragmatic function* has been used to as opposed to *used functionally*. The difference lies in the form-function pairing of the formula. That is to say, using a wordstring that is typically associated with a function in the communal language does not imply per se that the sequence has the same form-function pairing in the idiolect. This is an important distinction to make as it has several implications for intervention in ASD. In demonstrating that persons with ASD do in fact have access to formulaic sequences, the next question is to determine whether these forms have a typical form-function pairing or whether the pairing is idiosyncratic. The latter must be considered as language use in ASD is idiosyncratic (APA, 2013). If formulas are found to have a conventional form but an idiosyncratic function, intervention becomes a matter of teaching appropriate use of formulas as opposed to teaching formulas.

In order to better understand the functions of participants' formulaic language, a case-by-case functional analysis was required. To this effect, a qualitative analysis was carried out on select sequences chosen throughout the transcript. The findings are presented and discussed in the following section.

6.3. Qualitative Analysis of Formulaic Language

The remainder of this chapter presents and discusses the findings of a qualitative analysis of select formulaic expressions used by the participants. This section examines

the relationship between the form and function of formulaic expressions in order to better understand the nature of formulaic language use. It is divided into three parts: idiosyncratic formulas with a function, conventional formulas with an idiosyncratic function, and conventional formulas with a conventional function. A total of 36 sequences, or nine for each of the four participants, is discussed in this section. The key factors that led the researcher to identify each of the sequences as formulaic are integrated in the discussion. For a full breakdown of each sequence in terms of the eleven criteria proposed by Wray & Namba (2003) for identifying formulaic sequences, see Appendix L.

6.3.1. Idiosyncratic formulas with a function. The first part of the qualitative results section presents seven idiosyncratic sequences that have been harnessed by participants to execute a number of functions. Idiosyncratic sequences are those that would not meet the criteria of institutionalization or frequency with respect to the communal language. They are strings of words that a naïve native speaker would not recognize as formulaic. When considered within the participants' idiolect, the sequences may be identified as formulaic despite the fact that a naïve outsider would not necessarily understand the form-function pairing of each sequence. The functions of the seven examples presented in this section are varied and range from manipulating others to self-directing to providing a processing shortcut to serving as input for further analysis.

It is not surprising that this study found evidence of idiosyncratic formulas having social and cognitive functions. Previous ASD research findings suggest that idiosyncratic phrases can have a form-function pairing in the speaker's idiolect (e.g., delayed echolalia, see Prizant and Duchan, 1984; idiosyncratic requests, see Volden & Sorenson, 2009).

However, the scope of these studies was limited in that their analyses were focused exclusively on echolalia or politeness sequences. The findings of this study extend the previous research by including idiosyncratic formulas, such as Example (6) and Example (7), which are neither echoes nor derivations from politeness scripts.

The first three sequences presented in this section are segments of delayed echoes taken from computer games and television shows. They are used by the participants as devices of social interaction to control the direction of the play and to fulfil their needs through the SLP.

(2) The SLP is holding a Minnie and a Mickey toy. Louis wants both.

Louis	I want Minnie and Mickey please.
SLP	Okay well here's Minnie.
Louis	**And here's Mickey**.
SLP	@@@ Here's Mickey.

Louis's utterance, *And here's Mickey*, was isolated from a longer delayed echo of the script for *Disney's Mickey Mouse Preschool*, a computer game narrated by characters from Mickey Mouse. Throughout the play session, Louis used the script to direct and describe his play with toys from Mickey Mouse. Self-directing was initially identified as a function of delayed echolalia by Prizant and Duchan (1984).

In the computer game, several Mickey Mouse characters are introduced using a similar structure. Therefore, while the entire utterance, including the noun, has been identified as a formula in Louis's idiolect in Example (2), it is possible that Louis has segmented the original sentences and has represented the formula as *and here's [noun]*. In this case, the formula would be considered a frame with a slot as opposed to a single unit. However, Louis only used *And here's [noun]* to introduce Mickey Mouse figures despite having played with figures from several other television programs. Therefore, he

could potentially have represented all the variations heard in the computer game as separate units (e.g., *And here's Daisy*, *And here's Mickey*) rather than segmenting them into a frame and slot formula (e.g., *And here's [noun]*). Thus, the sequence was treated as an unanalyzed unit isolated from a longer formula rather than a frame and slot combination. While a frame and slot combination might have been considered a conventional formula, the formula viewed as a single unit is idiosyncratic.

The particular instance of use in Example (2) was notable because it did not occur within the context of self-directed play. Rather, Louis used the formula as a follow-up request when he only received one of the two toys he had asked for. Additionally, he held out his hand to get the toy when he produced this utterance, which supports the assessment of the sequence's intended function as a request. Thus, the formula in Example (2) was segmented from a delayed echo but applied purposefully. This evaluation is in line with Louis's current productive abilities – his mother indicated that over the course of the past year he has been adapting scripts to fit the circumstances.

(3) The SLP and Louis are playing with *Wiggles World* toys.

SLP	Orange. Okay, waiting. I found Sam's dog. (barking sounds)
Louis	Dog is leav- **The dog is leaving**.
SLP	The dog is leaving? I don't want the- You don't want the dog?

Unlike Example (2), the sequence in Example (3) could not be confirmed as a delayed echo. However, there was evidence to suggest that Louis encountered this sequence in an episode of the television show *Wiggles World*. First, all other instances of verbs conjugated in the present perfect in Louis's transcript were related to *Wiggles World*, including lyrics from songs such as "Toot Toot, Chugga Chugga, Big Red Car" ("Toot Toot, Chugga Chugga, Big Red Car", n.d.). Additionally, one of the characters in

Wiggles World is a named Wags the Dog, so the sentence would make sense within the context of the show. Thus, while a preliminary search of episode transcripts did not reveal the sentence *The dog is leaving*, there was evidence to support the speculation that the utterance is a delayed echo from an episode of *Wiggles World*.

The first attempt at producing the sequence *the dog is leaving* can be interpreted in one of three ways. Two of these suggest derivation from a formula, thus supporting the proposal that *the dog is leaving* is a formulaic utterance. The third possibility, which interprets the utterance as novel speech, is unlikely based on an assessment of Louis's expressive abilities. Louis's initial production of the sequence in Example (3) was transcribed as *dog is leav-*, which represents a nearly complete present perfect conjugation. This transcription imposes an interpretation of the sequence as an incomplete telegraphic echo of the original formula. Conversely, the utterance could also have been transcribed as *dog is leave*. This interpretation could constitute a mitigated, albeit ungrammatical, echo of the formula *the dog is leaving*. Alternatively, it could be the result of a propositional utterance created using incomplete grammatical rules. However, the latter is unlikely as Louis's mother indicated his current expressive language is predominantly at the one-word stage. Therefore, while it is impossible to determine whether the production was a telegraphic echo or a mitigated echo, it is not likely that it was created propositionally. Rather, the two most plausible interpretations suggest that the initial production was derived from a formula. Thus, the first incomplete utterance reinforces the proposition that *the dog is leaving* is a formulaic expression in Louis's idiolect.

Additionally, the interpretation of the initial production as a telegraphic or a mitigated echo suggests that Louis may have segmented the original formula, though the extent of the segmentation cannot be established based on the information available in the transcript. The segmentation of the formula could potentially have been supported by the frequent use of similar structures throughout episodes of *Wiggles World*, with sentences such as *Anthony is eating* ("Toot Toot, Chugga Chugga, Big Red Car", n.d.).

As in Example (2), Louis used a sentence from a script to express a function beyond the meaning of the words themselves. The SLP introduced a dog into the play, to which Louis responded by saying that the dog was leaving. As a statement, it was in fact a false description of the ongoing action. Therefore, his utterance is best interpreted as a means of protesting the SLP's attempt to join in play with the dog. As illustrated above, the SLP indeed responded to the causative interpretation of the sequence as opposed to the descriptive one. Thus, as in Example (2), this example indicates that Louis used a segment of a script associated with the toys that were being played with and successfully applied it to manipulate his interlocutor's behaviour. Again, this contextualizes his mother's statement that he has begun using script segments for interactive purposes.

In conversation, Louis's mother indicated that he generally only repeats utterances from movies or computer games, not from other people. Specifically, she said that other people's speech is rarely "flashy" enough. As LaCAS proposes that language emerges through instances of use (The Five Graces Group, 2009), this preference can be expected to have a considerable impact on language. Not only is Louis more likely to be engaged by movies or computer games and hence attentive to the language, but also he is more likely to repeat the language from those sources. Therefore, it is not surprising that

idiosyncratic sequences should emerge in his language as a result. Rather than being deviant forms of formulaic language, they are the result of the same processes acting on qualitatively different input.

(4) Luke is playing with the Grover puppet.

SLP	Hey Grover what can we play?
Luke	**Guess what you are thinking about today**?
SLP	I don't-
Luke	((SINGING))
SLP	I don't know. What can I be thinking about? I think I'm thinking about elephants.

In contrast with the two previous examples of formulaic sequences, Example (4) appears to be a semantically malformed utterance; it is odd to ask someone to guess what he or she is thinking about. In this respect, a potential conclusion based on a naïve native speaker interpretation of the sequence would be to suggest that *guess what (optional dependent clause)* is an underanalyzed formulaic sequence that Luke has unintentionally applied inappropriately based on the semantic incoherencies. *Guess what* meets the criteria for formulaicity in several respects: according to *The Corpus of Contemporary American English* (Davies, 2008-), *guess what* appears 16.5 times per million words in spoken conversation and so it is likely to be known to native speakers; it has a function beyond the meaning of the individual words; and, the words are fixed in that replacing *guess* with other synonyms such as *estimate*, *suppose*, etc. changes the meaning of the sequence.

However, this interpretation would be inconsistent with the ongoing play and the information provided by Luke's mother in the Parent Observation Sheets, which suggest that the sequence is likely a segment from *Elmo's World*. As idiosyncratic sequences are by definition characteristic of the speaker's idiolect, not of his or her speech community,

the idiolect-based segmentation of idiosyncratic sequences must be favoured over the communal language interpretation. The fact that echoes may appear to blend novel and formulaic utterances is a reflection of two processes: the speaker's processes that led to the production of the original sequence and those that were involved in the listener's interpretation of the repetition. It does not reflect the processes that led to the echoing of the sequence.

Further analysis of the sequence helps explain why Luke chose this sequence and what it was intended to do. Like the rest of Luke's scripts in this portion of the play session, Luke was borrowing material from *Elmo's World*. A cursory look at *Elmo's World*'s videos revealed sentences such as *Can you guess what Elmo is thinking about today*? (Sesame Workshop, 2014a) and *Guess what Elmo is thinking about today*? (Sesame Workshop, 2014b) in the opening scenes. When compared with the formula identified in Example (4), these examples suggest Luke may have segmented the delayed echo such that the beginning of the question is optional and the pronoun and conjugated verb are variable. Potentially, he has represented the formula as: *(Can you) guess what [pronoun] [to be] thinking about today*? Like Louis's segmentation of Example (3), Luke's segmentation was potentially facilitated by the recurrence of similar sentences with minor variations in different episodes of the television program. As discussed in Section 6.1.1.3, the lexical and structural correspondence between the sequence produced by Luke and those of the original utterance are indicative of long-term holistic storage rather than online reconstruction of a script.

Luke also used a voice similar to Elmo's when delivering the sequence, thus marking it phonologically. However, it is worth noting that Luke and the SLP were

playing with puppets when this sequence was produced. Thus, this phonological marking may, to an extent, have been related to the toys more than an indicator of formulaicity.

Luke used the sequence to move the play in the direction of his choice, following the general succession of *Elmo's World* episodes. In contrast with Example (3), Luke used the sequence to engage the interlocutor in play as opposed to refusing her intent to participate.

Example (4) presented a clear case of the importance of contextual information, especially from a knowledgeable informant, to support the analysis of formulaic language in the speech of persons with ASD. If native speaker intuition had been used as the sole a priori screening method, this sequence would likely have been incorrectly segmented; several factors, discussed earlier, suggested that *guess what* was a formulaic sequence in and of itself. It also demonstrated the value of having access to the original utterance that was produced. Determining whether an echo is mitigated, or partially analyzed, requires having access to the original utterance. In this respect, Example (4) also illustrated the value of knowledgeable informants to guide the researcher towards media sources that can be scanned for the original production. In order to confirm the characteristics of an idiosyncratic sequence, be it its appropriate segmentation or its flexibility, the researcher must take extra steps in the analysis phase.

The following is yet another example of scripting in the participants' play. However, it differs considerably from Examples (2)-(4) because of its intended function. While the first three were at the very least socially instrumental, if not interactional in nature, the formulaic sequence in Example (5) solely functioned to narrate or guide

Louis's play. In this instance, Louis had toy figures of Mickey Mouse characters and was using them to enact the script he was narrating aloud.

(5) Louis is playing with figures of characters from Mickey Mouse.

Louis	**Look, here comes Daisy. Hiya Daisy. How's business? Oh, business is busy, busy, busy**. ((UNINTELLIGIBLE MICKEY MOUSE INTONATION)) **Coming Mickey. Bye Daisy. Goodbye. Bye**.

The sequence in Example (5), like Example (2), is part of a script from the computer game *Disney's Mickey Mouse Preschool*. The delivery of the entire segment is striking for similarity to the voices of the Mickey Mouse characters; even the utterances that could not be transcribed because they were mumbled were clearly a continuation of the script based on the intonation patterns. In this respect, the sequence bears some similarities to unanalyzed language units seen in the early language acquisition of typically developing children, which have "a 'melody' unique enough so that [they] can be recognized even if rather badly mumbled" (Peters as cited in Lin, 2010, p. 176). However, the unintelligible portion of this example differs from the description of Louis's Donald Duck echoes given in Section 6.1.1.3, wherein Louis's speech was incomprehensible because he was imitating the inaccurate articulation of the original production. Here, Louis's sentence cannot be understood not because he replicated the articulation of the original utterance, but rather because he mumbled the sequence. The sequence was reproduced clearly elsewhere in the transcript therefore the mumbling did not reflect incomplete knowledge of the script. This further supports the proposition that the formula was self-directed and functioned solely to narrate Louis's play. As it was not directed to the SLP, vocalizing loudly enough to be clearly understood was not necessary.

The sequence also stood out for its length. Excluding the unintelligible segment, this example represented Louis's second longest uninterrupted run of speech in the entire transcript.

In total, Louis repeated this script, or considerable portions of it, 17 times throughout the entire play session. However, not all instances of scripting were examples of self-directed play; sometimes he repeated this segment while playing with toys that were not Mickey Mouse characters or while cleaning up. Therefore, while contextual information in the video suggests that Example (5) is an example of a script functioning as a means of self-directing or thinking aloud, each reoccurrence of the script must be analyzed separately with regards to the context of use. That is to say, a single form-function pairing cannot be attributed to the formula. While "cross-functioning" (Moon as cited in Wray & Perkins, 2000, p. 8) has been discussed with respect to formulas in non-ASD speech, it is possible that it is even more a characteristic of formulas in ASD. Formulas in ASD can have both interactive and non-interactive functions such as situation association, rehearsal, or non-interactive labelling (Prizant & Rydell, 1984). Therefore, the possibilities for "cross-functioning" (Moon as cited in Wray & Perkins, 2000, p. 8) may be increased compared to non-ASD speech, wherein non-interactive functions are likely less prevalent.

However, even formulas produced with non-interactive goals are important in the development of the speaker's idiolect. According to the principle of perceptual dynamics of LaCAS (The Five Graces Group, 2009), each instance of language use leads to a reorganization of the representational system. Thus, it is possible that repeated uses of a formula, regardless of interactional function, might strengthen the cohesion of the

formula as a unit similarly to the way in which frequently used generative utterances can be fused together (see Peters, 1983),

Example (6) stands in stark contrast to Example (5) in terms of the characteristics that led to its identification as a formulaic sequence. Even without any information from a knowledgeable informant, Example (5) would likely have been identified as a formula based on its frequency in the transcript and the prosody of its delivery. In both of these respects, Example (6), on the other hand, appeared to be a novel utterance. The fact that two idiosyncratic sequences can have such different characteristics of formulaicity suggests that research methods must incorporate a range of approaches to successfully identify idiosyncratic sequences. In order to identify delayed echoes from non-media sources, collecting longitudinal data, for example, may help substantiate information from knowledgeable informants.

(6) The SLP and Joey are deciding what to play next.

SLP	How about some machines?
Joey	**Do you wanna lie down with me in the blue room**?
SLP	Say it again?
Joey	**Do you wanna lie down with me in the blue room**?

Without the benefit of a knowledgeable informant, there is nothing about the previous example that sets it apart from a novel sentence such as "*The cat often sits on the sofa*" (Van Lancker Sidtis, 2012a, p. 65). Even the reduction of *want to*, which is an indicator of formulaicity (Lin, 2010), could be interpreted as a characteristic of an informal register instead (Carter & McCarthy, 2006). However, background information led to the conclusion that the sequence as in fact a formula that Joey used as a request. Joey's mother explained that he asks this particular question when he wants to read. She added that he will often ask using made-up sign language, pointing at the person to

indicate *you*, folding his hands like a pillow to symbolize *lie down*, signalling himself to show his intent to participate, and finally pointing to something blue to represent the *blue room*.

In this example, the SLP failed to understand the pragmatic intent of the sequence and Joey's mother intervened to explain what he meant. As discussed in Section 6.1.2.1, Joey had not seen the SLP in 2 years. Therefore, while she was a familiar adult for Joey, she likely was not aware of the sequence's intended function because of the amount of time that had passed since the last time they saw each other. With familiar adults who interact with Joey on a regular basis, however, Joey's sequence could likely be used successfully to request that they read a book.

The formula in Example (7) has been included because it illustrates an instance in which the speaker has marked the formula lexically, "making it quite clear that the wordstring is being treated holistically" (Wray & Namba, 2003, p. 31). Sean was not the only participant to demonstrate awareness of sequences. As noted in the Chapter 5, Luke did so by introducing a script using utterances such as *Do you know this*? and *It's from*. Joey and Louis, on the other hand, directly identified the source of the script when prompted to do so by the SLP. Thus, they recognized that they did not create it and demonstrated their awareness of the source of the formula. Sterponi and Shankey (2014) indicate that prior to their study, no one had questioned "the assumption that the child with autism is unable to highlight the borrowed status of the source material" (p. 6). As in this study, they found evidence that their participant was aware of the external source and able to identify it, albeit in terms of voicing variations.

(7) Sean is explaining how *Skylanders* works.

SLP	Oh.

Sean	But but but they've got some sort of connection in them and then when you put it to this onto this **portal of power** they call it
SLP	Wow.
Sean	Uh that's the *Skylanders* way to call it. There's this extension cord that plugs into the *Wii* and that connects that figure to the *Wii*.

The lexical demarcation of the sequence using *they call it* draws attention to the sequence and facilitates its identification as such. Furthermore, it indicates that the name of the pedestal is meaningful and established in certain social circles.

The sequence in Example (7) was considered idiosyncratic because the majority of speakers would not recognize it nor would they be able to fill in the blank correctly if they were given "portal of __" on a handout; the second is a verification method proposed by Van Lancker-Sidtis and Rallon (2004). On the other hand, individuals who play *Skylanders* would likely be able to do so. In adhering to specialized terminology rather than referring to the Portal of Power as a pedestal for the figures, Sean is asserting his membership as part of a group.

The final example, like the previous one, has been marked within the surrounding text in a way that suggests it is a unit. However, while Example (7) was marked lexically with a phrase, Example (8) stands out in the context of the utterances because of the functional contradictions of the two formulas that have been combined into an utterance. *Please* is used to make a polite request both in Louis's idiolect and in the communal language; conversely, the first sequence, *I don't want to give you Daisy* is a refusal. Thus, the combination of these two formulas with incompatible functions suggests that Louis has not fully analyzed the attributes of the echo.

(8) The SLP wants to trade toys with Louis.

SLP	No. Okay, you can have Mickey if I can have Daisy. Can I have Daisy?
Louis	No Daisy.
SLP	‘Kay. I don’t want to give you Daisy.
Louis	**I don’t want to give you Daisy** please.

(9) The SLP wants to trade toys with Louis.

Louis	Can I have one Minnie please?
SLP	Okay. Can I have Daisy then?
Louis	No Daisy. I don’t- I don’t- give- I don’t want give Daisy.

In Example (8), there were several additional indicators that Louis’s utterance was formulaic. First, it was an immediate repetition of the SLP’s preceding utterance. Additionally, he said it using the same intonation pattern as the SLP. Local repetition is proposed by Wray and Namba (2003) as a marker of formulaicity. It is only possible to rely on this marker if the data supports it; for example, analysis of transcriptions must include all speakers, not only the speaker whose idiolect is of interest. Furthermore, Louis’s first utterance in Example (8) illustrates his tendency use the core negative word *no* in structures such as *No X* or *No thanks* when formulating negative declaratives rather than using *don’t* or *do not*. Together, this evidence suggests that Louis’s production in Example (8) was a formulaic sequence and that it as intended as a refusal of the SLP’s request to trade toys.

Despite the short duration of the recording session, the transcript included evidence to suggest that the formula in Example (8) had potentially been segmented by the participant, as illustrated in Example (9).

In repeating the SLP’s sequence in Example (8), Louis had the opportunity to practice a new negative declarative structure. This structure was reinforced throughout the play session through other prompted repetitions using *I don’t*. Approximately five

minutes later, an identical situation arose wherein the SLP wanted to trade a toy for the figure of Daisy. On this second occasion, Louis was able to reproduce a sequence that appears to be derived from the sequence he had practiced earlier. It seems to be a telegraphic echo of the formula in Example (8). While the extent of segmentation of the sequence in Example (9) cannot be determined, Examples (8) and (9) in combination provide evidence of sequences being used as material for analysis. Example (9) is especially noteworthy as an example of segmentation as it was the first and only instance in the transcript in which Louis used *don't* to form a negative declarative without a model from the SLP immediately preceding it. While Louis continued to use *No X* as a preferred structure, Example (9) indicates that he may eventually learn a more grammatically complex means of expressing refusal.

As discussed in relation to Example (5), "every instance of language use changes an idiolect's internal organization" (Bybee as cited in The Five Graces Group, 2009, p. 16). Louis echoed various sentences that had all been formed with auxiliary *do* negation but had different direct objects. The combination of structural consistency and direct object variation it may have promoted the segmentation of the echoes. Segmentation was also likely encouraged by the effectiveness of the sequences as the SLP responded behaviourally to echoes using *I don't* but not to refusal structured using *No X*.

6.3.1.1. Summary. To summarize, the above section provided evidence that the participants used a range of idiosyncratic formulas to execute a range of social and cognitive functions. The idiosyncratic formulaic sequences presented in this section can be grouped into one of three categories: formulas that stem from media, formulas that are immediate repetitions of an interlocutor's utterance, and formulas that appear to be novel

constructions. Each type has different implications for data collection and analysis in studies of formulaic expressions in ASD. However, regardless of the subtype of idiosyncratic sequence, native speaker intuition alone was insufficient for the correct identification and demarcation of novel and formulaic utterances.

The following section discusses the use of formulaic sequences that appear to be conventional but that have form-function associations unique to the participants.

6.3.2. Conventional formulas with idiosyncratic functions. The second section of the qualitative results analysis deals with conventional sequences that have idiosyncratic form-meaning pairings. Unlike the sequences in Examples (2) to (9), these sequences are strings of words that would be known to naïve native speakers. However, they remain idiosyncratic in that participants used these sequences for unconventional purposes. The combination of a conventional formula and an idiosyncratic function raises an interesting implication for research methods. While methods of identification that pertain to the communal language such as native speaker intuition may be applied to identify a formula, an idiolect-based analysis of function is still required to complete the form-meaning pairing as it pertains to the speaker's idiolect. Thus, despite the conventionality of the sequence's form, contextual information and knowledgeable informants remain as important as they were for the idiosyncratic sequences discussed in the previous section. A total of 11 formulas are presented in this section.

Although a documented phenomenon in aphasia (e.g., Van Lancker as cited in Wray & Perkins, 2000; Wray, 2002) and Alzheimer's disease (e.g., Bridges & Van Lancker Sidtis, 2013; Wray, 2008), the use of conventional formulas with idiosyncratic functions has not been specifically addressed to date in ASD. The conclusions drawn

from research on aphasia or Alzheimer's disease are not necessarily applicable per se to language in ASD because of the different circumstances that led to the form-meaning pairings. In Alzheimer's disease and aphasia, conventional formulas presumably were ascribed conventional functions prior to the onset of the neurological damage. The additional functions the formulas adopt result from being unable to access novel language or formulas that convey the intended function (Van Lancker as cited in Wray & Perkins, 2000). Conversely, in the idiolect of a person with ASD, a conventional formula may always have had an idiosyncratic function. Cognitive differences associated with ASD such as the association of sequences with environmental features, internal states, sensations, etc. (Prizant, 1983) combined with deficits in joint attention (Wetherby et al., 2004), for example, might lead to an idiosyncratic form-function pairing in language acquisition. The fact that the string of words of the idiolect sequence matches that of a communal formula might be merely coincidental, although characteristics such as frequency and striking prosodic patterns (e.g., alliteration, see Lindstromberg & Boers, 2008) might increase the probability of communal formulas being taken up in the idiolect. Thus, while conventional formulas with idiosyncratic functions are seen in aphasia, Alzheimer's disease and ASD, they emerge from different "preexisting cognitive abilities, processing idiosyncrasies, and general and specific conceptual circuitry of the human brain" (The Five Graces Group, 2009, p. 17).

The first example of a conventional formula with an idiosyncratic function is unique when compared to formulas in aphasia of Alzheimer's disease in that it potentially represents an underextension of the conventional formula's function. The formula in Example (10) generally serves to create a connection between two related ideas in

discourse. However, here it is used idiosyncratically in that the expected connection is not completed.

(10) Joey is looking through computer game CDs.

SLP	You have no clue? What are you finding up there? Oh there we go. Some old games. Some old computer games.
Joey	*Action Words*. *HearBuilder*. **This is nothing**.
SLP	This is nothing? You don't like those? @@ What would you like to find Joey?

This is nothing is potentially a formulaic sequence derived from the more explicit comparative frame *X is nothing (compared to/with X)*. Joey's prosodic delivery of the sequence supports this assessment as the stress and intonation of the shortened sequence coincide with that of the fully expanded formulaic sequence; as expected, Joey shortened the vowel in *is* and emphasizes the first syllable of *nothing*.

While the connector between the two ideas is optional (e.g. *This is nothing. Yesterday I did twice as much work without any help.*), typical use of the sequence *this is nothing* would involve a follow-up comment that explains the superior thing the subject is being compared with. However, in Example (10), when Joey said, "this is nothing", he put the CDs away and did not complete the frame. Thus, the sequence functioned not to connect two ideas in discourse but solely to express his lack of interest in the topic. In this respect, it could be considered an underextension of the conventional formula as only the first component of the relator was expressed. It is unclear whether Joey was aware of the expected use of the sequence based on the data in the play session as he only produced the formula on one occasion.

Thus, Example (10) potentially represents an idiosyncratic form-function pairing that would not be expected in disorders such as aphasia or Alzheimer's disease. Formulas

in adults with aphasia or Alzheimer's disease are best described as overextensions. Underextensions would not be expected because acquisition is complete prior to the neurological damage that leads to the communicative strategy of overextension. Conversely, in ASD, underextensions as well as overextensions may occur as the unique the cognitive idiosyncrasies are present prior to the initiation of language acquisition.

Examples (11) to (14) illustrate cases of overextended functions; that is to say, the expected function was attested but the formulas also took on additional functions in the speech of the participants. Examples (11) to (13) present a series of exemplars of a formulaic sequence rather than a single case to demonstrate how the formula adopted more than one function in Louis's speech.

(11) The SLP is trying to join Louis in play.

SLP	Look, here comes Daisy. Daisy, do you want to play with us?
Louis	**No thanks**.
SLP	No thanks?

(12) The SLP tries to join Louis in play.

SLP	Can we play too?
Louis	**No thanks.**
SLP	No thanks? But I really want to play.

(13) Louis and the SLP are playing with *Wiggles World* figures.

SLP	No you don't. Hm. Here's here's Elmo. Hi. Can I ride in the big red car?
Louis	**No thanks**. No, that's not right.
SLP	No that's not right? You don't want Elmo?

Louis was taught the sequence *no thanks* explicitly by his parents. *No thanks* is an expression commonly used to decline an offer. It is more polite than *no* alone, yet not as formal as *no thank you*. In Example (11), Louis used the sequence appropriately to decline the SLP's offer to join her in play. Thus, it can be considered an example of a typical sequence being applied appropriately. However, Examples (11) and (13) are

somewhat different in that they represent what appear to be overextensions of the formula's use. In both cases, the SLP was not offering something to Louis, but rather she was asking for his permission. The use of *no thanks* is unusual in this context; a more expected response to deny permission would simply have been *no* or *no, you can't*.

As in the previous examples, it appears that Joey uses certain formulaic sequences in both contextually appropriate and idiosyncratic ways.

(14) The SLP is recording Joey on the tablet.

SLP	I am taking a movie of you. Tell me Joey, what are you going to do after you leave here afterwards?
Joey	**I have no clue**.
SLP	You have no clue? Are you hungry? Did you eat your lunch yet?
Joey	**I have no clue**.

Joey is resorting to the sequence *I have no clue* to respond to the SLP's questions. In the first instance, the response was appropriate with respect to the question; it is entirely plausible that he did not know what they are going to do after leaving the recording session. However, the second usage is unusual and is an example of a conventional sequence being overextended. There is a possibility that Joey did not know whether or not he was hungry – the ability to feel or interpret hunger is sometimes impaired in ASD (Wheeler, 2004). However, it does not follow that Joey would not have known whether had eaten his lunch yet. Throughout the play session, Joey used the expression a total of five times, indicating that he relied upon the sequence to a considerable extent. In three of the cases the response was plausible while on the other two occasions, it was not. Therefore, it seems likely that Joey used the sequence as a response to questions or even turn-taker instead of employing it exclusively to express that he did not know the answer to a question.

Thus, in Examples (11) to (14), both participants appear to have overextended the function of a conventional sequence; *No thanks* was used by Louis as a negative answer to both offers and requests, while *I have no clue* was used by Joey as a response to questions regardless of the logical consistency. It is interesting to note that both overextensions described above occured in response to high constraint question forms that tend to increase echoic behaviour (Prizant & Rydell, 1993). It is possible the interaction of several factors reinforced the formulaic responses as a more socially appropriate response than echolalia. This could ultimately have led to an overextension of the formulas' functions. Interacting reinforcement mechanisms might have included: direct instruction and reinforcement of politeness sequences by parents, positive reinforcement by having achieved a desired reaction in social interactions by using the sequence, or language interventions similar to Schreibman and Carr's (as cited in Rehfeldt & Chambers, 2003) reduction of post-question echoes in children with ASD by "differentially reinforc[ing] stating 'I don't know' in response to unfamiliar questions" (p. 259).

(15) Louis has the Grover puppet and wants to play with the ukulele.

SLP	Okay I'll take the ukulele out of the bag. Aw it's so cool.
Louis	Oh haloha **I was just** practicing my ukulele.
SLP	I was just practicing my ukulele @@ Oh Gro- wait a second. Oh wait that's his foot. He can't do it with his foot. Just a second. Grover, you play the ukulele so well.

Louis's mother indicated that the formula in this Example (15), while recognizable by native speakers, is a recurring sequence in *Global Grover* that Louis uses frequently. *Global Grover* is a segment of the television program *Sesame Street* that Louis particularly enjoys. Louis imitated Grover's voice when producing the segment. However, as remarked in Example (4), there is also the possibility that the mimicry of

voice quality was related to the fact that the participant was playing with a puppet when he produced the utterance. To Louis's mother's knowledge, there has never been an episode in which Grover is playing the ukulele. Therefore, this utterance is also an example of a script that has been partially segmented and modified to fit the context.

In this example, Louis was playing with a Grover puppet while the SLP pulled out the ukulele he had requested. Based on the transcript alone, Louis's statement could have been interpreted as an accurate reflection of the play. However, the video data indicated that this was not the case. Rather, the formula's function in Example (15) was best described as a request for the ukulele according to the ongoing activity in the video recording. At the point in time when Louis produced the utterance, the SLP was playing the ukulele. Louis accompanied this sequence by positioning the Grover puppet behind the ukulele and pulling it away from the SLP. From this information, we can determine that this is not the expected usage of the sequence *I was just*, which is generally used to signify that the speaker was interrupted while doing something or had recently finished doing something.

On this occasion, the segment of the script and the communal expression are the same; thus, the example has been categorized as a conventional formula with an idiosyncratic function as opposed to an idiosyncratic formula with a function. In contrast with an idiosyncratic formula as defined in this study, a naïve native speaker would likely recognize the formula in Example (15). As discussed previously, there are likely to be several recognizable conventional formulas in delayed echoes. Nonetheless, it is not always the case that the echo will be segmented in such a way that it aligns with the conventional formula.

In some respects, Example (15) is similar to Example (3), in which Louis used the delayed echo *the dog is leaving* to indicate that he did not want to incorporate the figure of the dog in his play. In both cases, Louis appears to have made an association between an event occurring in the television program, such as Grover carrying out an activity or the dog leaving in *Wiggles World*, and the sentence being said at the time. He then used the sequence to duplicate that event in the play.

The identification and classification of the formula in Example (15) was supported by a knowledgeable informant. Conversely, for the following sequence, it was based on repeated occurrences in the transcript.

(16) Luke is looking for an elephant.

Luke	**I thought-** I must need an elephant.

(17) Luke and the SLP are playing with puppets.

Luke	I wish I could play with us Grover. **I thought** Elmo can help us.

(18) Luke is acting out a script from a television program, *Sesame Street*.

Luke	**I thought** it looks like trees **but it's not. Look a little closer.**
SLP	I think it looks more like-

The sentence builder *I thought* appeared four times in Luke's transcript. In Examples (17) and (18), *I thought* was followed by a verb complement. Example (16) highlights the use of the sequence as a sentence fragment, followed by a reformulation. The pause between the sentence fragment and the following utterance lends credence to the proposition that *I thought* is a unit.

In Examples (17) to (18), the verb tense in the formula did not agree with the tense in the verb complement. More specifically, the verb in the reported clause was conjugated in the present tense. In the transcript, Luke's other uses of the past tense were

clear derivations from a book. Therefore, it is possible that the past tense was beyond Luke's current level of competence, which would support the proposition that *I thought* was a single unit for him.

The other possibility is that Luke was aware that *I thought* is in the past tense, but was not yet able to conjugate the verbs in the verb complements of the previous examples. In this case, an alternate, grammatically correct, solution would have been for Luke to use the sentence stem *I think* instead. However, there were no attested instances of the sequence *I think* in the transcript.

For Luke, *I thought* might therefore have covered the functions normally taken on by *I think*. Further evidence for this suggestion comes from the fact that *I thought* carries implications that *I think* does not. Carter and McCarthy (2006) indicate that the use of the past simple tense for report verbs "refers to a single past occasion of speech [or thought] as a concluded event" (p. 809). Therefore, the use of *I thought* may carry the implication that the speaker is no longer of the same opinion – in other words, that opinion is a "concluded event" (Carter & McCarthy, 2006, p. 809).

"When someone's words [or thoughts] are reported indirectly, pronouns, tenses, clause types, etc. change to reflect the situation of the current report in relation to the original moment of speaking of the words reported" (Carter & McCarthy, 2006, p. 805). Example (18) included the contrastive *but* while retaining the present tense in the reported clause. This is problematic as the *but* in *I thought…but* serves to contradict Luke's belief that the object looked like trees, while the present tense *looks* in the reported clause suggests that at the moment of speaking, the speaker still considers the belief to be true.

Additionally, it is likely that *I thought…but* in Example (18) was part of a script based on the surrounding text. Thus, the use of the contrastive *but* clause in Example (18) is not a clear indication that Luke was aware of the potential implications of the formula *I thought*. Consequently, the most concise explanation is that Luke has overextended the functions of *I thought* to encompass functions such as asserting that are normally subsumed by *I think*.

In Examples (11) to (18), it was possible to determine that the participant had likely ascribed a function to the sequence based on an analysis of several reoccurrences or information provided by the participants' parents. In such a case, the sequence is consistently used for a determined interactive function across several contexts. This differs from a sequence that has been applied functionally in conversation but that may not be used consistently to achieve the same communicative purpose.

The fact that conventional formulas may be ascribed idiosyncratic functions is problematic for the application of Wray and Namba's (2003) formulaicity criteria, which distinguishes between error-free formulas and formulas with an error in usage (see Appendix B). If it is determined than a formula has an error in usage, an additional criterion, Criterion J, is applied (Wray & Namba, 2003). Criterion J states, "by my judgement, this wordstring is formulaic, but it has been unintentionally applied inappropriately" (Wray & Namba, 2003, p. 32). The erroneous usage of a formula is different from its idiosyncratic application. If a formula is consistently used to achieve a function in communication, then it is idiosyncratic, not erroneous or inappropriate. In the speaker's idiolect, the formula has indeed been applied appropriately according to its form-function pairing. The fact that that form-function pairing does not align with that of

the communal language is the result of local change and intrinsic diversity as per LaCAS (The Five Graces Group, 2009). Thus, determining whether there has been an error in usage such that Criterion J applies should be decided in relation to the speaker's idiolect, not with respect to the communal language form-function pairing. In the case of conventional formulas where it is not possible to determine whether it is consistently used idiosyncratically, it can be impossible to distinguish between an error in usage and an idiosyncratic usage. As a consequence, distinguishing between error-free formulas and errors in usage in ASD to correctly apply Wray and Namba's (2003) list of criteria is highly dependent on external information provided by knowledgeable informants or recurrent examples in transcripts.

The following three examples, along with Example (10), differ from Examples (11) to (18) in that there was not enough contextual information to determine whether the formula was applied functionally on one occasion or was ascribed a function by the participant. Rather, it was simply determined that the form-function pairing was atypical in the context of use.

(19) Joey is scrolling through *YouTube* videos on the computer.

Joey	Yeah. And go down to number two. **Find out** the one you want.
SLP	You're going down to number two to find out the right one-
Joey	You **find out** a longer one and you **find out** another one.

The use of the phrasal verb *find out* generally implies that the person searching has discovered something through inquiry. *Find* alone, however, suggests that something was discovered by searching or by accident. In this context, *find* would have been most appropriate as Joey was looking for something he wanted to watch and not inquiring as to

which video he would have liked to see. Nonetheless, the intended meaning of the sentences was recoverable in Example (19).

In this example, Joey was narrating his search process aloud in a step-by-step fashion. In doing so, he appeared to be self-directing his activity through the use of the sequence *find out*. It is not clear from the transcript whether he consistently used this formula for this purpose. While the formula was repeated three times in two conversational turns, this is not indicative of the formula being used consistently across different contexts.

(20) Louis has the Grover puppet and is playing with the ukulele.

SLP	I was just practicing my ukulele?
Louis	Lady.
SLP	My lady?
Louis	Um **let me go get changed**.
SLP	Let me go get changed? What are you going to wear?

The formula in Example (20) can be identified as such on the basis of three notable factors. Grammatically, the sequence is somewhat atypical; a more explicit version would have been *let me go and get changed*. In terms of delivery, the utterance stood out because of the voice that Louis adopted. However, the source of the voice could not be identified other than to say that it was not Louis's nor Grover's. Finally, the formula functioned beyond its semantic interpretation in that it was not a request for permission to get changed, but rather a means of requesting that the listener wait for him to carry out the specified activity.

In this example, the video provides contextual information for Louis's utterance. In the video, Louis was playing with Grover, then started looking around and said, "let me go get changed". He moved the puppet away from the focal point of the play and then

picked up a mouse puppet. From this context, it can be presumed that Louis's *let me go get changed* was not referring to clothes, as would be expected, but to getting a new toy. Nonetheless, the formula was not entirely unusual in this context as it could be interpreted as wearing a puppet and changing into a new one. Accordingly, the video was insufficient to conclusively determine whether Louis overextended the function of the formula or simply applied the formula functionally on this occasion.

(21) Luke is having a difficult time expressing what he wants to do.

SLP	Oh Elmo, what can we do in your world?
Luke	I want to use the door shade drawer or TV to watch something.
SLP	You want to watch door shade door?
Luke	Or My- stuff is. My friends are. Computer. **You've got mail. You've got mail. You've got mail.**
SLP	Is that a computer game?

Up until Luke repeats the sequence *you've got mail*, his speech in this excerpt was very difficult to follow. He used small sentence fragments, paused frequently, and created a sentence that was very unusual semantically. Thus, *you've got mail* provided Luke a means of recovering from the dysfluency and allowed the SLP an opportunity to react to his utterance and resume participation in the conversation. Additionally, it provided Luke with a means of bringing the play back to the *Elmo's World* script that had been guiding the play. *Elmo's World* includes a segment in which Elmo opens letters or emails from viewers and answers their questions ("Elmo's World", n.d.). Therefore, while Luke did not intend to convey the expected meaning of the utterance, he was able to wield the formula to move past expressive difficulties and carry on with the play.

As in Example (15), the formulaic sequence that Luke used was both a conventional formula and a script from a media source. Luke produced the script using an

intonation pattern that aligned with that of Elmo's. However, as in previous examples, the fact that he was playing with an Elmo puppet may have influenced the prosodic delivery of the utterance.

Here, it was unclear whether this script segment was a formula that Luke generally used to guide play or whether it had been applied functionally on this occasion. However, it was most likely the latter as his mother's indication that she was surprised he remembered scripts from *Elmo's World* suggests that he did not use them frequently.

Compared with the formulas in Examples (11) to (18), the sequences in Examples (19) to (21) are more suggestive of a one-time functional application than of a form-function pairing that is consolidated in the idiolect. However, the distinction between the two is not necessarily clear-cut as the successful application of a formula for an unconventional purpose might reinforce its use and eventually lead to an idiosyncratic form-function pairing. Determining whether the formulas in Examples (19) to (21) were *unintentionally* applied inappropriately (Wray & Namba, 2003, p. 32, emphasis added) is challenging; Louis's *let me go get changed*, for example, may have been consciously chosen to express a related idea that he might have been unable to express using a propositional utterance.

Though some cases of error in usage are difficult to conclusively identify as a consequence of conventional formulas potentially being ascribed idiosyncratic functions, it does not mean that errors in usage cannot be identified in ASD speech or that they do not occur. For contrastive purposes, the last two examples in this chapter present two formulas that are believed to have been unintentionally used inappropriately by the participants. Thus, they do not represent conventional formulas with idiosyncratic

functions. Rather, they represent an error in usage as described by Wray and Namba (2003). This determination can be made with relative confidence as they were used correctly elsewhere in the transcript, were only misapplied on one occasion, and were not beyond the participants' level of competence.

(22) Luke and the SLP are playing with toy animals.

SLP	I know which one's my favourite. Do you wanna guess?
Luke	Hm **I dunno** want to guess.
SLP	You you don't want to guess?
Luke	I know I don't like to t- have to guess.

The string of words *I dunno* is marked as a formula both phonologically and grammatically. In pronouncing the formula, Luke reduced the vowel in *don't* and fused the words *don't* and *know* together. It was marked semantically as a sequence by its odd fit in response to the question and grammatically within the frame of the utterance itself.

I dunno is an informal conversational form of *I don't know.* In Example (22), it was likely unintentionally misapplied as Luke reformulated his sentiment more appropriately when prompted by the SLP's question-form repetition of his utterance.

(23) Sean is explaining how *Skylanders* works.

SLP	So they which one's like stronger? Or does it work that way?
Sean	It it it dep- it it doesn't really depend it- it doesn't really matter which type it is. The the types **depend on** which gates you can unlock.
SLP	Hm

In this example, Sean had a number of false starts before answering the SLP's question. He was able to formulate a cohesive sentence, though he incorrectly answered her question. In fact, as Sean had explained earlier in the conversation, the type of Skylander determines, rather than depends on, the gates that the player can unlock.

Therefore, while Sean established a relationship between the two elements of the sentence using the formulaic sequence *X depends on Y*, he nonetheless unintentionally misapplied the sequence with regards to its truthfulness.

As mentioned previously, Wray and Namba's (2003) checklist accommodates errors in usage and includes guidelines for applying different subsets of criteria to the original form that was observed and the appropriate form for the context (see Appendix B). While this solution is appropriate for formulas such as those in Examples (22) and (23), it does not accommodate conventional formulas with idiosyncratic functions, as discussed earlier. The fact that no sets of criteria applied specifically to these types of formulas proved to be particularly problematic for the application of checklist criteria that were relevant to both the idiolect and the communal language; namely, Criterion C and Criterion D. Criterion C states, "by my judgement this wordstring is associated with a specific situation and/or register" (Wray & Namba, 2003, p. 30). Criterion D states, "by my judgement, the wordstring as a whole performs a function in communication or discourse other than, or in addition to, conveying the meaning of the words themselves" (Wray & Namba, 2003, p. 30). While association with a register is a property of the communal language, association with a specific situation and performing a function in communication or discourse is a property of both the speech community and the individual.

In the case of conventional formulas with conventional functions, these criteria are not problematic as there are no discrepancies between the two usages. Similarly, they are straightforward for idiosyncratic sequences, as these do not have a function in the communal language. However, in the case of conventional formulas with idiosyncratic

functions, the functions of the formula in the speech community differ from the functions attributed to the formula by the individual. For example, consider the perseveration of a formula such as *happy birthday*. By definition, the perseveration has no communicative function and it is not necessarily associated with a specific situation. Conversely, the conventional use of *happy birthday* is associated with a specific situation and does perform a function in communication. Therefore, the ratings of formulaicity for Criteria C and D differ according to the level of language described. One solution is to refer only to the idiolect, as it is the level of interest. Another is to adopt guidelines for the application of criteria to conventional formulas with idiosyncratic functions, such that one set applies to the original form and the other applies to the form as used in the speech community. The latter solution is more informative as it clarifies how the two forms differ, similar to how Wray and Namba (2003) distinguish between the original and the attested form with respect to errors of form and errors of usage. To be useful, criteria that can apply to either level of language would have to appear in both sets of guidelines. In relation to the criteria proposed by Wray and Namba (2003) (see Appendix B), those that apply to the idiolect would be C to I, and K; those that apply to the communal language as well would be C, D. Criteria A and B apply to the form itself, irrespective of the level of interest. These guidelines would allow the researcher to recognize both the functions of the formula in the speech community and those in the speaker's idiolect without implying that the different functional uses represent an error in usage.

6.3.2.1. Summary. The formulaic sequences provided in this section were examples of conventional formulas whose form would be known to naïve native speakers. However, some were likely segmented from scripts rather than acquired

through interactions with members of the speech community. These sequences were notable because their functions in the participants' speech differed from the expected form-function pairing. Some represented underextensions of conventional pairings while others were examples of overextensions. Furthermore, two examples of formulas that were unintentionally misapplied were provided. The applicability of Wray & Namba's (2003) criteria was discussed in relation to conventional formulas with idiosyncratic functions and an alternate set of guidelines was proposed based on the levels of language proposed in the LaCAS framework and the problems encountered when rating these types of formulas.

The fact that the participants used conventional formulas atypically does not mean that they were not able to use conventional formulaic sequences appropriately. The following section provides a number of examples of formulaic sequences being used in the same contexts and for the same purposes as a native speaker.

6.3.3. Conventional formulas with conventional functions. This section provides evidence of conventional formulaic sequences being used conventionally by all four participants. Unlike the previous examples, they are not idiosyncratic in form or function. A total of 17 formulaic sequences is presented in this section.

These sequences represent intact pragmatic competence, which is rarely attributed to persons with ASD. These findings align with previous research on politeness sequences (e.g., Sirota, 2004; Volden & Sorenson, 2009), and discourse markers (e.g., de Villiers, 2011; Niemi et al., 2010), that suggests that while the social functions of formulaic language may be impaired or less prevalent, they are not necessarily nonexistent. Of particular interest here is the relationship between conventional formulas

and register. In the context of data collection, the expected register was conversational. The hierarchical relationship between the adult interlocutor and the participant suggests that participants might be expected to address the interlocutor with a degree of formality somewhat above the informal play situation. The following six examples are discussed with respect to the participants' adherence to these expectations.

(24) Sean and the SLP are playing *Blockus*. It's Sean's turn.

SLP	Here it goes.
Sean	**Oh shoot**. I shouldn't go for that.
SLP	You shouldn't go for that one? Ah. Don't bump the table. Watch out! @@@@

Sean used the expression *oh shoot* on two occasions. Both times, the two words were pronounced together as if they were a single word, thus they have been highlighted here as a single formulaic interjection.

Shoot is an informal exclamation used as a euphemism for the expletive *shit*. It is a mild expletive and is socially acceptable in this context of use, both in terms of the register of the conversation and the power relationship between the two interlocutors. It expresses surprise or distress.

(25) Luke wants to get the phonics desk out of the closet.

SLP	Maybe an elephant can do it because elephants are very strong. Uh. Something's on top. We better get what's on top first. Okay. That's the hockey game. Luke, could you pass that to me? I'll get it out of the way. Thank you.
Luke	**You're welcome**.

The sequence in Example (25) is situation-specific; it would not be uttered without the preceding component of the politeness script unless it were being used sarcastically as a reminder that someone has not shown an appropriate amount of gratitude. Additionally, the utterance somewhat lacks semantic transparency as *to be*

welcome only adopts the meaning of *no obligation* in this context; *you're welcome* outside of the politeness routine could be used to say someone is invited to join as in, *you're welcome to join us*.

You're welcome is one of several appropriate responses to complete a politeness sequence beginning with a variation of the formula *thank you*. According to Luke's mother, politeness formulas are rare in his speech. His parents often have to remind him to complete these politeness routines.

Both Examples (24) and (25) are indicative of the participants' sensitivity to context factors, particularly to the hierarchical relationship with the interlocutor and the presence of an observer, namely their mother. If the interlocutor had not been an adult or if Sean had not been hyperaware of his mother's presence, Sean might have selected a stronger expression as opposed to a mild expletive. Similarly, Luke may have been more apt to complete the politeness script because of his mother's presence, which in itself may have been sufficient to remind him to use a politeness formula.

(26) The SLP is holding a ring of bells that Luke wants to play with.

SLP	Look! It's like that the colours of the rainbow. You like music a lot, don't chya. I- I- I- It's flying @@ Tell me what to do, Luke. What would you like?
Luke	**Put it down!**

Luke used the sequence in Example (26) twice when they were playing with the bells. While the semantic meaning of the utterance is completely clear, Luke's mother noted that he frequently uses this precise command when he disagrees with the direction of the play.

Luke's expression in this sequence was in no way hedged or softened with a modal or the word *please* or *just*. Carter and McCarthy (2006) indicate, "the bare

imperative is a very direct form in English and should be used with great care in order to avoid the perception of impoliteness" (p. 542). Therefore, the use of this type of sequence is very specific to certain situations and power relations between the speakers.

The sequences in Examples (24) to (26) are contrastive with respect to their adherence to the hierarchical relationship between the interlocutors. In Example (26), Luke's use of a direct imperative to address the SLP could be considered a violation of the power relation between the two speakers while the sequences in Examples (24) and (25) respect the hierarchy. However, given the participants' ages, it is not surprising to see this range. As the participants in this study were between the ages of 9 and 11, it is quite likely that their social competencies have not yet fully developed. According to Wray's (2002) model of the balance between holistic and analytic processing, until the end of phase two at eight years of age and the early stages of phase three, "the child is socially buffered…and is largely cushioned from the need to develop an additional interactional repertoire, because it has an extremely limited set of social roles" (p. 135). As all four participants are only beginning to emerge from this "socio-interactional bubble" (Wray, 2002, p. 136), it is to be expected that they have not yet become fully sensitized to the social nuances of formulas and their role in affirming and adjusting the speaker and the listener's place in the social hierarchy (see e.g., Wray & Perkins, 2000).

Examples (27) to (29) are the final set that are especially relevant to the discussion of register variation through the use of formulaic expressions.

(27) The SLP and Sean are building a *Marble Run*.

SLP	Okay. Do you want to put them across cos I need one to connect up make sure yeah that's good. Is this high enough? Yeah.
Sean	**How 'bout – how 'bout** we do this? Like we put that one
SLP	Okay. But then we'll need another piece underneath here.

How about is a non-modal expression that has numerous functional applications (Carter & McCarthy, 2006). In this case, Sean used the expression to suggest that they place a piece of the *Marble Run* in a certain position. He accompanied the sequence by the action of putting the piece in place. In addition, Sean marked the sequence phonologically by eliminating the first vowel in *about*.

Carter & McCarthy (2006) indicate that *how about* is "common in everyday conversation" (p. 703). The SLP used the expression several times throughout the play session; therefore, we can conclude with certainty that Sean had previously encountered the sequence in a comparable context of use.

(28) Sean and the SLP are playing *Blockus*. Sean is planning his move.

SLP	That would have been smart that's bl- Oh no you can't do it. That's right. That would've blocked me. They're tricky.
Sean	**What if I were to** use something like this and just-

(29) Sean and the SLP are playing *Blockus*. It's SLP's turn.

Sean	**What if you were to** put it right oh

The sequence in Examples (28) and (29) was potentially formulaic for Sean for a number of reasons. First of all, it is grammatically unusual as it uses the subjunctive mood. Nonetheless, it is likely that he had encountered the pattern *What if [subject] [to be-subjunctive] to X* on other occasions. The use of the subjunctive mood after conditional expressions is associated with a formal style (Carter & McCarthy, 2006); a less formal alternative in Example (28), for example, would have been to use the indicative form *What if I use something like this and just-*.

The different subject pronouns in the formula's slot change the function of the sequence. The sequence in Example (28) was not specifically directed to the SLP. Rather, Sean voiced his thoughts aloud, and concurrently bought time while he planned his next

Blockus move. Example (29), on the other hand, was directed to the listener. It differed from the previous example in that it functioned as a suggestion. Thus, in Wray and Perkin's (2000) terms, the latter was a device of social interaction while the former was a compensatory device for memory limitations.

Examples (27) (*how 'bout*) and (29) (*what if you were to*) represent two different ways in which Sean formulated a suggestion directed to the SLP. It is especially interesting to note the considerable difference in formality of the two formulas. This variation in degrees of formality has been illustrated throughout all six examples provided in this section up to this point. However, nowhere is it as clear as through the juxtaposition of Examples (27) and (29), given their common function and the fact that they were produced by the same speaker under similar circumstances.

An important implication of this variation is that the characterization of speech in certain children with ASD as being pedantic (Tager-Flusberg et al., 2005) meaning "overly formal" (Eigsti et al., 2011, p. 683) is not entirely attributable to the use of formulaic sequences from a formal spoken or written register; sequences from an informal spoken register were observed as well. An interesting question is whether this inconsistent use of formulas from different registers persists throughout adulthood; at this stage it is potentially related to an incomplete process of acquiring the social connotations of formulas. Persisting difficulties into adulthood would suggest a relationship to the social interaction and communication impairment in ASD.

The sequence in Examples (30) to (32) below is also related to earlier comments on inconsistent adherence to the hierarchical relationship between the participants and the

SLP. However, a more intriguing aspect is the fact that the same sequence is produced by the two participants who happened to be siblings.

(30) The SLP and Sean are picking up the *Marble Run* pieces when Sean spots bowling pins.

Sean	**Hey look** there's bowling.

(31) SLP and Luke are looking through a bin of puppets.

Luke	**Hey look** there's more in here.

(32) The SLP and Luke are playing with animals when Luke spots the train set.

Luke	**Hey look** over there.

The sequence in these examples is a combination of the interjection *hey* and the imperative verb *look*. The rationale for identifying the two words as a single sequence was supported by phonological evidence; neither Sean nor Luke paused between the words *hey* and *look*. This was especially relevant in relation to Luke's production in Example (32). The utterance could have been segmented in one of two ways: (a) as an exclamation followed by an imperative phrase, as in *hey, look over there*, or (b) as an exclamation followed by an adverbial phrase, as in *hey look, over there*. However, Luke inserted a pause after *hey look*, suggesting that this is a separate unit from *over there* for Luke. Furthermore, in the transcript, neither of the two participants used the attention devices *hey* or *look* outside of this combination.

Luke and Sean used the sequence in the same context and for the same purpose of drawing the SLP's attention to the toys that interested them. These similarities suggest that they had encountered the sequence before, likely in their home environment given that they are brothers.

One of the principles of LaCAS is sensitivity to and dependence on network structure (The Five Graces Group, 2009). It proposes that interactions between

individuals are "constrained by social networks" (The Five Graces Group, 2009, p. 17). Ultimately, this has an impact on the speakers' idiolects as the language is constructed through experience (The Five Graces Group, 2009). As the two participants are brothers, it can safely be assumed that there is overlap in their social networks and that they are part of each other's respective network. Their use of the same sequence in comparable contexts and for the same purpose is evidence for the interplay between network connectivity and idiolect.

The influence of network connectivity on idiolect may also be relevant to the pedantic speech observed in some children with ASD (Tager-Flusberg et al., 2005).

(33) Sean and the SLP are discussing the merits of old *Nintendo DS* games.

Sean	It's a whole other story for for an old game like that.
SLP	Yeah.
Sean	You gotta love it **in order to**
SLP	Yeah.
Sean	**In order to** get it like.

(34) Sean is talking about his purchase of the *Nintendo DS*.

Sean	It was fifty it was fifty dollars with the game. I have I have a *DSi* too but the *DS* was and the original *DS* was just so cheap that we just h- and we had to buy the original one **in order to** play

Sean used the complex subordinating conjunction *in order to* on three occasions while talking about *Nintendo DS*, as illustrated in the examples above. The sequence stood out because of its formality with respect to the topic, the interlocutor, and the surrounding text. A more informal alternative would have been the use of *to* on its own.

In all three instances, the sequence was phonologically marked through the flapping of the consonant and the reduction of the vowel in *to*.

Although no two speakers will have the same representational system, similarities in experience and social networks will decrease inter-individual variability (The Five

Graces Group, 2009). When compared to their peers, children with ASD may have very different experiences of language use as a result of fewer interactions with children their own age (Lord as cited in Eigsti et al., 2011). Luke and Louis's parents, for example, remarked that the participants either preferred or were better able to interact with adults than with their peers. Lord (as cited in Eigsti et al., 2011) proposes that this preference may lead to pedantic speech as "they may end up using adult-like speech and may fail to learn age-typical vocabulary items" (p. 683). Thus, the use of formal sequences such as *what if I were to* in Example (28) and *in order to* in Examples (33) and (34), which are noticeably adult-like, may be taken as evidence for the impact of a less peer-centric network on idiolect.

In addition, cognitive processing limitations may have played a role in the selection of the above formulaic sequences. Both *what if I were to* and *in order to* are two words longer than their informal equivalents, *what if I* and *to*. While conveying the same idea, the shorter phrases ultimately buy less time for processing. In using longer sequences, participants may be allowing themselves more time to plan upcoming speech while maintaining long, fluid runs. Thus, it is likely that pedantic speech results from the interaction of multiple elements, such as the mutual amplification of the effects of the network connectivity and cognitive processing limitations.

Example (35) illustrates the use of a prototypical formula that functions to buy time for the speaker.

(35) The SLP and Joey are watching clips from James Bond films.

SLP	Oh there's James Bond. He's funny. Okay. They're following a car.
Joey	Kay um. **What was I gonna say?** What do you wanna have?
SLP	What do you want to say? What do you have?

What was I going to say? is framed as a question but does not seek an answer from the listener. Rather, its purpose was to hold the speaker's turn and buy him time to plan what he wanted to say.

There were a few salient phonological features of the delivery of the sequence. First, the entire sequence was produced rapidly. As a result, not all sounds are fully enunciated. The *t* in *what*, for example, was not pronounced. Additionally, *going to* was shortened to *gonna*, which is a common feature of conversational speech. Joey used the same sequence on one other occasion; the delivery had the same phonological characteristics described above.

In addition to buying time for processing, the previous formula is also an example of thinking aloud.

In contrast with the previous example, which related to the speaker's own mental state, Examples (36) and (37) are notable because they demonstrate awareness of and even interest in the interlocutor's inner thought processes.

(36) The SLP and Joey are looking at videos on *YouTube*.

SLP	Yeah.
Joey	**How come** we're not going to watch this?
SLP	How about we're not going to watch it? Do you want to watch it or no?

In the example above, the SLP misunderstood Joey's question and repeated it incorrectly. However, Joey's use of the expression *how come* to mean *why* was in fact appropriate in this scenario.

How come is a "follow-up question that is formulaic and serves as a way of expanding the discourse or requesting further specification" (Carter & McCarthy, 2006,

p. 200). It is associated with an informal register. Furthermore, both semantically and syntactically, the expression is unusual.

As in the previous example, Sean's sequence in Example (37) was a request for explanation. However, it concurrently expressed Sean's disapproval of the SLP's actions in a non-confrontational manner.

(37) Sean and the SLP are playing *Blockus*. The SLP startles Sean when he is trying to pull out a block from the tower.

SLP	You shouldn't for for that one? Ah. Don't bump the table. Watch out! @@@@
Sean	**Why'd you do that?**
SLP	Justa- tease you. Just for fun.

In Sean's delivery, *did you* was contracted to *d'you*, which is characteristic of "very informal spoken language" (Carter & McCarthy, 2006, p. 426). While the sequence did not stand out due to semantic or grammatical irregularity, it is very likely that Sean had encountered this sequence on other occasions.

One account of ASD is the theory of mind approach, which "suggests that the social-communicative problems of people with autism are the consequence of an incapacity to attribute mental states to oneself and others" (Baron-Cohen as cited in Noens & Van Berckelaer-Onnes, 2004, p. 198). According to this view, impairments in theory of mind "may provide a critical constraint on pragmatic language skills" (Baron-Cohen as cited in Eigsti et al, p. 684). Thus, it would be expected that formulaic language, as a pragmatic language skill, would be particularly impacted by impairment in theory of mind. Interestingly, the sequences in Examples (36) and (37) appear to be indicative of the ability to attribute mental states to others and moreover, to use formulaic language to do so. While two exemplars are far from sufficient to disprove the theory of

mind approach, they raise the question of whether the attribution of mental states in ASD is truly an "incapacity" (Baron-Cohen as cited in Noens & Van Berckelaer-Onnes, 2004, p. 198) or a problematic area.

Similarly to the above formulas, the sequences Examples (38) to (40) are indicative of an awareness of the listeners' discourse needs and by extension, of their mental states. Examples (38) and (39) illustrate the use of a formulaic sequence functioning as an attention device. The formula focused the interlocutor's attention on the upcoming speech. In doing so, it demonstrated awareness of the listener's mental state as highlighting the information reduces the listener's processing efforts.

(38) Sean and SLP are planning strategies for *Blockus*.

SLP	You're not sure and you know what? It's amazing how quickly you run out of room for the funky ones.
Sean	**Know what**? I'm just gonna do that.
SLP	Alright. You're just gonna do that? Okay. Alright. Let me have a look here. I'm scared already. Cos you know.

(39) Sean is explaining to the SLP how *Skylanders* works.

SLP	I wonder- I wonder- but there must be a certain amount of memory like like computer memory associated with each of these things and maybe they get to a limit, do you think?
Sean	Uh I don't think they get to a limit. I think- I think- **Y'know what**? The data- It is a limit on upgrades for each guy.
SLP	Okay.

"The formulaic question *(do you) know what* is used as a preface to what the speaker considers newsworthy or important information" (Carter & McCarthy, 2006, p. 202). Even though it is phrased as a question, it is not intended to elicit a response from the listener. As proposed by the frame offered by Carter & McCarthy (2006), Sean consistently omitted the auxiliary *do* and on one occasion, the pronoun as well. On occasions when he did include the pronoun, Sean reduced the vowel in *you*.

Additionally, the formula is "semantically non-standard because…the word *what*, while clearly semantically cross-referenced with whatever follows, does not make a transparent semantic connection with it" (Wray & Namba, 2003, p. 38).

(40) Luke is introducing a new game.

Luke	Now, **I was gonna ask you** for you.
SLP	You were gonna ask me for me?

Initially, Luke's utterance is hard to understand. As illustrated in the transcript excerpt, the SLP repeated Luke's utterance, taking into account deictic changes, to confirm whether she had understood properly. However, further analysis of the sequence suggests that it was in fact a combination of two formulaic sequences intended to follow the structure of an *Elmo's World* episode. Broken apart, the utterance can be analyzed as *I was gonna ask you X* and *(Elmo has a question) for you*. While the first of the two sequences is the one of interest in this section of the results, the second is briefly discussed to support the division of the utterance into two formulas.

There were several clues to indicate that these two sequences had been combined, whether intentionally or not. The first segment, *I was gonna ask you X* is likely a sequence that Luke had encountered in many other contexts. The *X* in the sequence represents a slot that can be filled in a number of ways, including *for X* as in *I was going to ask you for help*. In his delivery, it featured phonological reduction of the phrase *going to*. Additionally, the sequence used a past tense verb, which might have been beyond Luke's current level of competence, as discussed previously in Examples (16) to (18).

There was clear evidence to corroborate the supposition that *for you* was derived from one of Elmo's utterances in *Elmo's World*. Each episode of *Elmo's World* features a question from Elmo for the viewers ("Elmo's World", n.d.). The segment begins with

Elmo has a question for you (Sesame Workshop, 2014a, 2014b). Throughout the play session, Luke had been structuring play according to *Elmo's World* using scripts taken directly from the television segment, and so it is reasonable to suggest that this was yet another attempt to do so. However, most significantly, *for you* was strongly demarcated phonologically both in the original production and in Luke's utterance. Elmo's voice is highly distinctive and is notable for its frequent changes in pitch. Luke imitated both the pitch changes and the vowel duration of Elmo's pronunciation of *for you*.

Thus, Example (40) illustrates the combination of two sequences: the first was a conventional expression used to highlight upcoming information; the second was a derivation from a script that was ineffectively combined with the former.

The use of discourse markers is not entirely listener-oriented (Wray & Perkins, 2000). They facilitate production by structuring discourse and promote the speaker's needs; "the hearer's success is entirely in the interests of the speaker because it is the speaker's way of achieving…socio-interactional functions" (Wray & Perkins, 2000, p. 18). Thus, they are at the intersection of listener- and speaker-oriented formulas and as such their presence in ASD is further evidence of retained pragmatic abilities. In this respect, the findings coincide with Solomon's (2004) analysis of narratives in ASD, which identified several discourse markers used to introduce topics. The findings here neither support nor conflict with observations such as Niemi et al.'s (2010) findings that participants with ASD were less likely than matched control participants to use discourse markers. However, they do suggest that categorical descriptions of discourse marker use, such as Fay and Schuler's (1980) statement that persons with ASD "do not properly

introduce the topic of conversations" (p. 107), are oversimplified – there might be a tendency not to use them, but they are not necessarily nonexistent.

Other domains of pragmatics have been similarly impacted by categorical descriptions of pragmatic abilities. With respect to idioms in ASD, for example, Vogindroukas and Zikopoulou (2011) observe, "idiom comprehension in children with AS/HFA [and therefore ASD] is described as an inability in the literature…In fact, idiom comprehension is not an inability but a problematic area" (p. 394). The sequences in Examples (41) and (42) are categorized as idioms, and thus suggest that the same distinction between an inability and a problematic area may be applicable to idiom production in ASD.

(41) The SLP is searching for the videos that Joey requests.

Joey	Okay. Do- Uh. Do uh- Do uh- Do *Mighty Machines* main menu.
SLP	Okay.
Joey	And we'll see **where we take it from there**.
SLP	Okay. And we'll see where we take it from there. Okay. That sounds cool. Oh. Careful. Ah. *Mighty Machines* main menu. I don't even know if so- something's coming up there. Huh.

Where we take it from there is a clear derivation of the formulaic sequence *we'll take it from there*. It was adapted to fit the grammatical context of the utterance it was a part of. Semantically, the original formula is unusual; there is no actual *taking* or movement involved, and the referents for both *it* and *there* are unclear. However, the expression is commonly used and it is likely that Joey had encountered it before.

Compared with the first half of the utterance, the sequence was produced at a fast rate. Additionally, all of the phonemes in the sequence were fully enunciated, which was not always the case in Joey's speech.

As in Example (41), the formula in Example (42) is idiomatic. However, whether the sequence was derived from an idiom or was an idiom in itself is undetermined.

(42) Sean and the SLP are discussing old video games.

SLP	Uh huh.
Sean	It's **a whole other** story for for an old game like that.
SLP	Yeah.

The expression *a whole nother* is a colloquial expression primarily used in the United States ("Nother", 2014). A more formal alternative would have been to say *it's a different/unrelated/separate story*, which are single words that have the same meaning as the 3-word expression. However, the expression *a whole nother* is more emphatic.

While the *Oxford English Dictionary* considers *nother* to be a word, popular opinion online in blogs and blog commentaries suggests that many people believe that *whole* is inserted into the word *another* (e.g., Allthehoopla, 2007; Grammarist, 2012; JSBangs, 2011; Maddox, 2009). Furthermore, people often indicate that the "correct" form of the expression *a whole nother* is *a whole other* (McGraw-Hill Dictionary of American Idioms and Phrasal Verbs as cited in "Whole Nother Thing", 2009). Therefore, whether Sean derived and "corrected" the sequence from *a whole nother* or originally represented the formula as *a whole other* cannot be determined. Nevertheless, the fact remains that the expression is idiomatic and that Sean used it in an appropriate context.

The dismissal of any retained pragmatic abilities propagated in the literature can further impact formulaic language analyses in ASD by predisposing researchers to view all language in ASD as impaired, such that any sequence that appears somewhat out of place is deemed idiosyncratic. Example (43) has been included to illustrate how the sequence could easily be mistaken as an example of a conventional sequence with an idiosyncratic function without a careful analysis of the surrounding talk and events.

(43) Louis and the SLP are playing with figures from *Wiggles World*.

Louis	Can I have Greg please?
SLP	And what colour is Greg?
Louis	Yellow.
SLP	Yellow. I found Greg's tree.
Louis	No. **That's not right**.
SLP	That's not right @@@ Okay. Let me find- I found Jeff's dog.
Louis	No. **That's not right**.
SLP	That's not right. You don't want Jeff's dog? Louis, don't you want Jeff's dog? Oopsie. There you go. Don't you want Jeff's dog?

In the excerpt provided above, Louis said *that's not right* on two occasions. *Right* used predicatively has a meaning of *correct* or *fair* (Carter & McCarthy, 2006, p. 135). If lines 4 and 5 or 6 and 7 were to be examined in isolation, it would appear that Louis was indicating that the SLP's statement was incorrect and that she had misidentified the toy. However, armed with the knowledge that Louis had previously requested the Greg toy from *Wiggles World*, Louis's sequence is contextually appropriate as it served to indicate that she has not found the correct toy, that is, the toy he asked for in an earlier conversational turn. Thus, he was refusing the new toy the SLP had offered and was implying that her search must continue.

Louis produced the sequence four times, which potentially indicates preference for this structure. Additionally, the sequence was delivered phonologically in the same manner on all four occasions.

Not only does the above example serve as a cautionary tale for future research, but also it provides additional support for the importance of contextual information in ASD language research.

The final five excerpts that are discussed in this section have been selected because they illustrate the potential for variation between speakers. Despite the fact that

the speakers are using the same sequence in each set, there is evidence to suggest that it might be represented differently in each speaker's idiolect.

(44) The SLP and Joey are looking at *Mighty Machines* videos on *YouTube*.

Joey	**Let's do** menu.

(45) The SLP and Joey are looking at games on the tablet.

Joey	**Let's do**...
SLP	Let's do…
Joey	Busy history!

In his delivery, Joey contracted *let* and *us* to form *let's*, the most frequent form of this sequence (Carter & McCarthy, 2006). Thus, the sequence was somewhat informal, compared to the formal *let us*. *Let's*, while being the first person plural imperative, often functions to make suggestions (Carter & McCarthy, 2006).

Joey used the formula *Let's do X* on several occasions. *Do* can be considered part of the sequence because of his preference for this verb as opposed to other possibilities such as *go to*, *click on*, *find*, etc. While more versatile, the semantic meaning of the sequence is less clear as a consequence. Furthermore, *let's do* appeared on its own as a sentence fragment, though he completed his thought in his subsequent turn. In addition, there was also phonological evidence in Example (44) that Joey treated *let's do X* as a formula as opposed to two consecutive formulas such as *let's + do X*. When Joey said, "let's do menu", he fully pronounced the vowel in *do* and put emphasis, as measured by intensity, on the word *menu*; in contrast, when the SLP repeated the sentence, she appeared to segment it differently as she shortened the vowel in *do* and put emphasis on *let's* and *do*. Therefore, Joey said, "let's do MENU,*"* while the SLP said, "LET'S do-menu. This suggests that they have segmented the formula differently.

Examples (46) to (48) illustrate variations on the structure *Modal + Pronoun + Verb phrase* (Nattinger & DeCarrico, 1992) in the speech of two participants.

(46) The SLP is showing Louis *Wiggles World* toys.

SLP	Hi. I'm Jeff.
Louis	**Can I have** Jeff please?
SLP	Yes, you can have Jeff. There he is.

(47) The SLP is going to get the engine for the train tracks.

SLP	((TRAIN SOUNDS)) We need a train. Shall I get a train?
Louis	**Can I get** the train please?

(48) The SLP and Joey are playing with flashcards.

SLP	Yeah, I think you're right. That guy was pretty unhappy that's for sure.
Joey	**May I tell** you something? Uh
SLP	Yeah, absolutely.

The formula *Can I X* in Examples (46) and (47) stood out because of its length and the complexity of the auxiliary-subject inversion required by the question form. Additionally, Louis produced the sequence by reducing the vowel in *can* and pronouncing *Can I* as if it were a single word.

The frame *Can I X (please)?* was also Louis's most frequently recurring sequence in the transcript. In total, he used this construction more than 60 times in the play session with the SLP. His mother indicated that he was explicitly taught this sequence to request things. The frequent use of requests was likely related to the SLP's use of PRT to engage Louis in conversation. By taking away toys he wanted, the SLP obliged Louis to make verbal a request to get the toy back. The ubiquity of this particular sequence is likely explained by the consistent results that Louis achieved using this sequence. In most instances, he received the toy he has requested without any further difficulties or questioning, though occasionally the SLP proposed a trade. Thus, the positive results likely reinforced the use of the sequence. Additionally, the slot allows the sequence to be

applied in a variety of situations. Louis demonstrated awareness of this flexiblity as he used the sequence to request various toys from the SLP, such as a ukulele, Daisy, the train set and the tunnel for the train.

Louis may also have been exhibiting some flexibility in the verb in the slot, as suggested in Example (47). However, whether this illustrates that Louis could productively use a slot for the verb is debatable, as he may have derived *get the train* from the SLP's preceding utterance. Louis used *have X* on 60 occasions but only used *get X* once. Additionally, the functions of *get* and *have* in this context were different in that *get* implies that Louis would get up to get the train himself rather than receive the train from the SLP. Based on his behaviour, that is, remaining seated, *Can I have X* was most likely the meaning he intended to convey. Therefore, while it we can confidently say that *Can I X*, wherein *X* is a verb phrase beginning with *have*, is a sequence for Louis, *Can I X*, wherein *X* is a verb phrase beginning with any verb, is less strongly supported by the evidence. Nonetheless, Example (47) may be an indication that the sequence was gradually being segmented by Louis.

Joey also used a variation on the *Modal + pronoun + verb phrase* sequence to make a request. However, Joey's representation may have been more flexible than Louis's because he also used *May + I + tell* and *May + I + have*. Therefore, for Joey, we can conclude that both the verb and the pronoun can be tailored to the situation, in addition to the object of the verb phrase.

The use of *may* is more polite/indirect than *can* (Carter & McCarthy, 2006, p. 693). According to Carter & McCarthy (2006), "'May I' to ask permission is infrequent

in informal conversation" (p. 693). In Example (48), Joey was asking for permission, and so the sequence was associated with a register.

As illustrated throughout Examples (44) to (48), variation between speakers' systems of linguistic representation likely extends to the representation of conventional formulas. According to the principle of intrinsic diversity, this variation is the result of different language use experiences (The Five Graces Group, 2009). Schmitt et al. (as cited in Conklin & Schmitt, 2012) also found evidence of individual variation in formula encoding. Nonetheless, similarities across idiolects lead to regularities in the communal language. Thus, despite potential differences in encoding, the formulas used by the participants in Examples (44) to (48) have a form-function pairing that is recognizable by other members of the speech community. Consequently, they are considered conventional formulas with conventional functions.

On the other hand, the likelihood that even conventional formulas vary across speakers has noteworthy implications for the distinction made here between idiosyncratic sequences, whether in form or in function, and conventional sequences. If at the level of idiolect even conventional formulas vary across speakers, there is nothing that distinguishes them from idiosyncratic formulas; that is to say, at the level of idiolect, all formulas are simply form-function pairings that are known to the speaker of said idiolect. Therefore, the distinction made here between idiosyncratic sequences and conventional sequences only applies in reference to the communal language, wherein some sequences may be known to many speakers while others may not. As one of the goals of this section was to determine whether functional formula use in ASD was solely idiosyncratic, the distinction was relevant. However, this may not be the case in every study.

6.3.3.1. Summary. This section illustrated the participants' use of formulaic sequences in non-idiosyncratic ways. As a whole, the examples demonstrated not only that formulaic language was found in the participants' speech, but also that it was used appropriately for a variety of functions in interaction and discourse, such as requesting, prefacing a topic, directing play, etc. Many of the examples provided illustrated pragmatic competencies in domains that are generally considered to be completely impaired in ASD. While some difficulties in register variation were observed, whether they were related to age and development or symptomatic of ASD could not be determined from this data set; both factors may have played a role. The interaction of factors such as these were noted throughout the section. Multiple elements such as experience, social networks, processing limitations, and context factors likely influenced the participants' on-the-spot choice of formulas. It was also proposed that broader tendencies in language use such as pedantic speech, for example, might be the result of these factors mutually influencing each other. Finally, examples were provided to point out that even conventional formulas might vary in their representation in the idiolect. While a distinction has been made throughout this chapter between idiosyncratic and conventional formulas, the difference between the two is a property of the communal language, not of the idiolect.

6.3.4. Summary of qualitative analysis. The qualitative analysis of formulaic sequences reported in this section indicates that the participants in this study utilized a range of formulaic sequences that varied in formal and functional conventionality. However, regardless of the level of idiosyncrasy of the sequences, the strings of words had a wide range of functions. Not only were the sequences used as compensatory

devices for memory limitations in organizing discourse and promoting fluency, but also they were used as devices of social interaction to manipulate and relate to the interlocutor (see Wray & Perkins, 2000). Overall, the successful use of idiosyncratic and conventional formulas was indicative of pragmatic abilities that might not have been expected in light of the social communication and interaction impairment that is at the core of ASD.

Formulas classified as idiosyncratic were those whose form would not be recognized by naïve native speakers. Consequently, their correct identification required additional information, such as video recordings or input from knowledgeable informants. Without this information, it would have been easy to commit errors such as: mislabelling utterances that appear to be novel but are delayed repetitions, not recognizing utterances that are in fact associated with specific situations, or not recognizing those that are the speaker's habitual way of conveying an idea. The importance of contextual information was discussed throughout the section in relation to the examples provided to highlight the role it played in successfully identifying formulas.

The second category of formulas was conventional formulas with idiosyncratic functions. They were defined as wordstrings that would be known to native speakers but that had idiosyncratic functions, whether in a specific instance of use or as a stable form-function pairing. While some represented overextensions of typical form-function pairings, others were indicative of underextensions. Several problems were encountered in applying Wray and Namba's (2003) criteria for formulaicity to conventional formulas with idiosyncratic functions. These were predominantly the result of differences in functions in the idiolect and in the communal language. An alternative set of guidelines

was proposed to overcome these difficulties while recognizing the form-function pairings in the idiolect and in the communal language.

Finally, conventional formulas were those that had a form-function pairing identifiable by naïve native speakers. More so than the other two types of sequences discussed in this section, conventional formulas such as idioms and discourse formulas were indicative of pragmatic abilities beyond those traditionally attributed to speakers with ASD in the research literature. Though some difficulties, such as selecting formulas from the appropriate register, were observed, the age of the participants means that their pragmatic competencies were likely still developing. Moreover, it was proposed that multiple factors such as experience, social networks, processing limitations, and context factors played a role in formulaic language use.

Although throughout this chapter considerable emphasis was placed on identifying formulas with respect to the idiolect in order to be inclusive of idiosyncratic speech in ASD, the classification system adopted was in reference to the communal language. At the level of the idiolect, the classification of formulas according to idiosyncratic or conventional formulas is irrelevant as both types of formulas represent form-function pairings that are known to a particular speaker. This proposition was further supported by evidence that conventional formulas were represented differently across speakers.

6.4. Summary of Findings

This mixed methods study used several approaches to examine the prevalence and nature of formulaic language use in the interactions of four children with ASD. This section summarizes the findings and discussions of the context factors analysis, the

quantitative analysis of formulaic language, and the qualitative analysis of formulaic sequences. The summary is organized in relation to the research questions that guided this study.

6.4.1. Research questions. The research questions presented in Chapter 1 Introduction are repeated below for the purpose of reviewing the issues that were of interest in this study. Question 1 and its dependent questions pertain to the prevalence of formulaic language in ASD. Question 2 and its related sub-questions address the nature of formulaic language use in ASD. Question 3 relates to both the prevalence and the nature of formulaic language use.

1. Do children on the verbal ASD spectrum with varying language abilities use formulaic language in interactions?
    a. If formulaic language is used, is a range of categories of formulaic language represented in interactions?
        i. Are the observed categories of formulaic language conventional, ASD-specific, or a combination of the two?
    b. If formulaic language is used, is formulaic language varied or dependent on the repetition of a limited number of expressions?
2. How are the form and function of formulaic expressions related in the interactions of children on the verbal ASD spectrum with varying language abilities? Specifically,
    a. Do idiosyncratic formulas have functions in their context of use?
    b. Do conventional formulas have idiosyncratic functions in their context of use?

c. Do conventional formulas have conventional functions in their context of use?

3. Which situational factors may have influenced the prevalence and nature of formulaic language use in the interactions of children on the verbal ASD spectrum?

Given the interconnectedness of Question 3 with the other two questions, findings pertaining to situational factors are addressed throughout Questions 1 and 2 instead of in a separate section.

6.4.2. Do children on the verbal ASD spectrum with varying language abilities use formulaic language in interactions? This study found that yes, children on the verbal ASD spectrum with varying language abilities used formulaic language in conversation. The overall balance of formulaic to novel language varied from participant to participant. The percentage of words in formulaic expressions ranged from 38% to 83% of the total word count of each participant's excerpt, which was between 250 to 254 words long. This variation is not surprising given the various situational factors at play. While some factors impacted the language system more globally, others had a more direct impact on language use at the moment of speech.

The participants' age, for example, is an example of a situational factor that shapes the language system through "preexisting cognitive abilities, processing idiosyncrasies, and general and specific conceptual circuitry of the human brain" (The Five Graces Group, 2009, p. 17). According to Wray's (2002) model of the balance of holistic and analytic processing throughout development, the ages of participants would be expected to impact their formulaic language use such that the older participants, Joey

and Sean, would rely more on holistic processing than the younger participants, Luke and Louis. This trend was observed with respect to the number of formulaic expression tokens used by each participant in the 250-word excerpts. However, it did not hold when formulaic language prevalence was measured by the percentage of words appearing in formulaic expressions with respect to the total word count. Variations in situational factors likely impacted the participants' speech and should be taken into account to conclusively determine whether Wray's (2002) developmental model applies to language in ASD.

In contrast with age, a global factor that impacts the language system as a whole, other situational factors shaped language use at a specific moment more than the language system itself. Nonetheless, each instance of use does ultimately impact the system as a whole. Factors such as sensitivity to observers, the room setup, and the interlocutor's speech style, for example, may all have impacted individual instances of language use. All three factors may have led participants to rely on formulaic language as a means of reducing their cognitive load. For instance, in the case of the first two factors listed above, the participants' attention may have been diverted and thus fewer cognitive resources available for language processing. With respect to the SLP's speech style, the use of certain utterance types which have been found to increase the tendency to use "less labour-intensive communicative utterances" (Prizant & Rydell, 1993, p. 277) may have led to the participants' use of formulaic language to compensate for the high cognitive demands imposed by the interlocutor.

The situational factors were not independent, but rather amplified and tempered their respective effects on formulaic language use. For example, the ongoing activity led

to different degrees of responsiveness, which in turn led to variations in the interlocutor's speech style and the use of behavioural techniques to elicit speech such as PRT. These variations increased or decreased the demands placed on participants to respond. In turn, this may have impacted the propensity to blend processing modes or rely exclusively on holistic processing, both of which are less cognitively demanding speech production strategies than the use of analytic processing alone. Thus, small differences between and within participants in any of the parameters of situational factors led to qualitatively different speech.

The finding that all four participants used formulaic language coincides with the results of previous studies such as Dobbinson et al. (2003) and Tager-Flusberg and Calkins (1990). However, it appears to contradict Van Lancker Sidtis's (2012a) observation that persons with ASD who have strong expressive language "communicate with an abnormal paucity of formulaic expressions" (p. 74). The latter, however, might be related to an alternate definition of formulaic language and not an actual difference in observed language behaviour.

This study examined the possibility that Van Lancker Sidtis's (2012a) observations were actually based on the definition that non-formulaic, and therefore novel, language includes all types of speech except UVB (i.e., immediate and delayed echolalia, perseveration). These definitions have been adopted elsewhere in ASD research (e.g., Howlin, 1982; Roberts, 1989). When interpreted with respect to these definitions, Van Lancker Sidtis's (2012a) observations can be reformulated to state that persons with ASD with strong expressive language use few UVB formulas. The reformulated observations were supported by the findings of the study, whether UVB

prevalence was measured by word count or by UVB tokens. When ranked by expressive language abilities, the amount of UVB decreased as expressive language abilities increased. The reformulated observations are also consistent with previous findings regarding the relationship between UVB and expressive language skills (e.g., McEvoy, Loveland, and Landry as cited in Tager-Flusberg et al., 2005; Prizant, 1983). As Van Lancker Sidtis (2012a) did not cite or describe the source of the observations, the operational definition of formulaic language cannot be determined with absolute certainty. However, this study has provided a possible means of reconciling Van Lancker Sidtis's (2012a) observations with previous research and the findings of this study.

6.4.3. If formulaic language is used, is a range of categories of formulaic language represented in interactions? The findings of this study indicate that the participants used a range of categories of formulaic language in interactions. Excerpts taken from each participant's entire transcript were analyzed with respect to twelve categories. Exemplars from 11 of 12 categories were found; no examples of expletives were found in any of the four 250-word samples, although they were observed in the qualitative analysis. The prevalence of exemplars across categories differed from participant to participant. Situational factors also played a role in the distribution of formulas across categories. For example, some delayed echoes of media such as television programs or computer games were found to be associated with the toys the participants had selected. Luke quoted from *Elmo's World* when playing with Elmo while Louis recited segments from *Disney's Mickey Mouse Preschool* while playing with Mickey Mouse figures. If participants had not had access to those triggers, it is possible that they would not have produced that type of formulaic expression.

6.4.4. Are the observed categories of formulaic language conventional, ASD-specific, or a combination of the two? The twelve categories of formulaic language were grouped into conventional and ASD-specific, or UVB, formulas. Conventional formulas included: collocations, idioms, multi-word verbs, pause fillers, conventional expressions, expletives, idiosyncratic expressions, pragmatic markers, and sentence builders. ASD-specific formulas included: delayed and immediate echolalia, and perseveration.

In this study, all four participants used conventional classes of formulaic language. Three of the four participants also used ASD-specific sequences. The prevalence of UVB was related to the participants' expressive language abilities and their AQ-Child (Auyeung et al., 2007a) scores. The stronger the participant's expressive language skills and the lower their AQ-Child (Auyeung et al., 2007a) scores, the less prevalent their use of UVB sequences.

ASD-specific sequences, while not generally seen in the general population, may be considered an adaptation of the system as opposed to deviant language behaviour. As language is shaped by language experience, social networks, and "preexisting cognitive abilities, processing idiosyncrasies, and general and specific conceptual circuitry of the human brain" (The Five Graces Group, 2009, p. 17), differences in these factors that stem from ASD lead to qualitative differences in language. For example, Louis's mother indicated that other people's speech is not "flashy" enough; he prefers to repeat sequences from movies, television, or computer games. Thus, his strong interest in media and decreased interest in the speech of members of his social network can be expected to

impact his language system, as in the form of formulaic expressions acquired from language used in media sources.

6.4.5. If formulaic language is used, is formulaic language varied or dependent on the repetition of a limited number of expressions? This study found that the participants' use of formulaic expressions was varied and not solely dependent on repetition of a limited number of expressions. This finding was supported quantitatively, through type-token ratios of formulaic expressions, as well as based on observations of the formulas analyzed qualitatively. Additionally, it was determined that ASD-specific formulas had an impact on measures of variability, such that perseveration tended to decrease the score while echolalia tended to increase it.

6.4.6. How are the form and function of formulaic expressions related in the interactions of children on the verbal ASD spectrum with varying language abilities? Various form-function combinations of formulas were observed in the speech of the participants. Functional uses of formulas were expected based on results of the quantitative analysis that indicated that all four participants used more formulas associated with pragmatic functions than formulas without a pragmatic function or with no function whatsoever. Nonetheless, a qualitative analysis was required to confirm the relationship between form and functional uses of formulaic sequences because of the quantitative analysis's focus on identification and classification by form. In the quantitative analysis only immediate and delayed echolalia were analyzed in terms of function. The functions of all other formulas were implicit based on their respective categories. For example, all collocations belonged to the group of formulas that had no pragmatic functions while all conventional expressions belonged to a subset of formulas

that did have a pragmatic function. However, the use of a formula that has a function in the communal language does not imply that it has that same function or any function at all in a speaker's idiolect, particularly in ASD, which is known for its idiosyncratic speech (APA, 2013).

The three form-function combinations of interest were: idiosyncratic formulas with functions, conventional formulas with idiosyncratic functions, and conventional formulas with conventional functions. While this study was focused on the participants' idiolects, these categories relate to the communal language. At the level of idiolect, idiosyncratic formulas and conventional formulas are the same in that they both represent a form-function pairing in an individual's system of linguistic representations. The purpose of this categorization was to better understand communicative abilities and difficulties in ASD as perceived by interlocutors.

6.4.7. Do idiosyncratic formulas have functions in their context of use? This study found evidence of functional uses of idiosyncratic formulaic expressions. These results coincide with findings of previous studies (e.g., Prizant and Duchan as cited in Prizant & Rydell, 1993; Prizant & Rydell, 1984; Stribling et al., 2007). Idiosyncratic formulas were defined as strings of words that would not be recognized as formulas by a naïve native speaker. They generally fell into one of three categories: formulas from media sources, immediate repetitions of an interlocutor's utterance, and formulas that appeared to be novel sentences. Given the nature of these formulas, native speaker intuition was not considered a sufficient indicator of formulaicity. Identification and demarcation of the formulas relied on video recordings of the recording sessions, information provided in the Parent Observation Sheets, and media such as movies or

computer games from which delayed echoes were copied. Idiosyncratic formulas were found to be used by participants for purposes such as manipulating the interlocutor, directing play, and signalling group membership. Their degree of segmentation varied, such that some idiosyncratic formulas had variable components while others were completely fixed.

6.4.8. Do conventional formulas have idiosyncratic functions in their context of use? This study found evidence of conventional formulas with idiosyncratic functions in their context of use. While this phenomenon has not been described in the ASD research literature, it is consistent with descriptions of speech in ASD as idiosyncratic (APA, 2013). Conventional formulas with idiosyncratic functions were strings of words that would be known to native speakers regardless of their familiarity or lack thereof with the participants' speech. However, the functions of the sequences were beyond, other than, or incomplete with respect to the conventional form-function pairing associated with the string of words. In some cases, participants used these formulas both in the expected manner in certain contexts and for an additional purpose in a different context. This suggests that they may have overextended the functions of the sequence with respect to the communal language. For example, Louis used the sequence *no thanks* both to decline offers and to deny permission, the latter being an idiosyncratic use.

Conventional formulas with idiosyncratic functions differed from conventional formulas that had been unintentionally misapplied. The latter were followed by self-correction, were not beyond the speaker's current level of competence, and were only misapplied on one occasion. The former represented a consistent form-function pairing or the intentional idiosyncratic functional application of a formula on a single occasion.

Rating the formulaicity of conventional formulas with idiosyncratic functions according to the 11 criteria in Wray and Namba (2003) proved to be particularly challenging. Two criteria referring to the function of the formulas and their association with a situation applied both to the idiolect and to the communal language. However, there was no way to distinguish between these two levels in the guidelines for application set out by Wray and Namba (2003). Therefore, an alternate guideline for rating conventional formulas with idiosyncratic functions was proposed for future research wherein both the form-function pairing in the idiolect and the communal language could be rated side-by-side. In contrast with the use of the guidelines for erroneous usage, the guidelines proposed in this study do not imply incorrect usage and still recognize a different functional application of the formula.

6.4.9. Do conventional formulas have conventional functions in their context of use? This study also found evidence of conventional formulas being used according to the form-function pairing of the communal language. Speakers used formulas from a range of registers and for a variety of purposes. Similarly to the quantitative analyses, the formulas analyzed qualitatively were from several different formal categories, including idioms and discourse markers. Examples of formulas used by the participants include: *how 'bout*, *what if I were to*, *you're welcome*, *know what*, and *I was gonna ask you*. These findings coincide with those of emerging qualitative analyses of discourse (e.g., Sirota, 2004) and narratives (e.g., Solomon, 2004) in ASD.

6.4.10. Summary. This section summarized the findings of this study with respect to the research questions that guided this project. The following chapter

concludes with a discussion of the limitations of these findings, the implications of the findings and a presentation of proposals for future research.

7. Conclusion

The purpose of this mixed methods multiple case study was to examine both the prevalence and the nature of formulaic sequence use in the interactions of four children with autism spectrum disorder (ASD) within the framework of language as a complex adaptive system (LaCAS) (The Five Graces Group, 2009). To this effect, the participants took part in a one-hour audio-video-recorded play session with their speech-language pathologist (SLP) to gather language samples. The participants' parents acted as informants while observing the play session and completed two take-home questionnaires. The audio-video recordings and the information provided by the parents were used to create participant profiles and analyze the situational factors surrounding the participants' use of language. The researcher transcribed the recordings in order to carry out quantitative analyses of the prevalence and qualitative analyses of the natures of use of formulaic language.

The main findings of the study pertain to three domains: situational factors, the prevalence of formulaic expressions, and the nature of use of formulaic expressions. This study found evidence that several situational factors impacted the participants' language use, and that these factors did not act in isolation but rather interacted together. The results of the quantitative analyses indicated that all participants, regardless of expressive ability, used formulaic language. All four participants used conventional sequences. Conversely only three of the four participants used unconventional sequences characteristic of disordered language, including immediate and delayed echolalia, and perseveration. All four participants used sequences from a range of categories of formulaic language and additionally used varied sequences, such that they were more

likely to use a new formula than to repeat an old one. Finally, a qualitative analysis of the nature of use of formulaic language was carried out on 36 exemplars selected throughout the transcripts. The sequences were analyzed in relation to the surrounding speech and ongoing activity to determine the markers of formulaicity associated with each and the sequences' functions in context. The sequences were categorized as belonging to one of three form-function pairings: idiosyncratic formulas with functions, conventional formulas with idiosyncratic functions, and conventional formulas with conventional functions. Participants used the formulas for a range of functional purposes, both interactive and non-interactive.

7.1. Limitations of the Study

The limitations of this study can broadly be classified into two groups: data collection limitations and data analysis limitations. Each is discussed in turn.

7.1.1. Data collection limitations. The main limitation associated with the design of the study was the variability in context factors between participants. Beyond ensuring that all participants conversed with the same interlocutor in the same physical setting, few measures were taken to reduce the variation in situational factors between participants. As the goal of data collection was to obtain language samples that were representative of the participants' speech, controlling situational factors was not a priority at the outset. However, the variability also had several benefits. First, the influence of these elements on language use could be observed and described. Secondly, the unexpected interactions detected provided information that can be applied in designing future research, both in terms of study design and in elaborating research questions pertaining to the interaction of these contextual elements.

The second type of data collection limitation arose throughout the data collection process and was not a consequence of the research design in itself. Throughout the play session, parents were asked to listen in on their child's interactions and concurrently fill out a Parent Observation Sheet. However, some parents were distracted during the recording session. Joey's mother brought his sibling to the play session and her attention was divided between the two children. Additionally, the parents and the researcher interacted throughout the play session, which provided another distraction. A potential solution for this problem would have been to ask parents to watch the video-recorded session and to fill out the Parent Observation Sheet at their leisure after the play session. However, this process would have placed more demands on the parents' time and might have led to fewer volunteers or a decrease in completion of the participation process.

7.1.2. Data analysis limitations. The limitations pertaining to data analysis can be divided into two categories: quantitative analysis and qualitative analysis.

Limitations were also found throughout the process of applying the categories of formulaic language classes that was developed for this study. Namely, there was no category for familiar proper nouns, which is identified as a class in Van Lancker Sidtis (2012b). In the quantitative analysis, proper nouns that were two or more words long were categorized as collocations and thus included in the tallies for word counts of formulaic language and formulaic sequence tokens. However, single-word proper nouns did not fit into any of the categories. Consequently, *Mighty Machines*, a proper noun familiar used by Joey was considered formulaic; conversely, Sean's use of the term *Skylanders* was not. This had a minimal impact on the quantitative analysis as few

exemplars of this type occurred in the samples that were analyzed. However, this could have a considerable impact on larger samples and should be addressed in future research.

The limitations of the qualitative data analyses result from issues with the video recordings. As only one camera was installed, the participants sometimes had their backs turned to the camera or were out of the frame. Consequently, the video did not allow the researcher to determine whether the participants were making eye contact with the SLP or to observe what they were doing with their hands, for example. As a result, establishing whether a sequence such as a script was used for interactive or non-interactive purposes was sometimes difficult. Furthermore, no analyses of body language could be carried out for Luke because the video data for the entire session could not be used.

7.2. Contributions of the Study

7.2.1. Contribution to paradigmatic shift in language and communication disorder research. A number of research fields related to formulaic language incorporate the assumptions of the LaCAS framework, whether implicitly or explicitly (Blythe & Croft, 2009). Examples include corpus linguistics, construction grammar, and sociocultural theory (see Ellis, 2013). Although their approaches to researching language may be different, "the complex adaptive systems approach unifies them" (Blythe & Croft, 2009, p. 48). However, the LaCAS approach is not well established in language and communication disorders research. Rather, research on the linguistic aspects of disorders "has been grounded in the nativist account outlined originally by Chomsky [Smith, 1999]" (Abbeduto et al., 2001, p. 47). Therefore, framing this study in terms of the

assumptions associated with the LaCAS framework was innovative with respect to the language and communication disorders research.

Within this framework, "many language behaviours, labelled as 'deviant' from a Nativist perspective, may have adaptive communicative functions" (Abbeduto et al., 2001, p. 53). Thus, in grounding the study in LaCAS, idiosyncratic uses of language and unconventional verbal behaviours (UVB) become worthwhile and important objects of study. Within the LaCAS framework, this study examined both idiosyncratic and UVB formulas and found that they played important roles in the participants' interactions with the SLP. Outside of the LaCAS framework, these types of formulas might have been automatically eliminated from analyses or considered dysfunctional. The resulting analysis would have considerably undermined the participants' communicative abilities. Thus, the innovative use of LaCAS as a framework for linguistic research in the field of language and communication disorders was found to provide a more constructive and accurate representation of communicative abilities of persons with ASD. Potentially, the successful application of the LaCAS framework to linguistic research in the field of language and communication disorders will help contribute to an ongoing paradigmatic shift in the field (e.g., Abbeduto et al., 2001; Prizant & Rydell, 1993), such that adaptive language behaviours are no longer automatically perceived as dysfunctional.

7.2.2. Methodological advances. This study brought forth three key methodological advances in formulaic language research.

7.2.2.1. Development of a categorization scheme for formulaic language in ASD. The first methodological advance was the development of a set of formulaic language categories applicable to language in ASD. The categorization scheme

developed for this study was based on two previously developed systems, namely those by Van Lancker Sidtis and Postman (2006) and Nattinger and DeCarrico (1992). However, four additional categories were added to account for idiosyncratic language use and UVB, both characteristic of speech in ASD (APA, 2013). The inclusion of these categories as subtypes of formulaic language was justified according to the definitions of formulaic language adopted in this study. While Wray (2008) had previously noted that echolalia could be considered a subtype of formulaic language, an explanation to justify this statement was provided here. Furthermore, this was built upon to include another subtype of UVB, perseveration. To date, perseveration had not been considered as a specific subtype of formulaic language.

UVB, such as echolalia and perseveration, and idiosyncratic uses of language are also observed in other disorders. Thus, the categorization scheme developed for this study can be applied to linguistic research on other disorders. While it may have to be modified to account for additional types of adaptive language behaviours, at the very least this study has provided justification for future research to include immediate and delayed echolalia, perseveration, and idiosyncratic sequences as formulaic language subtypes in their own right.

7.2.2.2. Development of new guidelines for applying existing sets of criteria. The second methodological advance resulting from this study is a new set of guidelines for applying Wray and Namba's (2003) criteria list of the markers of formulaicity. The guidelines were developed as a result of methodological difficulties encountered in this study. The set of guidelines apply specifically to formulas whose functions differ between the level of idiolect and communal language. In this study, these referred to

conventional formulaic sequences used for idiosyncratic purposes. Unlike the guidelines for "one or more error in usage" (Wray & Namba, 2003, p. 29), the guidelines for idiosyncratic uses of conventional formulas do not imply a mistake or an underdeveloped representational system. Rather, the guidelines recognize and accommodate differences between idiolects and the communal language. Furthermore, they allow researchers to compare both the characteristics of the attested sequence in context as well as the characteristics of the sequence as it is interpreted in the communal language.

As with the categorization scheme, the guidelines can be applied to language research in other disorders characterized by idiosyncratic language. They can even be helpful to compare formulaic sequences in different dialects. As formulaic language is intimately linked to the speech community such that it can indicate group membership (e.g., Wray & Perkins, 2000), different speech communities may have the same formulaic sequence albeit with dissimilar form-function pairings. Consider, for example, a research project on the formulaic language use of immigrants who speak the same first language as the speech community to which they have immigrated. In this case, it could be of interest to consider formulaic language use as it relates to the speaker's idiolect and to the adoptive speech community. There is a possibility that the characteristics of formulaicity that apply to a given formulaic sequence could differ between the two levels. Using the guidelines developed here, the characteristics of formulas in the idiolect and in the communal language could be considered side-by-side without implying that either is an erroneous usage.

7.2.2.3. Method for applying native speaker intuition to special populations. The third methodological development resulting from this study is an innovative method for

applying native speaker intuition to facilitate the identification of formulaic sequences in the speech of persons with ASD. Using the Parent Observation Sheets, the participants' parents were asked to identify utterances or topics that recurred frequently in their child's speech. This represents a shift from traditional formulaic language research, wherein the standard for recognition is generally that of a naïve native speaker (e.g., Van Lancker-Sidtis & Rallon, 2004). Here, the standard of native speaker recognition was modified such that it could be applied to idiosyncratic speech, where the knowledge of a naïve native speaker would not be informative with respect to idiosyncratic formulas. Using this method, idiosyncratic sequences such as *Do you wanna lie down with me in the blue room?* were recognized by the native speaker informants. This modified standard for familiarity has applications for child language research as well as disordered language research, as both populations may use sequences idiosyncratically.

It was initially expected that the information the parents provided would only serve to narrow the search for formulaic sequences. However, in their role as informants, the parents proved to be extremely valuable sources of information. Throughout their interactions with the researcher, they offered deep insights into their child's language use and acquisition process. The parents were very attuned to their child's linguistic knowledge and were able to offer information, such as the linguistic structures their children struggled with and the linguistic structures they were acquiring. Furthermore, they indicated the source of delayed echoes, which was especially helpful in delimiting formulaic sequences. The information they provided not only served as a starting point for identifying formulaic sequences but also helped the researcher understand the

evolution and current standing of the participants' language skills without undertaking longitudinal observations.

7.2.3. Contributions to the existing research body.

7.2.3.1. Forging a link between the fields of formulaic language and ASD research. This study contributed to the research literature by linking two well-established fields of research, formulaic language and ASD, that, to date, have developed almost entirely in isolation from one another. Moreover, it connected formulaic language research and language and communication disorders research in general, a link that has also been largely overlooked (Van Lancker Sidtis, 2012a). In doing so, this study addressed gaps in the existing bodies of both formulaic language and ASD research.

To date, the existing research combining the two fields included a quantitative analysis of formulaic language use by children with ASD (Tager-Flusberg & Calkins, 1990) and a qualitative analysis of formulaicity at various levels in the speech of adults with ASD (Dobbinson et al., 2003). Tager-Flusberg and Calkin's (1990) analysis of formulaic language use compared formulaic and novel language based on mean proportions of utterances. However, in coding at the utterance level, utterances combining the two modes of processing could not be clearly categorized. This study addressed this gap by comparing formulaic to novel language word counts as opposed to utterance counts. Dobbinson et al.'s (2003) study only included one example of formulaicity at the lexical level and both participants were adults. This study expanded the analysis of formulas at the lexical level by qualitatively analyzing 36 sequences. As the language samples were obtained from child participants, this study is the first qualitative analysis of formulas in the speech of children with ASD. Furthermore, the

study examined the situational factors that potentially influenced the participants' use of formulaic language. In doing so, it extended Dobbinson et al.'s (2003) discussion of the influence of topic-level perseveration on formulaic language use.

7.2.3.2. Reconciling conflicting accounts of formulaic language in ASD. In addition to the two studies described in the previous section, other information available regarding the prevalence of formulaic language in ASD came from on observation-based accounts (Van Lancker Sidtis, 2012a; cf. Perkins et al., 2006). Perkins et al.'s (2006) observations coincided with the two existing studies on formulaic language in ASD and suggested that formulaicity was a characteristic of speech across the verbal ASD spectrum. Conversely, Van Lancker Sidtis (2012a) indicated, "persons falling toward the severely impaired end of the autistic spectrum may be observed to produce formulaic expressions almost exclusively, while those toward the higher-functioning extreme end of the spectrum communicate with an abnormal paucity of formulaic expressions" (p. 74).

This study looked at prior definitions of novel language, the counterpart of formulaic language, in ASD research and found that they differed from those used in formulaic language research. In ASD research, some researchers have defined novel language as all speech that does not consist of UVB. In doing so, novel language as defined in ASD thus includes non-UVB categories of formulaic language. Van Lancker Sidtis's (2012a) observations were reinterpreted according to these observations and the predictions were tested in relation to existing research and the findings of this study. The reinterpretation of Van Lancker Sidtis's (2012a) observations according to definitions of novel language used in ASD research, as opposed to formulaic language research, proved to coincide with findings on the prevalence of UVB across the verbal ASD spectrum, the

findings of the two previously-mentioned studies on formulaic language in ASD, other observation-based accounts of formulaic language in ASD, and the findings of this study. Thus, while the definitions Van Lancker Sidtis's (2012a) applied in the description of language in ASD cannot be ascertained with absolute certainty, the observations can be reconciled with the existing research body if they are interpreted according to the definitions of novel language used in ASD research.

7.2.4. Utility for the key stakeholders. The key stakeholders in this study were the participants, their parents, and the SLP. The study had clear benefits for all three groups.

7.2.4.1. Utility for the participants. The chief benefit that the participants obtained from the study was interacting with a professional SLP. Even though the recording session consisted of informal play, there was evidence that the SLP was using her professional skills to help the participants develop their expressive language abilities. One technique she used was pivotal response therapy, in which children are motivated to use language in order to obtain a benefit (Koegel et al., 2003). For example, the SLP motivated the participants to use language in order to request toys that she kept in her possession. A more direct example of the benefit of interacting with a professional SLP was uncovered through the qualitative analysis of one participant's use of negation. Throughout the entire session, the SLP reinforced negation using the auxiliary *do* by having the participant repeat her sentences before responding behaviourally to the utterance. Near the end of the session, the participant produced an utterance spontaneously using auxiliary *do* negation where he had previously only used *No X*.

Thus, interacting with the SLP promoted the reorganization of the participants' representational system.

7.2.4.2. Utility for the parents of participants. As discussed previously, the parents of participants were very knowledgeable about their child's language use. This study was beneficial for the parents of participants as it systematically analyzed their child's speech. The outside perspective may provide the parents with new insights regarding their child's language use and abilities. In some cases, the findings confirmed certain assessments the parents made of their children's abilities. Louis's mother, for example, indicated that her son had begun applying delayed echoes for interactive purposes. This study provided evidence-based confirmation of this observation.

7.2.4.3. Utility for the SLP. The analyses undertaken in this study have several potential benefits for the SLP. First, the study analyzed the speech of her clients to a degree that might not have been attainable in her work environment given the time and financial limitations associated with therapy. In doing so, the findings provided evidence-based information about the strengths of her clients and potential areas requiring intervention. Additionally, this study included an analysis of the SLP's speech. These findings may provide the SLP with insights regarding her speech and the potential ways in which it influences her clients' language behaviour.

7.2.5. Implications for intervention and assessment. The findings of this study have several implications for language assessment and intervention in ASD. They are discussed here, keeping in mind that further research on a larger scale is needed to confirm these propositions.

7.2.5.1. Importance of context in language assessment. The first implication for assessment of language abilities is that accounting for or controlling extraneous situational factors is important to obtain an accurate measurement of language abilities. This study found that several contextual factors, such as the mother's presence, distracting noise, and arousal, for example, potentially impacted the participants' language use. All of these factors could be expected to play a role in typical assessment settings as well.

One means of decreasing the influence of variation in situational factors is to collect language samples on several occasions and even in different contexts. Another possibility is to attempt to control as many surrounding context factors as possible. However, this solution is more problematic than the former. Suppose, for example, that the influence of toys and games on language use is controlled by preselecting a set of toys that all participants will use. This still does not mean that the toys will have the same impact on all participants' language use. A toy that triggers scripting behaviour in one child may not carry the same associations for the other child. In this study, for example, the Elmo puppet triggered scripting for Luke but not for Louis; conversely, Mickey Mouse figures triggered scripting for Louis but not for Luke. Thus, despite being more time consuming, obtaining a representative picture of language use may be best done by using periodic data collection over several sessions.

7.2.5.2. Development of materials to support the reorganization of the representational system. This study found evidence of delayed echoes from media sources being used interactively. Furthermore, a qualitative analysis of delayed echoes suggested that they might provide linguistic material for analysis and segmentation,

ultimately leading to the encoding of productive frames, or frames with slots, and smaller units. An analysis of the original media sources on which the echoes were based indicated that in many cases, the structure of the text in the media sources supported the segmentation process. That is to say, consistent repetition of structures with minor variations may have facilitated the task of identifying commonalities between units, thus instigating the progression from multiple units to frames with slots. Additionally, the context surrounding the speech in the media sources was found to be more consistent than conversation. The television programs in particular tended to repeat overarching plots across episodes. As such, the media sources provide structured scaffolding for language acquisition. The consistency in plots across episodes leads to expectations of what comes next and helps create a situational context for the use of formulaic sequences.

With respect to intervention, the reorganization of the representational system may be facilitated by developing materials that capitalize on the above observations. By creating media that is engaging, children with ASD may be more inclined to attend to the language and reproduce it. Through the frequent repetition of utterances with minor, isolatable variations, segmentation may be encouraged. This is especially true if there is consistency in the variation, such that the commonalities of the items in the variable slot can easily be abstracted. At a more global level, consistency in the plot can help create expectations surrounding the contextual uses of certain utterances. This in turn may ultimately lead to increased flexibility, either by using the sequences outside of the delayed echo or by replacing parts of the delayed echo with equivalent sequences. For example, Luke had an overarching script for the narrative of *Elmo's World* episodes. At one point, he diverted from the delayed echo and replaced the expected sequence with an

equivalent formula. Thus, he was able to abstract contextual cues from the consistent patterning of *Elmo's World* episodes and appropriate the echo by using variations, concurrently demonstrating flexibility in echo use.

7.2.5.3. Identification of domains of formulaic language that may benefit from intervention. The findings of this study are also suggestive of domains of formulaic language that may benefit from direct intervention. The quantitative analyses indicate that participants used formulas from a range of categories, including conventional formulas. They also demonstrated that participants tended to use varied sequences rather than repeating formulas. Both of these findings appear to be indicative of unimpaired formulaic language use in terms of prevalence, although large-scale comparative research is required to confirm this conclusion.

Conversely, the findings of the qualitative analysis identified two potentially problematic aspects of the nature of language use. Specifically, two types of form-function pairings that would be challenging for naïve speakers to understand were identified. These included not only the use of idiosyncratic sequences, which is well established in ASD research, but also the use of conventional sequences for idiosyncratic purposes, which remains comparatively unaddressed. The latter form-function pairing is doubly challenging in terms of listener comprehension. One of the advantages of formulaic language is that the pairing simplifies the processing for the listener such that it does not need to be analyzed compositionally (Wray & Perkins, 2000). In digressing from the expected form-function pairing, these types of sequences both violate expectations and require analytic processing. Thus, they increase, rather than decrease, the possibility for misunderstanding. Idiosyncratic sequences and conventional formulas

with idiosyncratic functions are areas of formulaic language in ASD that could be targeted in intervention to improve impressions of comprehensibility.

7.2.5.4. Identification of unimpaired formulaic language in ASD. The qualitative analysis provided clear evidence that the participants of the study were able to use formulaic sequences with conventional form-function pairings for interactive purposes. This finding points to the importance of evidence-based research as opposed to observation-based accounts of language use. One major caveat of observation-based accounts is that the aspects of language that are salient to observers are likely to be those that are incorrect or different with respect to the observers' expectations. The same applies to formulaic language. Wray and Namba (2003) suggest that identification of formulas is difficult because "the majority of formulaic sequences are, to the casual eye or eye, indistinguishable from novel strings because they are grammatically unexceptional and their meaning is entirely predictable" (p. 26). Thus, the difficulties of identifying formulaic sequences used conventionally, compounded with the preconceived expectation that persons with ASD will have problems with uses of language pertaining to social communication and interaction, means that observation-based accounts are likely to focus on the challenging uses of formulaic language as opposed to the successful ones. Successful examples of formulaic language use might not be as salient. Moreover, the observers may not even be looking for conventional examples. Thus, anecdotal evidence may be systematically biased towards highlighting impairments in ASD as opposed to unimpaired aspects of language use. This is likely true of other areas of pragmatic competence in ASD, such as register variation, wherein anecdotal

presumptions of impairment differ from experimental evidence of intact abilities (e.g., Volden & Sorenson, 2009).

7.3. Future Research Directions

This study provided an initial description of the prevalence and nature of formulaic language in verbal children across the ASD spectrum. Although several questions were addressed, many more arose throughout this project. In fact, the questions that remain unanswered far outnumber those that have been answered to date in formulaic language research in ASD. Some of these questions are listed here below, and are divided into four categories: the relationship between formulaic language and the social interaction and communication impairment in ASD, the interactions of situational factors and formulaic language use, differences between formulaic language use in ASD and non-ASD populations, and formulaic language intervention in ASD.

7.3.1. Formulaic language and impairment in social interaction and communication. The following question asks how the impairments in social interaction and communication in ASD are related to children's formulaic language use. Understanding how the two are connected can help design more effective interventions.

1. Does impairment in social interaction and communication lead to adaptive formulaic language use (e.g., Dobbinson et al., 2003)? Or, does adaptive formulaic language use lead to impairments in social interaction and communication (e.g., Prizant & Duchan as cited in Wray, 2008)?

7.3.2. Interactions of situational factors and formulaic language use in ASD. The following set of questions relates to the interactions between situational factors and formulaic language use. While direct cause-effect relationships may be difficult to

isolate, understanding how situational factors work together to influence language use may help create more facilitative communicative environments for persons with ASD.

1. Prizant and Rydell (1993) described the impact of high and low constraint utterances on the prevalence of echolalia. Do their findings also apply to other classes of formulaic language?
2. Topic-level perseverative speech, or the tangential and persistent reintroduction of topics of interest to the speaker (Murphy & Abbeduto, 2007), might lead to a tendency to reuse certain formulas when discussing said topic (Dobbinson et al., 2003). Does topic-level perseveration lead to a lower type-token ratio than non-perseverative speech?
3. Does topic-level perseveration lead to an increase in the percentage of words in formulaic expressions with respect to non-perseverative speech?
4. How does processing strain relate to the use of formulas as devices of social interaction by children with ASD in interactive situations?
5. Do children with ASD follow the same developmental progression between holistic and analytic processing described by Wray (2002)?
6. Is the developmental progression of the balance of holistic and analytic processing in children with ASD related to age? To expressive language? To receptive language?

7.3.3. Formulaic language use in ASD and non-ASD populations. The following set of questions pertains to the differences and/or similarities between formulaic language use in populations with ASD and populations without ASD. These questions are particularly relevant as they can help identify areas of communicative

strengths or weaknesses. Note that while these questions have been written with respect to children, the same could apply to adult populations.

1. How does the prevalence of formulaic language in the speech of children with ASD compare with that of age-matched, typically developing children?
2. How does the prevalence of formulaic language in the speech of children with ASD compare with that of typically developing children matched on measures of expressive language? On measures of receptive language?
3. Are any classes of formulaic language over- or underrepresented in the speech of children with ASD with respect to that of typically developing children?
4. How do children with ASD compare with typically developing children in terms of the ratio of formulas used as social devices to formulas used as cognitive devices? Does this ratio vary developmentally?
5. Do children with ASD and typically developing children repeat and reuse formulas to the same extent when discussing the same topic on different occasions?

7.3.4. Formulaic language intervention in ASD. The following research questions relate to the development of interventions to target formulaic language in ASD.

1. What aspects of media make language more appealing than that used in conversational contexts?
2. How can media be developed to promote the acquisition of targeted language forms?
3. Which type of formula, idiosyncratic sequences or conventional formulas with idiosyncratic functions, is most challenging for listener comprehension?

4. How can the form-function pairings of conventional formulas with idiosyncratic functions in persons with ASD be modified to match the communal language?

7.4. Conclusion

This study represents an initial examination of the prevalence and nature of formulaic language use in the conversational speech of children with ASD. Much work remains to be done in this field. Hopefully, the methods developed for this study, the problems encountered, and the questions that remain unanswered will prompt further research in this area. Given the strong link between formulaic language and the social uses of language (e.g., Wray & Perkins, 2000), research on this topic has considerable potential to have a positive impact on the social interactions of persons with ASD.

References

Abbeduto, L., Evans, J., & Dolan, T. (2001). Theoretical perspective on language and communication problems in mental retardation and developmental disabilities. *Mental Retardation and Developmental Disabilities Research Reviews*, *7*(1), 45-55.

Accidental. (2014). In *Longman Collocations Dictionary and Thesaurus*. Retrieved from http://collocations.longmandictionariesonline.com/lcdt/collocations#accidental

Aijmer, K. (2002). *English discourse particles: Evidence from a corpus*. Amsterdam, The Netherlands: John Benjamins Publishing Company.

Allthehoopla. (2007, December 15). Nother. Retrieved from http://www.urbandictionary.com/define.php?term=nother

American Psychiatric Association [APA]. (2000). *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR* (4th ed., text rev.). Washington, DC: American Psychiatric Press.

American Psychiatric Association [APA]. (2013). *Diagnostic and Statistical Manual of Mental Disorders: DSM-5* (5th ed.). Washington, DC: American Psychiatric Press.

Arousal. (2014). In *MedlinePlus Medical Dictionary.* Retrieved from http://www.merriam-webster.com/medlineplus/arousal

Atkinson, J., & Heritage, J. (1984). Transcription notation. In J. Atkinson & J. Heritage (Eds.), *Structures of Social Action: Studies in Conversation Analysis* (pp. ix-xvi). Cambridge, UK: Cambridge University Press.

Audacity Team. (2013). Audacity version 2.0.3. [software]. Retrieved from

http://audacity.sourceforge.net/

Auyeung, B., Baron-Cohen, S., Wheelwright, S., & Allison, C. (2007a). *Cambridge University Behaviour and Personality Questionnaire for Children*. Retrieved from http://www.autismresearchcentre.com/arc_tests

Auyeung, B., Baron-Cohen, S., Wheelwright, S., & Allison, C. (2007b). The autism spectrum quotient: Children's version (AQ-Child). *Journal of Autism and Developmental Disorders, 38*(7), 1230-1240.

Baker, S. M. (2002). *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems*. Retrieved from http://www.autism.com/pdf/providers/questionnaire.pdf

Bannard, C., & Lieven, E. (2009). Repetition and reuse in child language learning. In R. Corrigan, E. A. Moravcski, H. Ouali, & K. Wheatley (Eds.), *Formulaic language: Distribution and historical change* (Vol. 1, pp. 299-321). Amsterdam, The Netherlands: John Benjamins Publishing Company.

Bannard, C., & Lieven, E. (2012). Formulaic language in L1 acquisition. *Annual Review of Applied Linguistics*, *32*, 3-16.

Becker, C., Blythe, R., Bybee, J., Christiansen, M. H., Croft, W., Ellis, N. C, …[The Five Graces Group]. (2009). Language is a complex adaptive system: Position paper. *Language Learning, 59*, 1-26.

Beckner, C., & Bybee, J. (2009). A usage-based account of constituency and reanalysis. *Language Learning, 59*, 27-46.

Biber, D. (2009). A corpus-driven approach to formulaic language in English: Multi-word patterns in speech and writing. *International Journal of Corpus Linguistics*, *14*(3), 275-311.

Bio Energy Medical Center. (n. d.). *Autism Medical History Questionnaire*. Retrieved from http://www.bioenergymedicalcenter.com/new_forms/PDFs/Autism%20Patient%20Questionnaire.pdf

Blythe, R. A., & Croft, W. A. (2009). The speech community in evolutionary language dynamics. *Language Learning, 59*, 47-63.

Boucher, J., Mayes, A., & Bigham, S. (2007). Memory, language, and intellectual ability in low-functioning autism. In J. Boucher & D. Bowler (Eds.), *Memory in autism: Theory and evidence* (pp. 268-290). Cambridge, UK: Cambridge University Press.

Bridges, K. A., & Van Lancker Sidtis, D. (2013). Formulaic language in Alzheimer's disease. *Aphasiology, 27*(7), 799-810.

Carter, R., & McCarthy, M. (2006*). Cambridge grammar of English: A comprehensive guide spoken and written English grammar and usage*. Cambridge, UK: Cambridge University Press.

Charlop, M. J. (1986). Setting effects on the occurrence of autistic children's immediate echolalia. *Journal of Autism and Developmental Disorders*, *16*(4), 473-483.

Chart. (2014). In *Longman Collocations Dictionary and Thesaurus*. Retrieved from http://collocations.longmandictionariesonline.com/lcdt/collocations#chart

Code, C. (1997). Can the right hemisphere speak? *Brain and Language, 57*(1), 38-59.

Code, C. (2005). First in, last out? The evolution of aphasic lexical speech automatisms to agrammatism and the evolution of human communication. *Interaction Studies*, *6*(2), 311-334.

Conklin, K., & Schmitt, N. (2012). The processing of formulaic language. *Annual Review of Applied Linguistics*, *32*, 45-61.

Cortes, V. (2004). Lexical bundles in published and student disciplinary writing: Examples from history and biology. *English for Specific Purposes, 23*(4), 397-423.

Courtney, R. (1983). *Longman dictionary of phrasal verbs*. Harlow, UK: Longman Group Limited.

Davies, M. (2008-). The Corpus of Contemporary American English: 450 million words, 1990-present. Available from http://corpus.byu.edu/coca/

de Villiers, J. (2011). Use of um and uh in spontaneous speaking in autism spectrum disorder. In P. Sutcliffe, W. J. Sullivan, & A. Lommel (Eds.), Proceedings from LACUS forum 2009, *LACUS Forum XXXVI: Mechanisms of Linguistic Behavior* (pp. 101-110). Houston, TX: LACUS.

Dobbinson, S., Perkins, M., & Boucher, J. (1998). Structural patterns in conversations with a woman who has autism. *Journal of Communication Disorders*, *31*(2), 113-134.

Dobbinson, S., Perkins, M., & Boucher, J. (2003). The interactional significance of formulas in autistic language. *Clinical Linguistics & Phonetics*, *17*(4-5), 299-397.

Dörnyei, Z. (2007). *Research Methods in Applied Linguistics*. Oxford, UK: Oxford University Press.

Dörnyei, Z. (2009). Individual differences: Interplay of learner characteristics and learning environment. *Language Learning, 59*, 230-248.

Du Bois, J. W. (2006). Transcription symbols by delicacy: Levels 1-4 [pdf]. Retrieved from http://www.linguistics.ucsb.edu/projects/transcription/A02bsymbols.pdf

Duff, P. A. (2008). *Case study research in applied linguistics*. New York, NY: Lawrence Erlbaum Associates.

Durrant, P., & Mathews-Aydınlı, J. (2011). A function-first approach to identifying formulaic language in academic writing. *English for Specific Purposes*, *30*(1), 58-72.

Eigsti, I., de Marchena, A. B., Schuh, J. M., & Kelley, E. (2011). Language acquisition in autism spectrum disorders: A developmental review. *Research in Autism Spectrum Disorders, 5*(2), 681-691.

eInstruction Corp. (2008). ExamView Test Generator 6.2.2 [Software]. Youngstown, OH: Turning Technologies.

Ellis, N. C. (2013). Emergentism. In *The Encyclopedia of Applied Linguistics*. Malden, MA: Blackwell Publishing Ltd.

Elmo's World. (n.d.). Retrieved February 4, 2014, from the Muppet Wiki: http://muppet.wikia.com/wiki/Elmo's_World

Fay, W. H., & Schuler, A. K. (1980) *Emerging language in autistic children*. Baltimore, MD: University Park Press.

French, L. R., Bertone, A., Hyde, K., & Fombonne, R. (2013). Epidemiology of autism spectrum disorders. In J. D. Buxbaum & P. R. Hof (Eds.). *Neuroscience of autism spectrum disorders* (pp. 3-24). Oxford, UK: Academic Press.

Gall, J. P., Gall, M. D., & Borg, W. R. (2005). *Applying educational research: A practical guide* (5th ed.). Boston, MA: Pearson Education.

Grammarist. (2012, February 24). A whole nother. Retrieved from http://grammarist.com/usage/a-whole-nother/

Handl, S., & Graf, E. (2010). Collocation, anchoring, and the mental lexicon – an ontogenetic perspective. In H. Schmid & S. Handl (Eds.). *Cognitive foundations of linguistic usage patterns: Empirical studies* (pp. 119-148). Berlin, Germany: Walter de Gruyter GmbH & Co.

Hickey, T. (1993). Identifying formulas in first language acquisition. *Journal of Child Language*, *20*(1), 27-41.

Howarth, P. (1998). Phraseology and second language proficiency. *Applied Linguistics*, *19*(1), 24-44.

Howlin, P. (1982). Echolalic and spontaneous phrase speech in autistic children. *Journal of Child Psychology and Psychiatry*, *23*(3), 281-293.

Information. (2014). In *Longman Collocations Dictionary and Thesaurus*. Retrieved from http://collocations.longmandictionariesonline.com/lcdt/collocations#information

Irlen Institute. (1995). *Autism Questionnaire*. Retrieved from http://www.irlenvisions.com/files/autism-questionnaire.pdf

Jordan, R. (2008). Practical implications of memory characteristics in autism spectrum disorders. In J. Boucher & D. Bowler (Eds.). *Memory in autism: Theory and evidence* (pp. 293-310). Cambridge, UK: Cambridge University Press.

JSBangs. (2011, July 7). “A whole nother” way of looking at things. Retrieved from http://english.stackexchange.com/questions/33155/a-whole-nother-way-of-looking-at-things

Kim, S. H., & Lord, C. (2013). The behavioral manifestations of autism spectrum disorders. In J. D. Buxbaum & P. R. Hof (Eds.). *Neuroscience of autism spectrum disorders* (pp. 25-37). Oxford, UK: Academic Press.

Koegel, R. L., Koegel, L. K., & Brookman, L., I. (2003). Empirically supported pivotal response interventions for children with autism. In A. E. Kazdin (Ed.), *Evidence-based psychotherapies for children and adolescents* (pp. 341-357). New York, NY: Guilford Press.

Lai, M.-C., Lombardo, M. V., Chakrabarti, B., & Baron-Cohen, S. (2013). Subgrouping the autism “spectrum”: Reflections on DSM-5 (APA, 2013). *PLoS Biology, 11*(4), 1-7. doi:10.1371/journal.pbio.100154

Lin, P. (2010). The phonology of formulaic sequences: A review. In D. Wood (Ed.), *Perspectives of formulaic language: Acquisition and communication* (pp. 174-193). London, Canada: Continuum International Publishing Group.

Lin, P. (2012). Sound evidence: The missing piece of the jigsaw in formulaic language research. *Applied Linguistics*, *33*(3), 342-347.

Lindstromberg, S. & Boers, F. (2008). Phonemic repetition and the learning of lexical chunks: The power of assonance. *System*, *36*(3), 423-436.

Maddox, M. (2009, October 7). Other, another, and “a whole nuther”. Retrieved from http://www.dailywritingtips.com/other-another-and-a-whole-nuther/

McNelis, D. N., & McLeer, S. V. (2012). Treatment of adults with autism spectrum disorders. In M. Reber (Ed.). *The autism spectrum: Scientific foundations and treatment* (pp. 305-326). Cambridge, UK: Cambridge University Press.

Miller, G. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *Psychological Review*, *63,* 81-97.

Murphy, M. M., & Abbeduto, L. (2007). Gender differences in repetitive language in fragile X syndrome. *Journal of Intellectual Disability Research*, *51*(5), 387-400.

Nattinger, J. R., & DeCarrico, J. S. (1992) *Lexical phrases and language teaching*. Oxford, UK: Oxford University Press.

NCH Software. (n. d.). Express Scribe (Version 5.50) [Software]. Available from http://www.nch.com.au/scribe/index.html

Niemi, J., Otsa, L., Evtyukova, A., Lehtoaro, L., & Niemi, J. (2010). Linguistic reflections of social engagement in Asperger discourse and narratives: A quantitative analysis of two cases. *Clinical Linguistics & Phonetics, 24*(11), 928-940.

Noens, I., & Van Bercklaer-Onnes, I. (2004). Making sense in a fragmentary world: Communication in people with autism and learning disability. *Autism*, *8*(2), 197-218.

Nother. (2014) In *Oxford English Dictionary*. Retrieved from http://www.oed.com.proxy.library.carleton.ca/search?searchType=dictionary&q=nother&_searchBtn=Search

Pawley, A., & Syder, F. (1983). Two puzzles for linguistic theory: Nativelike selection and nativelike fluency. In J. C. Richards & R. W. Schmidt (Eds.), *Language and communication* (pp. 191-268). London, UK: Longman.

Peck, C. A. (1985). Increasing opportunities for social control by children with autism and severe handicaps: Effects on student behavior and perceived classroom climate. *Journal of the Association for Persons with Severe Handicaps, 10*(4), 183-193.

Perkins, M. R., Dobbinson, S., Boucher, J., Bol, S., & Bloom, P. (2006). Lexical knowledge and lexical use in autism. *Journal of Autism and Developmental Disorders*, *36*(6), 795-805.

Peters, A. M. (1983). *The units of language acquisition*. Cambridge, UK: Cambridge University Press.

Prizant, B. M. (1983). Language acquisition and communicative behavior in autism: Toward an understanding of the "whole" of it. *Journal of Speech and Hearing Disorders*, *48*(3), 296-307.

Prizant, B. M., & Rydell, P. J. (1984). Analysis of functions of delayed echolalia in autistic children. *Journal of Speech and Hearing Research*, *27*, 183-192.

Prizant, B. M., & Rydell, P. J. (1993). Assessment and intervention considerations for unconventional verbal behavior. In J. Reichle & D. P. Wacker (Eds.). *Communicative alternatives to challenging behavior: Integrating functional assessment and intervention strategies* (Vol. 3, pp. 263-297). Baltimore, MD: P. H. Brookes Pub. Co.

Reber, M. E. (2012a). Autism nosology: Historical perspectives. In M. E. Reber (Ed.). *The autism spectrum: Scientific foundations and treatment* (pp. 1-33). Cambridge, UK: Cambridge University Press.

Reber, M. E. (2012b). Etiology: Syndromic autism. In M. E. Reber (Ed.). *The autism spectrum: Scientific foundations and treatment* (pp. 112-144). Cambridge, UK: Cambridge University Press.

Rehfeld, R. A., & Chambers, M. R. (2003). Functional analysis and treatment of verbal perseverations displayed by an adult with autism. *Journal of Applied Behavior Analysis*, *36*(2), 259-261.

Reuterskiöld, C., & Van Lancker Sidtis, D. (2012). Retention of idioms following one-time exposure. *Clinical Language Teaching and Therapy, 29*(2), 219-231.

Roberts, J. M. A. (1989). Echolalia and comprehension in autistic children. *Journal of Autism and Developmental Disorders*, *19*(2), 271-281.

Rydell, P. J. (1989). Social-communicative control and its effect on echolalia in children with autism. (Doctoral dissertation). Retrieved from ProQuest Database. (9004705)

Rydell, P. J., & Mirenda, P. (1991). The effects of two levels of linguistic constraint on echolalia and generative language production in children with autism. *Journal of Autism and Developmental Disorders*, *21*(2), 131-157.

Rydell, P. J., & Mirenda, P. (1994). Effects of high and low constraint utterances on the production of immediate and delayed echolalia in young children with autism. *Journal of Autism and Developmental Disorders*, *24*(6), 719-735.

Sealey, L. R., & Gilmore, S. E. (2008). Effects of sampling context on the finite verb production of children with and without delayed language development. *Journal of Communication Disorders, 41*(3), 223-258.

Sesame Workshop. (2014a). *Elmo's World: Dogs* [Video file]. Retrieved from http://www.sesamestreet.org/parents/theshow/episodes/elmos-world#video/81c216f4-1648-11dd-995c-3d52ab3e4656

Sesame Workshop. (2014b). *Elmo's World: Drawing* [video file]. Retrieved from http://www.sesamestreet.org/parents/theshow/episodes/elmos-world#video/4fff3dc7-154f-11dd-8ea8-a3d2ac25b65b

Sidtis, D., Canterucci, G., & Katsnelson, D. (2009). Effects of neurological damage on production of formulaic language. *Clinical Linguistics & Phonetics*, *23*(4), 270-284.

Silla-Zaleski, V. A., & Vesloski, M. J. (2010). Using DRO, behavioral momentum, and self-regulation to reduce scripting by an adolescent with autism. *Journal of Speech-Language Pathology & Applied Behavior Analysis*, *5*(1), 80-87.

Simpson-Vlach, R., & Ellis, N. C. (2010). An academic formulas list: New methods in phraseology research. *Applied Linguistics*, *31*(4), 487-512.

Sinclair, J. M. (1991). *Corpus, concordance, collocation*. Oxford: Oxford University Press.

Sirota, K. G. (2004). Positive politeness as discourse process: Politeness practices of high-functioning children with autism and Asperger Syndrome. *Discourse Studies*, *6*(2), 229-251.

Solomon, O. (2004) Narrative introductions: Discourse competence of children with autistic spectrum disorders. *Discourse Studies*, *6*(2), 253-276.

Southwood, F., & Russell, A. F. (2004). Comparison of conversation, freeplay, and story generation as methods of language sample elicitation. *Journal of Speech, Language, and Hearing Research*, *47*(2), 366-376.

Sterponi, L., & Shankey, J. (2014). Rethinking echolalia: Repetition as interactional resource in the communication of a child with autism. *Journal of Child Language*, *41*(2), 275-304.

Stribling, P., Rae, J., & Dickerson, P. (2007). Two forms of spoken repetition in a girl with autism. *International Journal of Language & Communication Disorders*, *42*(4), 427-444.

Tager-Flusberg, H., & Calkins, S. (1990). Does imitation facilitate the acquisition of grammar? Evidence from a study of autistic, Down syndrome and normal children. *Journal of Child Language*, *17*(3), 591-606.

Tager-Flusberg, H., Paul, R., Lord, C. (2005). Language and communication in autism. In F. R. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders* (3rd Ed., Vol. 1, pp. 335-364). Hoboken, NJ: John Wiley & Sons.

Toot Toot, Chugga Chugga Big Red Car. (n.d.). Retrieved February 4, 2014 from the Wigglepedia! Wiki: http://wiggles.wikia.com/wiki/Toot_Toot,_Chugga_Chugga,_Big_Red_Car

Van Lancker Sidtis, D. (2004). When novel sentences spoken or heard for the first time in the history of the universe are not enough: Toward a dual-process model of language. *International Journal of Language & Communication Disorders*, *39*(1), 1-44.

Van Lancker Sidtis, D. (2009). Formulaic and novel language in a 'dual process' model of language competence: Evidence from surveys, speech samples, and schemata. In R. Corrigan, E. A. Moravcski, H. Ouali, & K. Wheatley (Eds.), *Formulaic language: Acquisition, loss, psychological reality, and functional explanations* (Vol. 2, pp. 445-470). Amsterdam, The Netherlands: John Benjamins Publishing Company.

Van Lancker Sidtis, D. (2012a). Formulaic language and language disorders. *Annual Review of Applied Linguistics*, *32*, 62-80.

Van Lancker Sidtis, D. (2012b). Two-track mind: Formulaic and novel language support a dual-process model. In M. Faust (Ed.), *The handbook of the neuropsychology of language* (1st Ed., Vol. 1, pp. 342-367). Malden, MA: Blackwell Publishing Ltd.

Van Lancker Sidtis, D., & Postman, W. A. (2006). Formulaic expressions in spontaneous speech of left- and right- hemisphere damaged subjects. *Aphasiology*, *20*(5), 411-426.

Van Lancker-Sidtis, D., & Rallon, G. (2004). Tracking the incidence of formulaic expressions in everyday speech: Methods for classification and verification. *Language & Communication*, *24*(3), 207-240.

Vogindroukas, I., & Zikopoulou, O. (2011). Idiom understanding in people with Asperger syndrome/high functioning autism. *Revista da Sociedade Brasileira de Fonoaudiologia*, 16*(4), 390-395.*

Volden, J., Macgill-Evans, J., Goulden, K., & Clarke, M. (2007). Varying language register according to listener needs in speakers with Autism Spectrum Disorder. *Journal of Autism and Developmental Disorders, 37*(6), 1139-1154.

Volden, J., & Sorenson, A. (2009). Bossy and nice requests: Varying language register in speakers with autism spectrum disorder (ASD). *Journal of Communication Disorders*, *42*(1), 58-73.

Waterhouse, L. (2013). *Rethinking autism: Variation and complexity*. London, UK: Academic Press.

Wetherby, A. M., Woods, J., Allen, L., Cleary, J., Dickinson, H., & Lord, C. (2004). Early indicators of autism spectrum disorders in the second year of life. *Journal of Autism and Developmental Disorders*, *34*(5), 473-493.

Wheeler, M. (2004). Mealtime and children on the autism spectrum: Beyond picky, fussy, and fads. *The Reporter*, *9*(2), 13-19.

Whole Nother Thing. (2009). In *The Free Dictionary.* Retrieved from http://idioms.thefreedictionary.com/whole+nother+thing

Wood, D. (2002). Formulaic language in acquisition and production: Implications for teaching. *TESL Canada Journal/Revue TESL du Canada*, *20*(1), 1-15.

Wood, D. (2006). Uses and functions of formulaic sequences in second-language speech: An exploration of the foundations of fluency. *The Canadian Modern Language Review/La revue canadienne des langues vivantes*, *63*(1), 13-33.

Wood, D. (2009). Effects of focused instruction of formulaic sequences on fluent expression in second language narratives: A case study. *Canadian Journal of Applied Linguistics/Revue canadienne de linguistique appliquée*, *12*(1), 39-57.

Wood, D. (2010). *Formulaic language and second language speech fluency: Background, evidence, and classroom applications.* London, UK: Continuum.

Wray, A. (1999). Formulaic language in learners and native speakers. *Language Teaching*, *32*(4), 213-231.

Wray, A. (2002). *Formulaic language and the lexicon*. Cambridge, UK: Cambridge University Press.

Wray, A. (2008). Formulaic sequences and language disorder. In M. J. Ball, M. R. Perkins, N. Müller, & S. Howard (Eds.), *The handbook of clinical linguistics* (pp. 184-197). Malden, MA: Blackwell Publishing.

Wray, A. (2009). Identifying formulaic language: Persistent challenges and new opportunities. In R. Corrigan, E. A. Moravcski, H. Ouali, & K. Wheatley (Eds.), *Formulaic language: Distribution and historical change* (Vol. 1, pp. 27-52). Amsterdam, The Netherlands: John Benjamins Publishing Company.

Wray, A. (2011). Formulaic language as a barrier to effective communication with people with Alzheimer's disease. *The Canadian Modern Languages Review/La Revue canadiennne des langues vivantes*, *67*(4), 429-458.

Wray, A., & Namba, K. (2003). Use of formulaic language by a Japanese-English bilingual child: A practical approach to data analysis. *Japan Journal of Multilingualism and Multiculturalism*, *9*(1), 24-51.

Wray, A., & Perkins, M. R. (2000). The functions of formulaic language: An integrated model. *Language & Communication*, *20*(1), 1-28.

Appendix A

Severity Descriptors for Social Communication Impairment and Restricted, Repetitive Behaviours

Severity Level	Social Communication	Restricted, Repetitive Behaviours
Level 3 "Requiring very substantial support"	Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions, and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds only to very direct social approaches.	Inflexibility of behaviour, extreme difficulty coping with change, or other restricted/repetitive behaviours markedly interfere with functioning in all spheres. Great distress/difficulty changing focus or action.
Level 2 "Requiring substantial support"	Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. For example, a person who speaks simple sentences, whose interaction is limited to narrow special interests, and who has markedly odd nonverbal communication.	Inflexibility of behaviour, difficulty coping with change, or other restricted/repetitive behaviours appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/or difficulty changing focus or action.

Severity Level	Social Communication	Restricted, Repetitive Behaviours
Level 1 "Requiring support"	Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions, and clear examples of atypical or unsuccessful responses to social overtures of others. May appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences and engages in communication but whose to-and-fro conversation with others fails, and whose attempts to make friends are odd and typically unsuccessful.	Inflexibility of behaviour causes significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence.

Note. Adapted from "TABLE 2 Severity levels for autism spectrum disorder" in *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.), by APA, pp. 52. Copyright (2013) by APA.

Appendix B

Criteria for Rating of Formulaic Sequences (adapted from Wray & Namba, 2003, p. 29-32)

Table B1 presents the guidelines proposed by Wray and Namba (2003) for applying the list of criteria to different types of data, according to the type of speaker and the correctness of the sequence. It is followed by the list of criteria for rating formulaic sequences.

Table B1

Guidelines on General Application of Criteria to Different Types of Data

Data Source	Error-Free	One or More Errors in Form	One or More Errors in Usage
Option 1: Adult Native Speaker	Apply criteria A to I.	a) Apply criteria E to J to the original form. b) Apply criteria A to E, H, and I to the corrected form (if known)	a) Apply criteria A to J to the original form. b) Apply criterion H to the appropriate form for the context.
Option 2: Child Native Speaker/Non-Native Speaker	Apply criteria A to I and K.	a) Apply criteria E to J to the original form. b) Apply criteria A to E, H, I, and K to the corrected form (if known)	a) Apply Criteria A to K to the original form. b) Apply criteria H and K to the appropriate form for the context.

List of criteria for rating formulaic sequences:

A. By my judgment there is something grammatically unusual about this wordstring.
B. By my judgment, part or all of the wordstring lacks semantic transparency.
C. By my judgment, this wordstring is associated with specific situation and/or register.
D. By my judgment, the wordstring as a whole performs a function in communication or discourse other than, or in addition to, conveying the meaning of the words themselves.
E. By my judgment, this precise formulation is the one most commonly used by this speaker/writer when conveying this idea.
F. By my judgment, the speaker/writer has accompanied this wordstring with an action, use of punctuation, or phonological pattern that gives it special status as a unit, and/or is. Repeating something s/he has just heard or read.
G. By judgment, the speaker/writer, or someone else, has marked this wordstring grammatically or lexically in a way that gives it special status as a unit.
H. By my judgment, based on direct evidence or my intuition, there is a greater than chance-level probability that the speaker/writer will have encountered this precise formulation before in communication from other people.

I. By my judgment, although this wordstring is novel, it is a clear derivation, deliberate or otherwise, of something that can be demonstrated to be formulaic in its own right.
J. By my judgment, this wordstring is formulaic, but it has probably been unintentionally applied inappropriately.
K. By my judgment, this wordstring contains linguistic material that is too sophisticated, or not sophisticated enough, to match the speaker's general grammatical and lexical competence.

Appendix C

List of Toys, Games, and Popular Culture References

The following is a list of toys and games used by the participants during the recording sessions. Popular culture icons referenced by the participants are also included in the list.

Category	Name	Description
Book	*The Mixed-Up Chameleon*	Illustrated book about a chameleon that goes to a zoo and wishes to be like the other animals.
Electronic game	*Action Words*	Computer game with pictures used to teach verbs.
	Angry Birds	Video game in which players launch birds at pigs using slingshots.
	Angry Birds Star Wars	Video game blending the *Star Wars* and *Angry Birds* franchises.
	Disney's Mickey Mouse Preschool	Computer game for children targeting skills such as matching, shape recognition, following directions, etc.
	HearBuilder	Games designed to improve auditory memory.
	Skylanders	Video game series.
Electronic	*iPad*	Tablet by Apple.
	Laptop	Portable computer.
	Mp3 Player	Portable digital music player.
	Nintendo DS	Dual-screen handheld game console.
	Nintendo DSi	Dual-screen handheld game console.
	Smartphone	Telephone with internet capabilities.
	Tablet	Mobile computer without an attached keyboard or mouse.
	Wii	Video game console.
Movie	*Live and Let Die*	James Bond spy film.
	Star Trek	Science fiction film.
	The Rocky Horror Picture Show	Musical comedy horror film.
Musician	Elvis Presley	American musician.
Puppet	Big Bird	Puppet representing Big Bird, a character on *Sesame Street*.
	Cookie Monster	Puppet representing Cookie Monster, a Muppet character on *Sesame Street*.
	Elmo	Puppet representing Elmo, a Muppet character on *Sesame Street*.
	Grover	Puppet representing Grover, a Muppet character on *Sesame Street*.
	Kermit the Frog	Puppet representing Kermit the Frog, a Muppet character on *Sesame Street*.
	Sheep	Puppet representing a sheep.
Television	*Dora the*	Animated program starring *Dora the Explorer*. Her cousin

program	*Explorer*	is Diego.
	Elmo's World	Segment of *Sesame Street* television program with Elmo and Dorothy the goldfish as protagonists. Includes sections in which Elmo introduces a topic, Elmo asks a question to the viewers, Elmo receives mail, and Elmo gives a multiple-choice quiz.
	Global Grover	Segment of *Sesame Street* television program featuring Grover.
	Mighty Machines	Television program about machines and how they work.
	Sesame Street	Television series featuring Muppets.
Toy figures	Animals	Various toy figures of animals.
	Anthony	Toy figure representing Anthony, a character in the television program *Wiggles World*. Anthony loves to eat.
	Bert	Muppet from the television show *Sesame Street.*
	Care Bear	Multi-coloured bears that live in Care-a-Lot.
	Daisy Duck	Toy figure representing Daisy Duck, a Walt Disney Productions character in several films and games. Daisy Duck is Donald Duck's girlfriend.
	Dinosaur	Small toy figure that jumps when cranked.
	Donald Duck	Toy figure representing Donald Duck, a Walt Disney character in several films and games. Donald is known for his poorly intelligible speech.
	Dorothy the Dog	Toy figure representing Dorothy the Dog, a character in the television program *Wiggles World*.
	Ernie	Toy figure representing Ernie, a Muppet from the television show *Sesame Street*.
	Food	Various figures of different foods.
	Goofy	Toy figure representing Goofy, a Walt Disney character in several films and games.
	Greg	Toy figure representing Greg, a character in the television program *Wiggles World*. Greg loves to read.
	Jeff	Toy figure representing Jeff, a character in the television program *Wiggles World*. Jeff loves to sleep.
	Mickey Mouse	Toy figure representing Mickey Mouse, a Walt Disney character in several films and games.
	Minnie Mouse	Toy figure representing Minnie Mouse, a Walt Disney character in several films and games. Minnie Mouse is Mickey Mouse's girlfriend.
	Murray	Toy figure representing Murray, a character in the television program *Wiggles World*. Murray loves music.
	Pluto	Toy figure representing Pluto, a Walt Disney character in several films and games. Pluto is Mickey Mouse's pet.
	Street signs	Various figures of small road signs.
Toys and Games	*Blockus*	Strategy game in which players must place as many of their tiles as possible on the board while attempting to block their

		opponent. The player with the lowest number of squares on their tiles remaining wins.
	Bowling	Plastic ball and pin set. The objective of the game is to knock over the pins by rolling the ball the fewest times possible.
	Find That Action Verb! Listening Lotto	The names of actions are played on a CD. The player must find the picture of that action on their game board.
	Funny Faces	Felt pieces that can be arranged in any position to make funny faces.
	Hide-and-Seek	Game in which one person hides and has to be found by the seeker.
	Jenga	Set of 54 wooden blocks stacked into a tower. The objective of the game is to remove blocks from the lower levels and balance them on top of the tower without knocking it over.
	Lego	Plastic bricks with accompanying figures and attachments.
	Marble Run	Set of building pieces including loops, windmills, tunnels, etc. that can be assembled together to create a track for marbles.
	Phonics desk	Desk that plays and records sounds to teach sounds, words, etc.
	Picture cards	Cards with pictures of people and objects. The word they represent is written on the below the picture.
	Playhouse	Scaled model of a house that opens down the middle.
	Round Bells	Eight tin bells in different colours attached on a spinning platform.
	Ukulele	Member of the guitar family with four strings.
Website	*Mighty Book*	Website with free and subscription books with illustrations, songs, games, puzzles, etc.
	"Punny Valentines"	List of puns for Valentine's Day from *Mighty Book* website.
	YouTube	Website with short film clips and music videos.

Appendix D

Child Participant Profile Questionnaire

The following pages provide the Child Participant Profile Questionnaire developed for this study. The list of descriptors for each question, though not provided to the participants' parents, has been included after the Child Participant Profile Questionnaire.

Note that the page size has been modified to accommodate the printing requirements of this document. Also note that the title reflects the working title used to refer to this study.

Distribution of Formulaic Sequences in the Spontaneous Speech of Autistic Children
Child Participant Profile Questionnaire

This questionnaire contains 44 questions divided into 4 sections. It will take approximately 30 minutes to complete. Please answer the questions to the best of your abilities.

At any point during the completion of the questionnaire, you may decline to answer by leaving the response section blank or writing N/A (not applicable). You may contact the researcher or her supervisor in person, by telephone, or by email if you have any questions about the items on the questionnaire.

Contact Information

Please complete the following tables. This page will be separated from the rest of the questionnaire.

Child Participant's Name:	

Person Filling Out the Questionnaire:	
Today's Date:	

Mother's Name:	
Address:	
Email:	
Telephone Number:	

Father's Name:	
Address:	
Email:	
Telephone Number:	

Distribution of Formulaic Sequences in the Spontaneous Speech of Autistic Children: Child Participant Profile Questionnaire

Section 1: Demographic Information

This section contains 8 questions concerning demographic information. Please circle your answer or fill in the blank where appropriate.

1. Child participant's sex:
   a. Male b. Female
2. Date of birth: _____ / _____ / _____
   Month Day Year
3. Place of birth: _____
   City, Province/State, Country
4. If not born in the Ottawa-Carleton region, how many years has your child been living in the Ottawa-Carleton region? _____
5. Child's first language: _____

   Other languages spoken: _____
6. Mother's first language: _____

   Other languages spoken: _____
7. Father's first language: _____

   Other languages spoken: _____
8. Current school grade: _____

Section 2: Medical Information

This section contains 21 questions. They address your child's diagnosis, symptoms, and treatment. Please fill in the blank, circle/check your answer, or provide a short answer where appropriate. You may add additional comments for any of the questions.

9. When did you first notice your child's symptoms?

   _____

   _____

10. Was the onset of your child's symptoms:
    a. Sudden b. Gradual

11. Was the impression as to the timing of onset:
    a. Weak b. Strong

12. Does the impression as to the timing of onset differ among parents and others caring for the child?
    a. Yes
    b. No

13. What did you first notice?

    _____

    _____

14. Please indicate the approximate age (ex. walking 14 months) at which your child reached the following milestones. You made include additional comments if you wish.

Milestone	Age	Never	Comments
Sitting up	months	☐	
Crawl	months	☐	
Pulled to stand	months	☐	
Potty trained	months	☐	
Walked alone	months	☐	
First words	months	☐	
Phrases or sentences	months	☐	
Spoke clearly	months	☐	
Lost language	months	☐	
Lost eye contact	months	☐	

15. Who made the initial diagnosis of autism?

    _____

    _____

16. Age at autism diagnosis: _____ years _____ months

17. Does your child have any siblings?
    a. Yes
    b. No

    If you answered *yes* to the previous question, please specify whether any of your child's siblings have been diagnosed with autism.

Sibling	Sex	Date of birth	Autism diagnosis	No autism diagnosis
Sibling 1			☐	☐
Sibling 2			☐	☐
Sibling 3			☐	☐
Sibling 4			☐	☐

18. Has your child been diagnosed with intellectual impairment?
    a. Yes
    b. No

19. Has your child been diagnosed with language impairment?
    a. Yes
    b. No

20. Please indicate whether your child has been diagnosed with any of the following neurodevelopmental, mental, or behavioral disorders.

Condition	Yes	No
ADHD	☐	☐
Aggression	☐	☐
Anxiety	☐	☐
Bipolar Disorder	☐	☐
Depression	☐	☐
Dyslexia	☐	☐
Hyperlexia	☐	☐
Obsessive-compulsive disorder	☐	☐
Oppositional defiant disorder	☐	☐
Psychosis	☐	☐
Sleep disorder	☐	☐
Other behavioral disorder (list)	☐	☐
Other mood disorder (list)	☐	☐
Other neurodevelopmental disorder (list)	☐	☐

21. Has your child been diagnosed with any of the following genetic or medical conditions?

Condition	Yes	No
Fragile X syndrome	☐	☐
Rett syndrome	☐	☐
Tuberous sclerosis complex	☐	☐
Timothy syndrome	☐	☐
Down syndrome	☐	☐
Phenylketonuria	☐	☐
CHARGE syndrome	☐	☐
Angelman syndrome	☐	☐
PTEN macrocephaly syndrome	☐	☐
Joubert syndrome	☐	☐
Landau-Kleffner syndrome	☐	☐
Prader-Willi syndrome	☐	☐
Smith-Lemli-Opitz syndrome	☐	☐
Neurofibromatosis	☐	☐
Epilepsy	☐	☐

22. Please indicate whether any of the following apply to your child.

Environmental Risk Factor	Yes	No
Valproic acid exposure	☐	☐
Very low birth weight	☐	☐
Premature birth	☐	☐
Neurotoxin exposure	☐	☐
TORCH maternal infection (any of toxoplasmosis, syphilis, varicella-zoster, parvovirus B19, rubella, cytomegalovirus, herpes)	☐	☐

23. Please indicate therapies used now or in the past. Include your child's age (ex. 3 years 2 months) when he/she started and ended therapy. Or, check "Now" if he/she is still undergoing therapy.

Therapies	Yes	No	Start		End		Now
Acupuncture	☐	☐	yr	mth	yr	mth	☐
Articulation therapy	☐	☐	yr	mth	yr	mth	☐
Auditory training	☐	☐	yr	mth	yr	mth	☐
Craniosacral	☐	☐	yr	mth	yr	mth	☐
Energy therapy (specify)	☐	☐	yr	mth	yr	mth	☐
Homeopathy	☐	☐	yr	mth	yr	mth	☐
Inst. for human potential	☐	☐	yr	mth	yr	mth	☐
Lovaas (ABA)	☐	☐	yr	mth	yr	mth	☐
Medication affecting central nervous system							
for attention	☐	☐	yr	mth	yr	mth	☐
for behaviour	☐	☐	yr	mth	yr	mth	☐
for mood	☐	☐	yr	mth	yr	mth	☐
for seizures	☐	☐	yr	mth	yr	mth	☐
Naturopathy	☐	☐	yr	mth	yr	mth	☐
Neural therapy	☐	☐	yr	mth	yr	mth	☐
Occupational therapy	☐	☐	yr	mth	yr	mth	☐
Osteopathy	☐	☐	yr	mth	yr	mth	☐
Physical therapy	☐	☐	yr	mth	yr	mth	☐
Sensory diet	☐	☐	yr	mth	yr	mth	☐
Speech therapy	☐	☐	yr	mth	yr	mth	☐
Vision therapy	☐	☐	yr	mth	yr	mth	☐
Other (specify)	☐	☐	yr	mth	yr	mth	☐
Other (specify)	☐	☐	yr	mth	yr	mth	☐
Other (specify)	☐	☐	yr	mth	yr	mth	☐
Other (specify)	☐	☐	yr	mth	yr	mth	☐
Other (specify)	☐	☐	yr	mth	yr	mth	☐
Other (specify)	☐	☐	yr	mth	yr	mth	☐

24. Please indicate whether your child has been diagnosed with any of the following speech-sound production disorders.

Condition	Yes	No
Delay in articulation	☐	☐
Dysarthria	☐	☐
Phonological disorders (list)	☐	☐
Verbal dyspraxia	☐	☐
Other (list)	☐	☐

25. Acute hearing (oversensitivity to sounds):
    a. Yes
    b. No

26. Hearing loss:
    a. Yes
    b. No

27. Corrected-to-normal hearing:
    a. Yes
    b. No

28. Please indicate which, if any, of the following stimuli appear bothersome, painful, or aversive.

Stimuli	Never	Occasionally	Frequently	Always	Past Only
Smells	☐	☐	☐	☐	☐
Sounds	☐	☐	☐	☐	☐
Touch	☐	☐	☐	☐	☐
Lights	☐	☐	☐	☐	☐
Patterns	☐	☐	☐	☐	☐
Textures	☐	☐	☐	☐	☐
Other (list)	☐	☐	☐	☐	☐

29. Please indicate which, if any, of the following stimuli have a "mesmerizing" effect.

Stimuli	Never	Occasionally	Frequently	Always	Past Only
Sounds	☐	☐	☐	☐	☐
Lights	☐	☐	☐	☐	☐
Colours	☐	☐	☐	☐	☐
Patterns	☐	☐	☐	☐	☐
Sparkles	☐	☐	☐	☐	☐
Textures	☐	☐	☐	☐	☐
Spinning	☐	☐	☐	☐	☐
Moving	☐	☐	☐	☐	☐
Other (list)	☐	☐	☐	☐	☐

30. Which of the following statements best describes your child's restricted and repetitive behaviors?
    a. Inflexibility of behavior, extreme difficulty coping with change, or other restricted/repetitive behaviors markedly interfere with functioning in all spheres. Great distress/difficulty changing focus or action.
    b. Inflexibility of behavior, difficulty coping with change, or other restricted/repetitive behaviors appear frequently enough to be obvious to the casual observer and interfere with functioning in a variety of contexts. Distress and/or difficulty changing focus or action.
    c. Inflexibility of behavior cause significant interference with functioning in one or more contexts. Difficulty switching between activities. Problems of organization and planning hamper independence.

Section 3: Communication

This section contains 4 questions about your child's communicative abilities. Please circle/check your answer or provide a short answer where appropriate.

31. Which of the following best describe your child's mode of communication? Choose all that apply.

    a. Signing
    b. Oral speech
    c. Simultaneous signing and oral speech
    d. One word/sign utterances
    e. Two or three word/sign phrases
    f. Single sentences
    g. Compound sentences (phrases connected with *and*, *or*, *but*, *so*)
    h. Complex sentences (phrases connected with *because, since, although, after,* etc.)
    i. Augmentative communication device

32. If applicable, please specify your child's augmentative communication device.

    _____

    _____

33. Which of the following statements best describes your child's social communication?
    a. Severe deficits in verbal and nonverbal social communication skills cause severe impairments in functioning, very limited initiation of social interactions, and minimal response to social overtures from others. For example, a person with few words of intelligible speech who rarely initiates interaction and, when he or she does, makes unusual approaches to meet needs only and responds to only very direct social approaches.
    b. Marked deficits in verbal and nonverbal social communication skills; social impairments apparent even with supports in place; limited initiation of social interactions; and reduced or abnormal responses to social overtures from others. For example, a person who speaks simple sentences, whose interaction is limited to narrow special interests, and who has markedly odd nonverbal communication.
    c. Without supports in place, deficits in social communication cause noticeable impairments. Difficulty initiating social interactions, and clear examples of atypical or unsuccessful responses to social overtures of others. May appear to have decreased interest in social interactions. For example, a person who is able to speak in full sentences, but whose to-and-fro conversation with others fails, and whose attempts to make friends are odd and typically unsuccessful.

34. Please indicate which, if any, of the following statements are true for your child.

Statement	Never	Occasionally	Frequently	Always	Past Only
Pronounces words well	☐	☐	☐	☐	☐
Answers by repeating questions	☐	☐	☐	☐	☐
Asks using "you" instead of "I"	☐	☐	☐	☐	☐
Perfect musical pitch	☐	☐	☐	☐	☐
Babbling	☐	☐	☐	☐	☐
Does not ask questions	☐	☐	☐	☐	☐
Poor expressive language	☐	☐	☐	☐	☐
Does not answer simple questions	☐	☐	☐	☐	☐
Points to objects instead of naming them	☐	☐	☐	☐	☐
Uses "I"	☐	☐	☐	☐	☐
Good receptive language	☐	☐	☐	☐	☐
Scripting	☐	☐	☐	☐	☐
Talking to self	☐	☐	☐	☐	☐
Uses one word for another	☐	☐	☐	☐	☐

Section 4: Home and School Life

This section contains 10 questions about your child's home and school life. Please provide short answers.

35. What language(s) is/are spoken at home?

_____

_____

36. Who lives in the home with your child?

_____

_____

37. How does your child interact with other children?

_____

_____

38. How does your child interact with adults?

_____

_____

39. What language(s) is/are spoken at school?

_____

_____

40. Are any special accommodations made for your child at school? Please describe.

_____

_____

41. Is your child involved in any sports, music, or other activities? Please describe.

_____

_____

42. Does your child have any savant abilities (ex. perfect musical pitch, mathematics, drawing, etc.)? If so, please describe.

_____

_____

43. What are your child's favourite pastimes?

_____

_____

44. Does your child have any special interests? Please describe.

_____

_____

Child Participant Profile Question Descriptors

1. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Participant data
   SOURCE: New

2. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Participant data
   SOURCE: New

3. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Participant data
   SOURCE: New

4. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Participant data
   SOURCE: New

5. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Participant data
   SOURCE: New

6. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Family information
   SOURCE: New

7. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Family information
   SOURCE: New

8. SECTION: Demographic information
   TOPIC: Demographic information
   SUBTOPIC: Participant data
   SOURCE: New

9. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 2)
   SECTION: Medical history
   TOPIC: Medical history

SUBTOPIC: Timing
SOURCE: Modified

10. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 2)
SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Timing
SOURCE: Modified

11. REFERENCE: *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems* (Baker, 2002, p. 10)
SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Timing
SOURCE: Duplicate

12. REFERENCE: *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems* (Baker, 2002, p. 10)
SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Timing
SOURCE: Duplicate

13. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 2)
SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Symptoms
SOURCE: Duplicate

14. REFERENCE: *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems* (Baker, 2002, p. 10)
SECTION: Medical history
TOPIC: Developmental milestones
SUBTOPIC: Motor | Speech | Regression
SOURCE: Modified

15. SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Diagnosis
SOURCE: New

16. SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Diagnosis

SOURCE: New

17. SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Family medical history
    SOURCE: New

18. REFERENCE: APA (2013)
    SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Diagnosis
    SOURCE: Modified

19. REFERENCE: APA (2013)
    SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Diagnosis
    SOURCE: Modified

20. REFERENCE: APA (2013), McNelis & McLeer (2012)
    SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Diagnosis
    SOURCE: New
    NOTE: Recommended by SLP

21. REFERENCE: APA (2013), Lai et al. (2013)
    SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Diagnosis
    SOURCE: Modified

22. REFERENCE: APA (2013), Waterhouse (2013)
    SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Perinatal
    SOURCE: Modified

23. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 19); *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems* (Baker, 2002, p. 14)
    SECTION: Medical history
    TOPIC: Therapy
    SUBTOPIC: Treatment
    SOURCE: Modified

24. SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Symptoms
    SOURCE: New
    NOTE: Recommended by SLP

25. REFERENCE: *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems* (Baker, 2002, p. 17)
    SECTION: Medical history
    TOPIC: Sensory
    SUBTOPIC: Hearing
    SOURCE: Modified
    NOTE: Recommended by SLP

26. REFERENCE: *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems* (Baker, 2002, p. 17)
    SECTION: Medical history
    TOPIC: Sensory
    SUBTOPIC: Hearing
    SOURCE: Modified

27. SECTION: Medical history
    TOPIC: Sensory
    SUBTOPIC: Hearing
    SOURCE: New

28. REFERENCE: *Autism Questionnaire* (Irlen Institute, 1995, p. 2)
    SECTION: Medical history
    TOPIC: Sensory
    SUBTOPIC: Aversive
    SOURCE: Modified

29. REFERENCE: *Autism Questionnaire* (Irlen Institute, 1995, p. 2)
    SECTION: Medical history
    TOPIC: Sensory
    SUBTOPIC: Appealing
    SOURCE: Modified

30. REFERENCE: APA (2013)
    SECTION: Medical history
    TOPIC: Medical history
    SUBTOPIC: Symptoms
    SOURCE: Modified

31. REFERENCE: *Autism Questionnaire* (Irlen Institute, 1995, p. 7)
    SECTION: Medical history

TOPIC: Communication
SUBTOPIC: Speech
SOURCE: Modified
NOTE: Recommended by SLP

32. SECTION: Medical history
TOPIC: Communication
SUBTOPIC: Speech
SOURCE: New
NOTE: Recommended by SLP

33. REFERENCE: APA (2013)
SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Symptoms
SOURCE: Modified

34. REFERENCE: *Questionnaire for Children with Autism & Related Developmental and/or Attention Problems* (Baker, 2002, p. 20)
SECTION: Medical history
TOPIC: Communication
SUBTOPIC: Speech
SOURCE: Modified

35. SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: Home
SOURCE: New

36. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 7)
SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: Home
SOURCE: Duplicate

37. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 7)
SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: Interaction
SOURCE: Duplicate

38. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 7)
SECTION: Environmental information

TOPIC: Environmental information
SUBTOPIC: Interaction
SOURCE: Duplicate

39. SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: School
SOURCE: New

40. SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: School
SOURCE: New

41. REFERENCE: *Autism Medical History Questionnaire* (Bio Energy Medical Center, n.d., p. 7)
SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: Interests
SOURCE: Duplicate

42. SECTION: Medical history
TOPIC: Medical history
SUBTOPIC: Symptoms
SOURCE: New

43. 4SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: Interests
SOURCE: New

44. SECTION: Environmental information
TOPIC: Environmental information
SUBTOPIC: Interests
SOURCE: New

Appendix E

Cambridge University Behaviour and Personality Questionnaire for Children (Auyeung et al., 2007a) with Scoring Key

The following pages provide the *Cambridge University Behaviour and Personality Questionnaire for Children* (Auyeung et al., 2007a) items, as formatted for this study. Additionally, the scoring key has been superimposed. Scores from 0 to 3 are summed based on parents' responses, the total indicating the participant's autism spectrum quotient. The maximum possible score is 150.

Note that the page size has been modified to accommodate the printing requirements of this document. Also note that the title reflects the working title used to refer to this study.

ID: _____

Distribution of Formulaic Sequences in the Spontaneous Speech of Autistic Children

Cambridge University Behaviour and Personality Questionnaire
For Children

This questionnaire contains 50 questions that will complement your responses on the Child Participant Profile Questionnaire. It will take approximately 10 minutes to complete. Please answer the questions to the best of your abilities.

At any point during the completion of the questionnaire, you may decline to answer by leaving the response section blank or writing N/A (not applicable). You may contact the researcher or her supervisor in person, by telephone, or by email if you have any questions about the items on the questionnaire.

	Definitely Agree	**Slightly Agree**	**Slightly Disagree**	**Definitely Disagree**
1. S/he prefers to do things with others rather than on her/his own.	0	1	2	3
2. S/he prefers to do things the same way over and over again.	3	2	1	0
3. If s/he tries to imagine something, s/he finds it very easy to create a picture in her/his mind.	0	1	2	3
4. S/he frequently gets so strongly absorbed in one thing that s/he loses sight of other things.	3	2	1	0
5. S/he often notices small sounds when others do not.	3	2	1	0
6. S/he usually notices house numbers or similar strings of information.	3	2	1	0
7. S/he has difficulty understanding rules for polite behaviour.	3	2	1	0
8. When s/he is read a story, s/he can easily imagine what the characters might look like.	0	1	2	3
9. S/he is fascinated by dates.	3	2	1	0
10. In a social group, s/he can easily keep track of several different people's conversations.	0	1	2	3
11. S/he finds social situations easy.	0	1	2	3
12. S/he tends to notice details that others do not.	3	2	1	0
13. S/he would rather go to a library than a birthday party.	3	2	1	0

ID: _____

	Definitely Agree	Slightly Agree	Slightly Disagree	Definitely Disagree
14. S/he finds making up stories easy.	0	1	2	3
15. S/he is drawn more strongly to people than to things.	0	1	2	3
16. S/he tends to have very strong interests, which s/he gets upset about if s/he can't pursue.	3	2	1	0
17. S/he enjoys social chit-chat.	0	1	2	3
18. When s/he talks, it isn't always easy for others to get a word in edgeways.	3	2	1	0
19. S/he is fascinated by numbers.	3	2	1	0
20. When s/he is read a story, s/he finds it difficult to work out the characters' intentions or feelings.	3	2	1	0
21. S/he doesn't particularly enjoy fictional stories.	3	2	1	0
22. S/he finds it hard to make new friends.	3	2	1	0
23. S/he notices patterns in things all the time.	3	2	1	0
24. S/he would rather go to the cinema than a museum.	0	1	2	3
25. It does not upset him/her if his/her daily routine is disturbed.	0	1	2	3
26. S/he doesn't know how to keep a conversation going with her/his peers.	3	2	1	0
27. S/he finds it easy to "read between the lines" when someone is talking to her/him.	0	1	2	3
28. S/he usually concentrates more on the whole picture, rather than the small details.	0	1	2	3
29. S/he is not very good at remembering phone numbers.	0	1	2	3
30. S/he doesn't usually notice small changes in a situation, or a person's appearance.	0	1	2	3
31. S/he knows how to tell if someone listening to him/her is getting bored.	0	1	2	3
32. S/he finds it easy to go back and forth between different activities.	0	1	2	3
33. When s/he talk on the phone, s/he is not sure when it's her/his turn to speak.	3	2	1	0

ID: _____

	Definitely Agree	Slightly Agree	Slightly Disagree	Definitely Disagree
34. S/he enjoys doing things spontaneously.	0	1	2	3
35. S/he is often the last to understand the point of a joke.	3	2	1	0
36. S/he finds it easy to work out what someone is thinking or feeling just by looking at their face.	0	1	2	3
37. If there is an interruption, s/he can switch back to what s/he was doing very quickly.	0	1	2	3
38. S/he is good at social chit-chat.	0	1	2	3
39. People often tell her/him that s/he keeps going on and on about the same thing.	3	2	1	0
40. When s/he was in preschool, s/he used to enjoy playing games involving pretending with other children.	0	1	2	3
41. S/he likes to collect information about categories of things (e.g. types of car, types of bird, types of train, types of plant, etc.).	3	2	1	0
42. S/he finds it difficult to imagine what it would be like to be someone else.	3	2	1	0
43. S/he likes to plan any activities s/he participates in carefully.	3	2	1	0
44. S/he enjoys social occasions.	0	1	2	3
45. S/he finds it difficult to work out people's intentions.	3	2	1	0
46. New situations make him/her anxious.	3	2	1	0
47. S/he enjoys meeting new people.	0	1	2	3
48. S/he is good at taking care not to hurt other people's feelings.	0	1	2	3
49. S/he is not very good at remembering people's date of birth.	0	1	2	3
50. S/he finds it very to easy to play games with children that involve pretending.	0	1	2	3

You have completed the questionnaire.
Thank you.

Appendix F

Detailed Transcription Conventions

Symbol	Meaning
word	Boldface indicates forms relevant to the point being made in the text.
.	The period indicates a falling, or final, intonation contour, not necessarily the end of a sentence.
?	The question mark indicates rising intonation, not necessarily a question.
!	Indicates an animated tone.[a]
,	The comma indicates 'continuing' intonation, not necessarily a clause boundary.
:::	Colons indicate stretching of the preceding sound, proportional to the number of colons.
-	A hyphen after a word or part of a word indicates a cut-off or self-interruption.
<u>word</u>	Underlining indicates some form of stress or emphasis on the underlined item.
WOrd	Upper case indicates loudness.
° °	The degree signs indicate segments of talk that are markedly quiet or soft.
> <	The combination of 'more than' and 'less than' symbols indicates the segments of talk between them is compressed or rushed.
< >	In the reverse order, they indicate that a stretch of talk is markedly slower.
=	An equal sign indicates no break or delay between the words thereby connected.
(1.0)	Numbers in parentheses indicate silence in tenths of a second.
[ ]	Square brackets indicate points of overlap. [b]
$[_2$]	Square brackets with subscript 2 indicate the second instance of overlap. [b]
@	Laugh, one symbol per pulse of laughter. [b]
#	Uncertain, one symbol per syllable. [b]
#word	Transcribed words are uncertain. [b]
<VOX> Words </VOX>	The words between the symbols indicate the use of the voice of another. [b]
((WORD))	Metatranscription comment. [b]

Note. Adapted from "Positive politeness as a discourse process: Politeness practices of high-functioning children with autism and Asperger syndrome" by K. G. Sirota (2004), p. 248. Copyright 2004 by SAGE Publications.

[a]Adapted from "Transcription notation" by J. Atkinson and J. Heritage in *Structures of Social Action: Studies in Conversation Analysis*, edited by J. Atkinson and J. Heritage, pp. ix-xvi. Copyright 1984, Cambridge University Press.

[b]Adapted from "Transcription symbols by delicacy: Levels 1-4" [pdf]. Copyright 2006 by John W. Du Bois.

Appendix G

Utterance Constraint Coding Definitions

Constraint	Category	Definition	Code	Definition
High	Directives	Directives are utterances that elicit and constrain the physical behaviour of the hearer.	Direct Commands	Commands that heavily constrain the hearer's behaviour, with no softening or provision of acceptable verbal substitutes (*Don't do that* or *Put that here*).
			Indirect Commands	Commands that are softened or less explicit; a verbal response may be substituted for physical action. These include requests (*Would you please sit down?*), suggestions (*Why don't you shut the door?*), demands (*I want the car*), and threats (*I'll spank you if you do that*).
	Questions	Questions have a dual function: they pass the speaking turn to the hearer and they elicit a verbal response from the hearer.	Repairs	Devices for repairing conversation when a misunderstanding has arisen; they elicit a whole or partial repetition of the hearer's previous utterance, with no alternative (*Huh?* or *You what?*).
			Test Questions	Questions for which the speaker already has an answer; used to instruct the hearer socratically, demonstrate his knowledge, or explore its extent (*What colour is the fire engine?* or *Is the tree green or red?*).
			Real Questions	Information-seeking questions for which the speaker does not have the answer (*Does the dolly like mustard?* or *What are you going to do now?*).
			Permission Requests/Offers of	Questions that elicit verbal behaviour and seek permission or acceptance for an

Constraint	Category	Definition	Code	Definition
			Help	action of the speaker (*May I help you?*). They may serve to regulate the behaviour of the hearer (*May I speak to Harry?*).
	Prompts	A prompt is an attempt by the speaker to force a response from the hearer. To be coded as a prompt, an utterance must follow a previous utterance by the same speaker, must be meaningless in itself, and must elicit a response to the speaker's previous utterance.	Question Prompts	Elicit a verbal response to the speaker's previous question or declarative (*Don't you like that?* is followed by *Huh?*).
			Directive Prompts	Elicit physical compliance with the speaker's previous directive (*Sit in the chair* is followed by *Okay?*).
	Attention Devices	Attention devices include a wide range of utterances used to elicit attention.	Attention Devices	Attention devices include a wide range of utterances used to elicit attention (*See?* or *Look at that*).
	Feedback for Verbalizations	Utterances in this category acknowledge or respond to the previous hearer utterance.	Responses to Questions/Directives	Include all utterances that are judged appropriate responses to questions or directives that are not themselves questions or directives. These utterances serve the function of negation (*No, I won't sit down*).
			Acknowledgments of Previous Declaratives	Explicitly acknowledge previous declarative utterances and also serve a negation function; utterances that merely continue the conversational topic are not included since they do not add new information (*The MOTHER doll, Zachary*).
Low	Questions	Questions have a dual function: they pass the speaking turn to	Verbal Reflective Questions	Questions that repeat, reduce, represent, or paraphrase the hearer's previous utterance,

Constraint	Category	Definition	Code	Definition
		the hearer and they elicit a verbal response from the hearer.		without adding new information. They act to acknowledge or signal comprehension of the previous utterance, while at the same time passing the speaking turn to the hearer (*He does?* or *He does, doesn't he?*).
			Action Reflective Questions	Questions that describe or acknowledge the activity of the hearer, while passing the speaking turn to him. They describe action in a question form without adding new information (*You're driving, aren't you?* or *The car's going now?*).
			Report Questions	Questions that comment upon, and inform the child of, an event or fact of which he may or may not be aware. They provide new information (*That car doesn't fit, does it?*).
	Feedback for Verbalizations	Utterances in this category acknowledge or respond to the previous hearer utterance.	Positive response	Positive responses to questions/directives (*Yes, I do*).
			Positive Acknowledgement	Positive acknowledgments of previous declaratives (*That's the way to do it*).
	Spontaneous Declaratives	This category includes all declaratives that do not provide explicit feedback for preceding utterances or actions. They may maintain a previous topic or extend it, but they need not; they must add new information to the conversation.	Spontaneous Declaratives	This category includes all declaratives that do not provide explicit feedback for preceding utterances or actions. They may maintain a previous topic or extend it, but they need not; they must add new information to the conversation (*The car goes fast*).

Note. Adapted from "Appendix: Categories and definitions for high and low constraint utterances" by P. J. Rydell and P. Mirenda (1991), p. 152-154. Copyright 1991 by Plenum Publishing Corporation.

Appendix H

Facilitative and Directive Style Coding Definitions and Instructions

Code	Variable	Style	Applied to	Definition	Additional Instructions
Responsiveness	High	Facilitative	Adult, turn	Adult follows child's lead in conversation the majority of the time. Adult responses serve to deliver some object, activity, assistance, or attention for which the child has initiated (unprompted) a request.	If the adult initiates a turn that is related to the topic proposed by the child, it is coded as high responsiveness. Every turn is coded according to responsiveness.
	Low	Directive	Adult, turn	Adult assumes the lead in conversation the majority of the time.	If the adult initiates a turn that is tangentially or not related to the topic proposed by the child, it is coded as low responsiveness. Every turn is coded according to responsiveness.
Demand	High	Directive	Adult, turn	Majority of utterances are high constraint. Adult uses verbal statements, gestures, or physical prompts that serve to specify either the specific form or content of the child's response. Adult uses verbal statements, gestures, or direct guidance to identify two or more response options a child may take.	Individual utterances in the turn are coded according to the codes for high and low constraint utterances in Appendix G. The total of high and low constraint utterances in a turn is calculated. A rating of high demand is applied to the turn if the half or more than half are high constraint forms. Every turn is coded according to demands.

Code	Variable	Style	Applied to	Definition	Additional Instructions
	Low	Facilitative	Adult, turn	Majority of adult utterances are low constraint. Adult responses are similar in topography (imitations) or represent a suitable expansion (elaboration) of a previous utterance. Adult uses motor/gestural or vocal/verbal behaviours that prompt a social-communicative responses without specifying either the form (syntax) or content (semantics) of the response.	Individual utterances in the turn are coded according to the codes for high and low constraint utterances in Appendix G. The total of high and low constraint utterances in a turn is calculated. A rating of low demand is applied to the turn if more than half of the utterances are low constraint forms. Every turn is coded according to demands.
Initiation	Adult	Directive	Adult, turn	Adult structures the nature of the child's contributions to the ongoing topic.	Not every turn will be coded in terms of initiation. Adult initiations with also be coded according to responsiveness and demands.
	Child	Facilitative	Child, turn	Adult encourages the child to contribute to the conversation in a variety of ways. Adult allows periods of silence before initiating a new sentence.	Not every turn will be coded in terms of initiation. If the child is following the topic proposed by the adult, no code is applied.

Code	Variable	Style	Applied to	Definition	Additional Instructions
Control	Adult	Directive	Adult and child, segment	Adult controls the focus and direction of the verbal interaction the majority of the time.	Generally, adult control in a segment will be associated with low responsiveness and adult initiation. However, a segment can only be coded as adult control if there is uptake of the focus and direction by the participant. Segments must not leave out any turns from the excerpt coded.
	Child	Facilitative	Adult and child, segment	Child controls the focus and direction of the verbal interaction the majority of the time.	Generally, child control in a segment will be associated with high responsiveness and child initiation. There may also be adult initiation throughout. However, a segment will be coded as child control if there the child does not take up the topics initiated by the adult. Segments must not leave out any turns from the excerpt coded.

Note. Adapted from "Assessment and intervention considerations for unconventional verbal behavior" by B. M. Prizant and P. J. Rydell (2003) in *Communicative Alternatives to Challenging Behavior: Integrating Functional Assessment and Intervention Strategies* (Vol. 3) by J. Reichle and D. P. Wacker (Eds.), pp. 267. Copyright 1993 by P. H. Brooks Pub. Co.

Appendix I

Formulaic Expression Code Definitions and Examples

Category	Code	Defining Characteristics	Examples
Discourse Formulas	Pause Fillers	Vocalizations or words that mark hesitations or pauses, often as a result of thinking or planning (Carter & McCarthy, 2006). They are not reactions to the discourse nor do they provide a means of organizing it (see pragmatic markers). In other words, they have no function.	List: Uh, um, hm, er, erm, um, mm (Carter & McCarthy, 2006) Example: Do you want to go? I think **uh** we should go. Explanation: *Uh* indicates a hesitation. It is not a reaction to the discourse. Counter-Example: Do you want to go? **Uh huh**. I think we should go. Explanation: *Uh huh* indicates agreement. Therefore, it is a reaction to the discourse and would not be considered a pause filler; it would be considered a pragmatic marker.
	Pragmatic Markers	Pragmatic markers "operate outside of the structural limits of the clause" (Carter & McCarthy, 2006, p. 208) and have a pragmatic function. They "include discourse markers (indicate the speaker's intentions with regard to organizing, structuring and monitoring the discourse, stance markers (indicate the speaker's stance or attitude vis-à-vis the message), hedges (enable speakers to be less assertive in formulating their message) and interjections (items which indicate affective responses and reactions to the discourse)" (Carter & McCarthy, 2006, p. 208) and vague language, which "softens expressions so that	List: Anyway, right, okay, you see, I mean, mind you, well, so, now, cos, fine, good, great, like, now, oh, mind you, you know, thing, stuff, or so, like, or something, or anything, and so on, or whatever, kind of, sort of, actually, ah, all right, anyway, God, goodness, gosh, I see, I think, mhm, no, please, quite, sure, question tags, that's right, yes/yeah (Aijmer, 2002; Carter & McCarthy, 2006) Example: **Anyway**, the point is that I was right. Explanation: *Anyway* functions outside the structural limits of the clause. It serves to organize the discourse. Counter-Example: I shouldn't be jealous but I

Category	Code	Defining Characteristics	Examples
		they do not appear too direct or unduly authoritative and assertive" (Carter & McCarthy, 2006, p. 202).	am **anyway**. Explanation: *Anyway* is an "adjunct modifying the second main clause" (Carter & McCarthy, 2006, p. 174). Therefore, it operates within the structural limits of the clause and is not considered a pragmatic marker.
Non-Lexicalized Formulas	Collocations	Collocations are "strings of specific words, that co-occur with a mutual expectancy greater than average" (Nattinger & DeCarrico, 1992, p. 36). They do not have any pragmatic functions (Nattinger & DeCarrico, 1992).	List: Blonde hair, lean meat, perform a play
	Idioms	Idioms are "complex bits of frozen syntax, whose meanings cannot be derived from the meaning of their constituents, that is, whose meanings are more than simply the sum of their individual parts" (Nattinger & DeCarrico, 1992, p. 33).	List: Piece of cake, costs and arm and a leg, break a leg, hit the books, let the cat out of the bag Example: I'm **on the fence** about the latest changes to the operating system. Explanation: *On the fence* means *undecided*. It cannot be interpreted literally. Counter-Example: A note warning passersby to stay off the property was posted **on the fence**. Explanation: In this case, a literal interpretation is appropriate. The meaning is not idiomatic as the sum is not more than the individual parts.
	Multi-Word Verbs	Multi-word verbs are formed through the combination of a lexical verb and an adverbial or prepositional particle, which together have a single unit of meaning (Carter & McCarthy, 2006).	List: Name after, hound down, drink to, cough up Example: "This **calls for** a celebration" (Carter & McCarthy, 2006, p. 429). Explanation: *Calls for* in this context means

Category	Code	Defining Characteristics	Examples
		Some multi-word verbs have two particles (Carter & McCarthy, 2006). Adverbs or discourse markers may appear between the lexical verb and the prepositional particle of certain multi-word verbs (Carter & McCarthy, 2006).	*demands* or *requires* (Carter & McCarthy, 2006). Counter-Example: She **called for** a taxi. Explanation: *Called for* does not function as a single unit of meaning in this context.
Lexicalized Formulas	Conventional Expressions	Conventional expressions are "collocations that have been assigned pragmatic functions" in the communal language. (Nattinger & DeCarrico, 1992, p. 36) They include lexical phrases, polywords, and institutionalized expressions (Nattinger & DeCarrico, 1992). Polywords are "short phrases which function very much like individual lexical items" (Nattinger & DeCarrico, 1992, p. 38). Institutionalized expressions are "lexical phrases of sentence length, usually functioning as separate utterances" (Nattinger & DeCarrico, 1992, p. 39). Phrasal constraints are "short- to medium-length phrases…They allow variation of lexical and phrasal categories" (Nattinger & DeCarrico, 1992, p. 41). Conventional expressions include collocations with unexpected pragmatic functions. That is to say, if a native speaker recognizes the string of words, but the function is idiosyncratic, it remains classified as a conventional expression.	List: See you __, good morning, nice to meet you, give me a break Example: **See you tomorrow** at yoga. Explanation: *See you tomorrow* is a parting message. Counter-Example: I can **see you** through the window. Explanation: *See you* does not have a pragmatic function in this context.

Category	Code	Defining Characteristics	Examples
	Expletives and Taboo Expressions	Expletives and taboo expressions in English are often interjections, of word- or phrase-length, relating to religion or parts of the body and bodily processes (Carter & McCarthy, 2006). They are "used to express a variety of strong feelings, in particular, annoyance, frustration, and anger" (Carter & McCarthy, 2006, p. 226).	Example: "I hope it's your hormones, you stupid **cow**" (Carter & McCarthy, 2006, p. 226). Explanation: *Cow* is used to express annoyance or anger. Counter-Example: On our field trip to the farm we got to see a **cow** named Betsy. Explanation: *Cow* does not have a pragmatic function. It refers to an actual animal.
	Idiosyncratic Expressions	Idiosyncratic expressions are collocations that have been assigned pragmatic functions in an individual's lexicon (cf. conventional expressions). They would not be recognized by naïve native speakers as being a familiar string of words. They are an individual's preferred way of expressing an idea. They can be of phrase- or sentence-length. There must be no evidence of scripting, perseveration, or immediate echolalia.	Example: **Do you wanna lie down in the blue room with me?** Explanation: Joey asks this question when he wants to read a book, therefore it has a function beyond the meaning of the words themselves. There is no evidence that the sentence comes from a movie or a book. It is not an immediate repetition of another person's utterance. He is not repeating it incessantly. Counter-Example: **Do you wanna read a book with me?** Explanation: There is no function beyond the meaning of the words themselves. It is not Joey's preferred means of expressing this request.

Category	Code	Defining Characteristics	Examples
	Sentence Builders	Sentence builders are "lexical phrases that provide the framework for whole sentences" (Nattinger & DeCarrico, 1992, p. 43). Sentence builders have a slot, *X*, which can be completed to express an entire idea (Nattinger & DeCarrico, 1992). They allow "considerable variation of phrasal and clausal elements" (Nattinger & DeCarrico, 1992, p. 43). Sentence builders include the following pattern: "*Pronoun + modal/auxiliary verb"* (Code, 2005, p. 322). Sentence builders with an incomplete argument (i.e., With an incomplete *X*) are accepted.	List: That reminds me of X, modal + pronoun + VP (could you pass me the salt?), my point is that X, I think (that) X, I want, I can, I can't, I don't (Code, 2005; Nattinger & DeCarrico, 1992) Example: **I think** it's a good idea. Explanation: It contains a slot for the expression of an entire point. It is a complete sentence. Counter-Example: The cake, **I think**, was too dry. Explanation: *I think* is a pragmatic marker. It does not function to structure the sentence. It has a function outside of the clause.
Unconventional Formulas	Delayed Echolalia (also known as scripting)	Delayed echolalia is exact repetition or repetition with minimal structural change of a segment of media such as a book, movie, song, etc. The repetition does not occur immediately following the original production. Delayed echolalia may serve a variety of communicative and cognitive functions (Prizant & Rydell, 1993).	Example: Louis says, "**Over here Mickey. Look. Here comes Daisy. Hiya Daisy. How's business? Oh business is busy, busy, busy**." His mother indicated that this was a quote from a computer game. Further research indicates that it is indeed a word-for-word repetition of the soundtrack of the computer game. Counter-Example: A child says, "**Here's Johnny**," when a boy named Johnny enters the classroom. While *Here's Johnny* is a famous quote from the 1980's film *The Shining*, there is no evidence that the child is referencing this quote unless an informant were to indicate otherwise.

Category	Code	Defining Characteristics	Examples
	Immediate Echolalia	Immediate echolalia is the repetition of speech "produced either following immediately or within two turns of original production" (Prizant & Rydell, 1993, p. 264). It involves exact repetition (pure echolalia) or minimal structural change (mitigated immediate echolalia) (Prizant & Rydell, 1993). Immediate echolalia may serve a variety of communicative and cognitive functions (Prizant & Rydell, 1993).	Example: "The child repeats, '**Want some juice**' immediately following an adult's question. The child's nonverbal behaviour (i.e., reaching toward juice bottle) indicates child was repeating the utterance in order to acquire juice, serving the function of affirmation (Kanner, 1943) or yes-no answer (Prizant & Duchan, 1981)" (Prizant & Rydell, 1993, p. 264). Counter-Example: The child repeats, "**Want some juice**" immediately following an adult's question, but does not demonstrate any nonverbal behaviour that indicates the intention to acquire juice. The child continues to repeat the utterance even when offered the juice. While the first production is an immediate echo, the remaining cyclical repetitions are an example of perseveration.
	Perseveration	Perseveration is the repetition of speech that is "produced in a cyclical, recurring manner" (Prizant & Rydell, 1993, p. 264). Perseveration is "produced with no evidence of communicative intent or expectation of a response from the partner" (Prizant & Rydell, 1993, p. 264). The first instance of production is not considered perseveration as perseveration by definition involves repetition. The first instance may or may not be a formula. If it is a formula, it should be coded accordingly. All	Example: "Child states repeatedly, "**we must clean up the mess**" while pacing in a corner of the classroom away from the other students and teacher. His teacher said this to him 1 month before in the same location after he spilled some juice" (Prizant & Rydell, 1993, p. 264). Counter-Example: There is a mess on the floor. The child states repeatedly "**we must clean up the mess**" and stops when the teacher approaches to clean up the spilled juice.

Category	Code	Defining Characteristics	Examples
		following repetitions are coded as instances of perseveration, regardless of whether the wordstring can be classified as another type of formula.	

Appendix J

Quantitative Analysis Transcripts and Formulas

Tables J1, J3, J5, and J7 provide the 250-word segments that were analyzed quantitatively. Formulas have been indicated in bold. Transcription conventions are provided in Appendix F. Note that while the speech-language pathologist's utterances have been included, they were not analyzed with respect to formulaic expressions. Brief descriptions of the ongoing activity have also been provided.

Tables J2, J4, J6, and J8 provide a list of the formulas identified in the coded transcripts, organized alphabetically by category.

Table J1

Coded Transcript of Quantitative Analysis Segment: Joey

Speaker	Utterance	Activity
SLP	A::h. Neat. (0.4) Okay >just a second.< (1.2) Okay:: <*Mighty Machines* (0.2) at-> oh, give me a second. At: (0.5) the: [uh there it is!]	The SLP and Joey are on the laptop looking at videos on *YouTube*. Joey has requested *Mighty Machines* at the garbage dump. Joey is rocking in his chair. Joey leans forward and reaches over the SLP's hands while she is typing to control the mouse.
Joey	**[$_2$>I'm gonna do it I'm gonna do it] I'm gonna do it I'm gonna do it I'm gonna do it I'm gonna do it ˚I'm gonna do it I'm gonna do it˚< (0.4)**	Joey is controlling the laptop.
SLP	You're gonna do it? [I can see the garbage dump up there.]	SLP points out the video Joey requested.
Joey	**[$_2$>˚I'm gonna do it I'm gonna do it I'm gonna do it˚<]**	
SLP	Can you see it? (1.5) It's the <u>second</u> one. (4.5) At the demolition site. (1.4) Oo::h a:h <u>this</u> should be pretty cool. (1.9) What is the one with the airplane (0.3) Joey? (0.3) ˚Did you see that?˚ (1.8) It's Canadian (.) airlines. (2.7) [It's-]	Joey is still scrolling through videos.
Joey	**[$_2$Yeah::.] (0.5)**	
SLP	Yeah. (0.4)	
Joey	**Yeah::.**	
SLP	>I bet< it's: the:: machines at the airport [that]	
Joey	**[$_2$We:ll,]** =	
SLP	=Load up the airplane. (3.1)	
Joey	>**Are you just gonna**< tell me which one-	

	which episode it is? (0.4)	
SLP	We:ll am I? I don't know which one which one do you want? (0.6)	
Joey	**We:ll**, (0.3) I said I wanted **u::m** at the airport, **so**.	
SLP	Oh, you do- you did say you wanted at the airport? Okay, let's find it at the airport cos it looks pretty cool. (0.5) I'll take out demolition. (1.0)	The SLP takes over control of laptop to type in new search terms.
Joey	**No**: **u:m**. (0.6)	
SLP	At the airport? (0.7) >There you go.< There's a whole bunch of them. (1.3) O::h! At the airshow. (1.7) Hm. (0.6) Those guys'll be doing tricks in the air. (8.8) Woah:: [#####]	Joey is scrolling through the videos.
Joey	[$_2$**Now you have to type in-**] **you're >gonna hafta**< **type in *Mighty Machines*** at the **construction site**. (0.4)	Joey removes his hand from the mouse.
SLP	At the <construction> site this time. (0.5) O::KAY what do you think we'll see at the construction site? (2.0)	The SLP types in a new search term.
Joey	Constructions. (0.4)	
SLP	Construction? =	
Joey	= **Yeah**.	
SLP	Maybe they'll be building::: uh oh: I spelled that wrong. (0.7) A::h >maybe they'll be:< building a tall:: skyscrapper. (0.2)	Joey is leaning backwards in his chair.
Joey	**Yep**. (3.8)	
SLP	OKAY:. (0.5)	The SLP leans away from the laptop.
Joey	'**Kay**. (0.3) **Now** if this (0.2) ˚i:s (0.3) >going to be< the right one **I >swear to God< I** really **want** the airport.˚ (0.5)	Joey takes over control of the mouse.
SLP	Really want the airport? >Back to the airport< now? Didn't we just leave it? (4.1) Tha:t's construction site. (2.7) O:::h look at that! That is enormous. (2.4) Y:ikes. (2.8) A:::h that's the theme song. (3.7) @@ (1.5) LOOK! It's a skyscrapper. (1.1)	Joey is strolling through videos. He picks a video. The theme song is playing. SLP points to the screen.
Joey	**U::h yep**. (0.8)	
SLP	That's pretty amazing. (1.0) Ha: that's a crane. (2.0) That is a really tall crane. (0.8) Woah:::: (1.7) Look at that! (1.1)	
Joey	**May you** to- **please type in** a so::ng, (1.2)	
SLP	A song? (0.9)	
Joey	**Okay** do- **u::h No**. Do **u:::m** (1.0) do: **u::m** (0.4) do ***mighty machines*** **main menu.**	Joey moves away from the laptop.

SLP	Okay. (1.0)	The SLP moves in to type.
Joey	>**And we'll see:::<** where >we **take it from there**<.	Joey is rocking in his chair.
SLP	Okay. And we'll see where we take it from there. That sounds cool. (0.2) Oh. Careful:! ah. (0.3) *Mighty* (0.3) <*Machi::nes* main (0.6) menu> >I don't even know if so-< (0.2) something's coming up here! (1.6) [Huh.]	The SLP backs away from laptop.
Joey	[$_2$**Main] (0.4) menu**:. (1.6) **[U::::m]**	Joey moves in to control mouse. He scrolls through videos.
SLP	[$_2$Nothing came up!] (3.9) Maybe::: (0.3) maybe take out menu. Main. And just say menu. (0.6)	
Joey	Menu.	
SLP	Yeah, let's [just]	
Joey	[$_2$Do-] =	
SLP	= Try that.	
Joey	**Let's** do menu.	Joey is rocking in his chair.
SLP	Let's do menu. Yeah. (0.4) I'll take that ou::t, (0.5) okay. A:nd then >let's see< how this goes. (1.2)	The SLP is in control of the mouse, and then Joey takes over.
Joey	˚**Let's** do menu.˚	Joey is scrolling through videos.
SLP	U:::h >there you go,< *Mighty Machines*: (0.4) deep undergrou::nd. (0.2) Oh secret menu! (0.8) Oh no that's the Coke machine. (0.4) That's not it. (2.0) @@ (1.1) O:kay::. (0.2) The trainya:rd, (0.8) that looks pretty ni- =	The SLP points to a video.
Joey	= **Yeah** that =	
SLP	= O::h =	
Joey	**O::::h** (2.0)	
SLP	We could- (0.4) we could even look up u::m (0.6) u:::h *Star Trek* on:: on here. (0.6) >I bet< there would be some cool things? (2.8)	
Joey	**Can you please type in** a novie? (0.4)	Joey raises his hand from the mouse.
SLP	A movie? (0.4) Which- =	The SLP moves in to type.
Joey	= >***Live and let die***.< (0.8)	
SLP	Let uh >*live and let die*?< =	
Joey	= >***Live and let die***.<	
SLP	O:h that is such a cool movie. Can you move over a tiny bit so I can do it? (1.0) <*Live and let die*.> There you [go:::]	The SLP backs away from the computer.
Joey	**[$_2$And** I'll::s] **take it from there.** (0.3)	Joey takes over the mouse.
SLP	And we'll:: take it from there. Look at that!	

	(0.3)	
Joey	**Look at <u>that</u>! Isn't that just beautiful**?	
SLP	It's very cool. (0.7)	
Joey	**Oh I think I love it**. (0.4)	
SLP	Yea::h <u>I</u> saw this movie when I was (0.4) like thirteen years old. (1.3) >Just a< little bit older than you. (1.5) It's an old old movie. (1.8) >There you go,< TWO ONE a::nd >you can skip.< (1.9) O::h ˚there's the crocodile farm escape,˚ that one is <u>so:</u> weird. (5.0)	Joey starts the video. Ads play. The SLP points to a video.
Joey	What? **No**, (0.3)	Ads start again.
SLP	What? (1.2) @@ Start it again. ˚Got it? Oh wait let's see it.˚ (3.5) Oo:::h [Joey]	The video starts.
Joey	>[$_2$**D'you know** what that] is?< (1.0)	Joey points to the screen and looks at the SLP.
SLP	That there? It's for - information- uh that thing? Um =	
Joey	= **That's** the views already.	
SLP	Watch later. (2.0) Sign in to add this to your playlist. Yeah. No. (2.3) Cool. Uh oh. (0.6) Look at <u>that</u>! (1.6) New York <u>City</u>! (6.0) What's gonna happen? Did you watch this before? What's gonna happen next? (1.4)	
Joey	**What is that**? (1.2)	Joey points to the screen and looks at the SLP.
SLP	That's what happens in three minutes. But I dunno, it looks like New York City at night. (1.6)	
Joey	**No**, **what is <u>that</u>**? (1.1)	Joey points to the screen again and looks at the SLP.
SLP	I dunno. (0.3)	
Joey	Press it. (1.6)	
SLP	U:h. (0.9) ˚It takes us there.˚ (0.5) Oh and it- it should come up now. (1.2) What is it? (1.4) O:::::h. <u>That's</u> when they're doing um it- a voodoo dance. (0.3)	The SLP clicks on a link Joey indicated earlier. A new video starts and Joey has startled expression on his face. He looks at the SLP.
Joey	**Are they**? (0.3)	Joey looks at the SLP.
SLP	Yea::h. (0.8) And they l- Look at the snakes. Ooh ah. Do you like snakes or no?	The SLP points to the screen.
Joey	**No**. (0.3)	Joey looks at the SLP.
SLP	No. (0.4) It's a <u>voodoo</u> dance. Yea::h. (0.8) <u>They're</u> in big trouble there but they get away in the end. (1.3)	
Joey	**What is <u>he</u> doing**? (0.7)	Joey points at the screen

		and looks at the SLP.
SLP	<He is scared> of that snake, because I think that's a poisonous snake. (1.3)	The SLP points at the screen.
Joey	>**What do you think is gonna happen**?< (1.2)	Joey looks at the SLP.
SLP	<IF THAT SNAKE BIT HIM>, (0.6) I think he: could get really sick and die. (0.4) Oh. Yea- Y- >did it< Oh and see (0.3) he's really sick now. (1.4) The snake bit him. Look at tha::t. (0.3)	Joey changes the video.
Joey	**Now** >**what if-**< >**Where do** you-< (2.5)	Joey points at the screen. He starts the video.
SLP	A::h. New Orleans. (1.0) That- yeah. (0.6) Oh no: they say San Monique, it looked like New Orleans. (0.4) But it's:: u:m. (0.7) Yea:::h, that's pretty wi::ld. Those are::, like voodoo dancing. (1.3) It's a kind of a tribal thing down in: um the Caribbean. (2.0) And here comes that snake again. >I bet that's< u:::h. (1.0) That did you see the snake's open mouth? (2.3) These- H- How do you think that man feels? (1.5) Joey what do you think he's feeling? He's like- Ooh	Joey is hand flapping. He accidentally hits the SLP's chin.
Joey	**Sorry**.	
SLP	He's like a:h! (0.8)	
Joey	**What's he gonna do**? (0.5)	Joey looks at the SLP.
SLP	He::'s scared of being bitten by that snake. (1.5) Yeah. (1.5) O::h that's pretty crazy how excited everyone is hey? (0.9) Wait! See what happens nex- oh that's the next one. So maybe get the next one that comes after. (1.9) U::m. (0.3)	Joey is scrolling through videos.
Joey	**Yeah**, **maybe**. (2.2)	
SLP	*Live and let die*. =	
Joey	= **Uh huh**.=	
SLP	= >There's another one< there.	The SLP points at the screen.
Joey	**Yeah**.	
SLP	I like the crocodile [farm part.]	
Joey	[$_2$>**I love it**.<] (0.4)	
SLP	Because, they jump on the crocodiles to get away. (1.0) O:h Mr. Big. @@@@ (2.1) <He's so funny.> (4.4) >Can I see it?<	
Joey	**Yeah sure u:m.**	
	End of excerpt	

Table J2

List of Sequences Identified in the Quantitative Analysis Segment: Joey

Category	**Sequence**	**Token**
Collocations	Construction site	1
Collocations	*Live and Let Die*	2
Collocations	Main menu	2
Collocations	*Mighty Machines*	2
Conventional Expressions	I swear to God	1
Conventional Expressions	Are they?	1
Conventional Expressions	I'm gonna do it	1
Conventional Expressions	Isn't that just beautiful?	1
Conventional Expressions	Please	2
Conventional Expressions	Sorry	1
Echolalia	Look at that	1
Idioms	Take it from there	2
Idioms	We'll see	1
Idiosyncratic Expressions	I love it	2
Idiosyncratic Expressions	What do you think is gonna happen?	1
Idiosyncratic Expressions	What is he doing?	1
Idiosyncratic Expressions	What is that?	2
Idiosyncratic Expressions	What's he gonna do?	1
Multi-Word Verbs	Type in	4
Pause Fillers	Uh	1
Pause Fillers	Oh	1
Pause Fillers	Um	6
Perseveration	I'm gonna do it	10
Pragmatic Markers	And	2
Pragmatic Markers	I think	1
Pragmatic Markers	No	4
Pragmatic Markers	Now	3
Pragmatic Markers	Oh	1
Pragmatic Markers	Okay	2
Pragmatic Markers	So	1
Pragmatic Markers	Sure	1
Pragmatic Markers	Uh huh	1
Pragmatic Markers	Well	2
Pragmatic Markers	Yeah	7
Pragmatic Markers	Yep	2
Sentence Builders	Are you (just) gonna X	1
Sentence Builders	Can you X	1
Sentence Builders	D'you know X	1
Sentence Builders	I want X	1
Sentence Builders	Let's X	2
Sentence Builders	May you X	1
Sentence Builders	That's X	1

Sentence Builders	What if X	1
Sentence Builders	Where do X	1
Sentence Builders	You have to X	1
Sentence Builders	You're gonna hafta X	1

Table J3

Coded Transcript of Quantitative Analysis Segment: Luke

Speaker	Utterance	Activity
Luke	**Ma:ybe we can** go to the drawer to find **anyone else** (0.3) about **wild animals**.	Luke and SLP are playing *Find That Action Verb! Listening Lotto.*
SLP	[To the draw-]	
Luke	[$_2$**Okay**!]	
SLP	Okay well let's go and find some more about wild animals,	
Luke	**Okay**.	
SLP	Kermit, are you a wild animal? (1.6) 'Cause we're monsters over here. (5.0) Are you a wild animal?	Luke has the Kermit puppet.
Luke	<VOX> **I:'m** a muppet. </VOX>	
SLP	You're a muppet not a wild animal! How about (0.27) a cheetah, is a cheetah a wild animal? (1.5) O::h (.) and how about a goldfish? (1.8) What kind of animal is a goldfish? (1.3)	
Luke	Orange! (0.2)	
SLP	An orange animal! =	
Luke	= <VOX> You: lo:ve Dorothy! </VOX> (0.4)	
SLP	I do [love Doro-]	
Luke	[$_2$**Let's** go to the drawer] (0.4)	Luke gets up and gets the Grover puppet.
SLP	Let's go to the drawer? [What drawer?]	
Luke	[$_2$**Uh we can** try] anyth- ((SCREAMING))	
SLP	We can- try anything?	
Luke	((SOUND EFFECT) (0.4)	
SLP	What is it? (0.4) What did you find?	
Luke	**Where does** a gorilla live? (0.3)	
SLP	[I:-]	
Luke	[$_2$A tri]cycle, (0.3) the jungle, (0.8) or, (0.3) a bathtub? (0.5)	
SLP	Hm I think he lives in a bathtub. (0.4)	
Luke	**NO:: >no no no no it's**,< (0.2) IN THE JUNGLE! =	
SLP	=O::[:h!]	
Luke	[$_2$**Yeah, you're] right**!	
SLP	He does, you're right what kinds of things does he like to eat? (0.5)	
Luke	BANANAS!	
SLP	Really? I like bananas too! (0.8)	
Luke	**Where does** the giraffe live? (1.7)	
SLP	[U::h]	
Luke	[$_2$A] bathtub, (0.7) a tricycle, (0.4) or (0.7) uh (.)	

Speaker	Utterance	Activity
	in Africa?	
SLP	Let me think, this is a tough one. (0.6) I think (0.2) on a tricycle! (0.5)	
Luke	**NO::** in Africa!	
SLP	In Africa? Are you sure? (0.7)	
Luke	Giraffes are tall animals **but they have** hooves (0.4) **but they're even** <VOX> faster **than** horses! </VOX>	
SLP	Are they faster than horses? (0.3) I don't believe you! Are you sure about that Grover? (1.0) Yeah, (0.5) he looks pretty fa:st. (0.3) L:ook at him run! (1.6) Hey, isn't there a horse here? Maybe they can have a race! (0.2) Yeah, (0.2) here's the horse. (0.3) I wanna race with (0.2) giraffe. (1.3)	Luke is moving the giraffe toy. SLP pulls out the horse toy.
Luke	Grover wants to race the giraffe. (0.7)	
SLP	Grover's gonna ra- Oh hey, he's riding the giraffe! I'll ride on the horse, >here we go.< (0.5) Chipa clocka clipa clopa clip clop. (0.4) O::h, you guys won. (3.2) Congratulations! (0.8)	Luke puts Grover on the giraffe. The SLP races with the horse and the Elmo puppet.
Luke	((SOUND EFFECT)) (0.4)	
SLP	What's that? (0.5)	
Luke	**Now, (0.3) I was >going ta< ask you** <VOX> **fo:::r you!** </VOX> (0.5)	
SLP	You were gonna ask me for me? (1.5)	
Luke	**Okay**, (0.8) >**we're gonna count**< (0.6) fro:m (0.5) te:n animals **toge'er.** (0.3)	
SLP	10 a[nimals!]	
Luke	**[$_2$KIDS!] (.) Are ya ready?** (0.4)	
SLP	I::'m ready. (1.6)	
Luke	**O:::ne. (0.2)**	Luke pulls out animals as he counts them.
SLP	O:ne animal.	
Luke	**Two::.**	
SLP	Two: animals!	
Luke	**Three**::.	
SLP	@ Oka:y	
Luke	**Fou::r. (1.3) Fi::ve. (2.3) Si:x. (1.7) Se:ven. (1.9) Ei:ght (3.6) Almost the:re!**	
SLP	>Nine and?< (1.9)	
Luke	**Ten**!	
SLP	Yeah yo- =	
Luke	= **Huh WE FOUND** AN ELEPHANT a kangaroo:, (0.5) a: (.) gorilla:, (0.5) a giraffe, (0.6) a: sea:l, (0.3) a panda:, (0.4) a raccoon,	Luke lists the animals in the order he places them.

Speaker	Utterance	Activity
	(0.4) a deer, (0.2) a lion, and a zebra!	
SLP	Grover, which is your favorite animal? (0.9)	
Luke	**Hm. (1.7) Mm.** (1.0)	
SLP	I know which one's my favorite, d'you wanna guess? (3.0)	
Luke	**Hm I >dunno**< want to guess.	
SLP	You- (.2) you don't want to guess? (1.0)	
Luke	**Hm. (0.5) I know I don't like** to d- (0.4) >have to< guess. (0.2)	
SLP	You don't like to have to guess? (0.5) Okay, I'm gonna guess your favorite animal. (0.2) Is your fa- does your favorite animal have a long neck? (3.1)	
Luke	**We:ll it has**, (2.9) **Look who's coming**! ((HOOF SOUNDS))	Luke moves the giraffe closer.
SLP	I:: think I know what your favorite is Grover. (1.3)	
Luke	**Maybe**, (1.0)	
SLP	[D-]	
Luke	[I th-] **I thought** it **looks like** trees, (0.6) <**bu:t** it's not.> (0.6) **Look a little closer**!	Luke moves the giraffe closer to his eyes.
SLP	It's no@[t tre@e@s. @@]	
Luke	[**Go: up**! (sound effect)] **A little closer**!	
SLP	[$_2$Yeah look-]	
Luke	[((SOUND EFFECT))] (1.2)	
SLP	I think it looks mo::re li::ke! (1.9)	
Luke	((SOUND EFFECT)) (1.0)	
SLP	[Le:gs, hey?]	
Luke	[$_2$ ((HOOF SOUNDS))] (0.3)	
SLP	[And hooves.]	
Luke	[$_2$ ((ANIMAL SOUNDS))] (0.4)	
SLP	What can you see? (1.3)	
Luke	A gira::ffe.	
SLP	It is, it's a giraffe. (0.9) And is your second favorite animal? (0.3)	
Luke	**Polar bear**!	Luke spots the polar bear on the floor.
SLP	Polar bear. (0.5) What can you tell me about a polar bear? (2.0) I think polar bears live in Africa! (1.3)	
Luke	***No**: they don't.* (0.3) They live in the Arctic.=	
SLP	=OH::, really, how do you know? (0.8)	
Luke	**Hm** >I ge-< (0.6) <VOX>**But**, (0.6) monsters don't eat any **polar bears pah**. </VOX>	Luke still has the Grover puppet.

Speaker	Utterance	Activity
SLP	No they don't. Yuck! Don't eat the polar bear! (0.9) And I-=	
Luke	=<**I'm** a Sesame.> (0.8)	
SLP	You're a Sesame? I think you're a- are- you’re a- a:: monster.	
Luke	Monster? (1.4)	
SLP	Yeah, wh- I'm a monster too but I’m a good monster. (0.2) Are you a good monster or a bad monster? (0.2)	
Luke	>˚**I'm** a˚< (0.4) ˚good monster˚ if I:- (0.3) I**:'m** (0.5) from ***Global Grover***. (0.3) >**Well I'm just gonna** start falling!< ((SCREAM))	
SLP	Oh my goodness! ((SCREAM)) What happened? (1.2)	
Luke	<VOX>**We're hurt.** </VOX>	
SLP	O::w. O::w. [I hurt myself.]	
Luke	[**May I-] You're** Grover **and I'm** Elmo!	Luke trades the Grover puppet for the Elmo puppet.
SLP	Okay, alright, let's switch. (1.7) Oh, are you alright Elmo? (1.4) A:w, (0.2) let me give you a hug. (1.5) A:::w y:es! We both feel much better now. (0.9) Now Elmo, what's you::r favorite animal? (1.1)	
Luke	˚**Hm I dunno.**˚	
	End of Excerpt	

Table J4

List of Sequences Identified in the Quantitative Analysis Segment: Luke

Category	**Sequence**	**Token**
Collocations	Polar bear	2
Collocations	Wild animals	1
Conventional Expressions	I dunno	2
Conventional Expressions	I was going to ask you	1
Idioms	Looks like	1
Pause Fillers	Hm	4
Pause Fillers	Mm	1
Pause Fillers	Uh	2
Pragmatic Markers	But	3
Pragmatic Markers	Maybe	2
Pragmatic Markers	No	2
Pragmatic Markers	No no no no	1
Pragmatic Markers	Now	1
Pragmatic Markers	Okay	3
Pragmatic Markers	Pah	1
Pragmatic Markers	Well	2
Pragmatic Markers	Yeah	1
Pragmatic Markers	You're right	1
Scripts	For you	1
Scripts	I thought… but… Look a little closer! Go up! A little closer!	1
Scripts	Look who's coming	1
Scripts	We're going to count…Kids! Are you ready? One. Two. Three. Four. Five. Six. Seven. Eight. Almost there! Ten! Hh We found…	1
Scripts	We're hurt.	1
Sentence Builders	(Even) ___er than X	1
Sentence Builders	I don't like X	1
Sentence Builders	I know X	1
Sentence Builders	I'm from X	1
Sentence Builders	I'm X	3
Sentence Builders	It has X	1
Sentence Builders	It's X	1
Sentence Builders	Let's X	1
Sentence Builders	May I X	1
Sentence Builders	We can X	2
Sentence Builders	You're X and I'm Y	1

Table J5

Coded Transcript of Quantitative Analysis Segment: Sean

Speaker	Utterance	Activity
Sean	**Uh That's** the *Skylanders* (.) way to call it. (0.3) **There's** this **extension cord** that **plugs into** the *Wii* (0.3) and that connects that figure (0.5) to the *Wii* =	The *Blockus* game is out on the table. Sean and the SLP are sitting across from each other at the table. Sean motions plugging in an extension cord.
SLP	[O::h.]	
Sean	[$_2$**And then**] it **comes on** to the game. (0.4)	
SLP	Comes on to the TV? (0.3)	
Sean	**Yeah**.	
SLP	[O:h.]	
Sean	[$_2$**Comes on**] to the TV! (0.3)	
SLP	W:o::w, that's pretty [amazing:.]	
Sean	[$_2$**And then** you **move**] that figure (0.4) **arou::nd** on the TV! (0.7)	Sean motions moving a figure around.
SLP	W:o::w and so like what's the- what's the whole point of the game then? (0.7)	
Sean	**U::h** <to beat the **bad guy**.> (0.3)	
SLP	Hm. =	
Sean	= **And u::h** (0.3) **there's** different *Skylanders* that can unlock different gates and unlock different powers, **and there's** different types of [*Skylanders* too.]	
SLP	[$_2$A::h.] This sounds like the perfect type of game for you.	
Sean	**And y'know what**? (0.3) **It's <u>such</u>** a **good idea and it's so** popular, (0.3)	
SLP	Yeah?	
Sean	**That** other (0.4) types (0.3) other <u>types</u> of <organizations> (0.6) like the ***Angry Birds*** organ- (0.3) organization or company,	Very little direct eye contact with the SLP.
SLP	Company, [yea:h.]	
Sean	**[$_2$U::m] a:::nd (0.5) a::nd (0.4) also:::** (0.6) Disney (0.4) is copying! (0.7)	
SLP	[The-]	
Sean	[$_2$*Skyl]anders*.	
SLP	O::h and so they're [using]	
Sean	**[$_2$a:nd]** =	
SLP	= The same kind of software. =	
Sean	= **Y:eah. =**	
SLP	= And hardware. [Yeah.]	

Speaker	Utterance	Activity
Sean	[$_2$A-] **a:nd** **now** ***Angry Birds Star Wars*** (0.2) have **come up with** telepods and you **stick** it **on** the camera part (0.6) **u::h and** it has this barcode **and then- and then appears in** the-	Sean motions sticking down a figure.
SLP	[On the television.]	
Sean	**[$_2$*Angry Bird*] appears on the- on the *iPad*. So::, =**	
SLP	= [O:::h.]	
Sean	= [$_2$That- **that's** a] complete copy **but** it- they just make the ba::rcode (0.4)	
SLP	[A:::h.]	
Sean	[$_2$On the- on the] little plastic figure, Luke wanted telepods **and** I wanted a *Skylander*. (0.3) My brother loves *Skylanders* too, (0.3)	
SLP	Uh hm. (0.3)	
Sean	**Althou::gh**, he **likes** telepods <**better** [**right no::::w**.>]	
SLP	[$_2$And I don't even really know] what telepods are? (0.7)	
Sean	Telepods are these- (0.2) are these ***Angry Birds Star Wars*** <minifigures> (0.3) that have <barcodes> stuck [to the back]	Sean makes gestures to indicate a figure then the position of the barcode.
SLP	[$_2$Okay.] (0.4)	
Sean	**I mean** under it. (0.2)	
SLP	Okay. =	
Sean	= >**And then**< (0.2) you **stick** it **on** this <magnifier> (0.3) >**and then** when you< **stick** it **on** the **camera lens** on the *iPad*, (0.5) [it-]	Sean gestures to indicate placing the figure on the magnifier then on the camera.
SLP	[$_2$Wow.] (0.2)	
Sean	It **u::h** it **appears:: on** the (0.9)	
SLP	Wow@@. (0.4) This thing's pretty- (0.7) pretty amazing [hey?]	
Sean	[$_2$**SO:**:], (0.2) **they're- that's practically** a copy of <*Skylanders*>,	Sean moves a few *Blockus* pieces around.
	End of excerpt	

Table J6

List of Sequences Identified in the Quantitative Analysis Segment: Sean

Category	**Sequence**	**Token**
Collocations	*Angry Birds*	2
Collocations	*Angry Birds Star Wars*	2
Collocations	Bad guy	1
Collocations	Camera lens	1
Collocations	Extension cord	1
Collocations	Good idea	1
Conventional Expressions	Like better	1
Conventional Expressions	Right now	1
Conventional Expressions	Y'know what?	1
Multi-Word Verbs	Appears in	1
Multi-Word Verbs	Appears on	2
Multi-Word Verbs	Come up with	1
Multi-Word Verbs	Move around	1
Multi-Word Verbs	Plugs into	1
Multi-Word Verbs	Stick on	3
Pause Fillers	Also	1
Pause Fillers	And	2
Pause Fillers	Uh	5
Pause Fillers	Um	1
Pragmatic Markers	Although	1
Pragmatic Markers	And	6
Pragmatic Markers	And then	6
Pragmatic Markers	But	1
Pragmatic Markers	I mean	1
Pragmatic Markers	Practically	1
Pragmatic Markers	So	2
Pragmatic Markers	Yeah	2
Sentence Builders	So + ADJ + that X	1
Sentence Builders	Such + ADJ + NOUN + that X	1
Sentence Builders	That's X	3
Sentence Builders	There's X	3
Sentence Builders	They're X	1
Sentence Builders	It's X	2

Table J7

Coded Transcript of Quantitative Analysis Segment: Louis

Speaker	Utterance	Activity
SLP	Can I play? (0.3)	The SLP has the Ernie toy and is holding it out in front of Louis.
Louis	**Can I play:?** (1.7)	Louis tries to take away the toy.
SLP	Hello purple be- Care Bear, (1.1)	Louis is holding the purple Care Bear.
Louis	Bro:wn Care Bear.	Louis starts looking through the toy box.
SLP	Brown Care- =	
Louis	=Yellow Care Bear. [**Hm**.]	
SLP	[$_2$You] would like the yellow Care Bear?	
Louis	Brown Care- (0.3)	
SLP	Yellow Care Bear where are you?	
Louis	Yellow and blue (0.3) and pink.	
SLP	Yellow and blue and pink. (1.3) I can't find any other play- Care Bears, only those two. (0.6) Hah (0.3) Another sign. (1.0)	Louis pulls out a sign from the play box.
Louis	**School area.**	
SLP	School area, that's for- (1.6) keeping all the children safe when they go to school! (1.3) Diego came! (0.4) Hey, (0.3) can- =	Louis turns around to get the other road sign. He is looking at them one next to the other. The SLP moves Diego into Louis's line of vision.
Louis	**= Hola, soy Diego!**	Louis looks up at Diego then back at the signs.
SLP	Hey there, I see Diego! (2.6) Diego and Dora. (0.3)	
Louis	**To the rescue::.** ((SOUND EFFECTS))	Louis puts down the signs then moves back towards the toy box. He looks through the toys.
SLP	Care Bears to the rescue, oh my goodness. (0.2)	
Louis	**Care Bears, welcome to Care-a-lot.** (0.9)	
SLP	We:lcome to Care-a-lot. Hey, (0.3) I'm climbing up (.) to the top of the [house.]	The SLP has a Care Bear and is climbing the house with it. Louis turns to look.
Louis	[$_2$Woo.] (2.6) >**Can I**< have the Care Bear ˚**please**˚? (0.3)	Louis grabs at the Care Bear.
SLP	Okay, there he is, there's the purple Care Bear. (1.0) >Is that< a girl Care Bear or a boy Care	SLP releases the Care Bear.

	Bear? (1.1)	
Louis	Girl Care Bear.	Louis places the toys in the house.
SLP	It's a girl Care Bear, okay. (0.6) Telly says hey you guys are you having fun? (0.2)	Louis looks through toy box.
Louis	>**Can I**< have # (1.5) **yi::eld si:gns please**? (0.5)	
SLP	Can you have- wha- which signs do you want to have?	
Louis	**Yi:el::d sign**.	
SLP	A yield sign. Hm. (0.8) Let's see if we can find a yield sign. (1.0) I'm not su:re, oh I found a stick! (1.6)	SLP pulls out a stick from the toy box.
Louis	**No stick**. (0.9)	Louis grabs at the stick.
SLP	I do- you don't want a stick? =	
Louis	= ˚**I don't want a stick**.˚ (0.3)	
SLP	Oka:y. (0.5) Let me have a look and see I might be able to fi::nd (0.9) some more signs. (1.9) Let's see what signs I have! Waiting. (1.1) Si:tting down. (0.8)	The SLP turns around to pull a box from the closet. Louis gets up and leans over the SLP to see inside the closet.
Louis	ELLOW **school crossing** sign. (0.4)	The SLP pulls out a box of signs. Louis sits down.
SLP	Another school crossing sign?	
Louis	ELLOW **school** ˚**crossing**˚. (1.1)	
SLP	The yellow school crossing sign >˚let me see-˚< (0.2) Hey, I found a parking meter. (1.5)	The SLP looks through the box.
Louis	Parking: level two. (0.7)	The SLP pulls out a parking meter.
SLP	Marking- Parking level two? (0.3)	The SLP pulls out another sign.
Louis	Parking: level one. (0.3)	
SLP	Parking level one, we can go to parking level two. (0.2)	
Louis	**Level two**::. (0.8)	
SLP	O:h, I don't have any yield signs I have gas sign that says gas that way, (1.7) a I have a pedestrian crossing sign. (2.3) Hm and I have lots of sticks. (0.4) Parking- (0.7) that wa:y. (0.6) That way to level two. (3.3) ˚I don't have an˚- oh wait a second, is this a yield sign? (0.2) No it's not. (0.3) It's a construction sign. (0.6)	The SLP pulls out various signs and shows them to Louis one by one.
Louis	Left P. (0.7)	
SLP	Left. (1.1) Parking, (0.4) go left. (1.0) Go: left if you want to park your car. =	

Louis	= P right. (1.0)	Louis takes the sign from the SLP.
SLP	It is actually @@, you're right it's right. (0.5) There you go:, let's look again! (1.6) This one says one way to:: the (.) right.	The SLP is looking through the box. Louis moves in to look.
Louis	<VOX> **To the right.** </VOX>	Louis sits down.
SLP	Yeah, there you go. (0.4) Good jo:b. (0.8) And here are the other ones. (1.0) No U-tu:rns! (1.3) A::nd pedestrian crossing! (0.5) Yield to pedestrians this is a yield sign M- um (0.7) Louis, (0.4) yield to pedestrians. =	The SLP shows him more signs.
Louis	= **Yield to pedestrians**.	
SLP	Yea::h, you >have to< yield to pedestrians. (1.6) U::m. (.) No:: passing ca::rs.	The SLP shows him another sign.
Louis	**No: passing cars**.	
SLP	Yeah. (4.7)	
Louis	˚**M:ath (0.3) journey (0.4) back to schoo:l.˚ (0.3)**	Louis is playing with a sign, taking it apart and putting it back together.
SLP	Math journey back to school? Are you doing that [computer game?]	
Louis	[((HUMMING))] <VOX>˚**Come o::n! (0.5) Let's go:**:!˚ </VOX> (0.4)	
SLP	Okay, [come on let's go::.]	
Louis	[$_2$ ((VEHICLE SOUNDS))]	
SLP	Here go:es the airplane. [((PLANE SOUNDS)) Cr:ash.]	The SLP moves an airplane into Louis's line of sight.
Louis	[$_2$ ((HUMMING))]	
SLP	I found the stop sign! (0.6)	The SLP pulls out another sign.
Louis	((HUMMING))	
SLP	[But we still don't have any yield signs. La: la. (1.6) What else did I find? Oh that's the no pa:ssing, (0.7) there's the stop sign, (0.2) we >don't want< that sign. (2.7) O:kay:. (0.6) Here comes a helicopter. (4.6) Look at the pictures Louis! (1.2) Look at tha::t, there's a big red ca:r. (1.7) And a gas station. (1.5) Uh hm. (5.4) Come s- (4.0)]	Louis is humming throughout. The SLP spins the wings of helicopter. Louis takes the box of signs and looks inside. The SLP shows him a pamphlet with pictures from the sign box.
Louis	[$_2$ ((HUMMING))]	
SLP	Hey::, you've got so many signs. (2.9) Uh oh. (1.4) Can we make him jump? (2.8) The cat can jump on the roof! (1.5) He's pretty good [at it.]	Louis looks through the toy box. The SLP cranks a toy cat and places it on the roof of the house. The cat

		jumps.
Louis	[$_2$F:all.] (0.4)	
SLP	You think he will fall? Just wait give him a se:cond. (0.4) >Oh no he's alm-< o:::h no::, what happened? (1.3)	Louis pushes the cat off the roof.
Louis	<VOX> **Are you okay?** </VOX> (0.2)	
SLP	Are you okay kitty cat? ((MEOWING)) I hurt my paw. (2.4) He wants to jump again though.	The SLP picks up cat and cranks it again. The SLP puts the cat on the roof.
Louis	**No jump**. (0.3)	
SLP	No jump? But he wants to jump. (0.4) He says I like to jump. (0.6) Oh. (0.4) Oh no:, don't make him fall. (0.4) Maybe he will hurt his paw again. (0.9) O:::h dear. (1.0) O::h dear. =	Louis tries to pull the cat off the roof.
Louis	= ((SOUND EFFECT))	Louis looks through the toy box.
SLP	Soon he will stop. (0.2) O::H (0.3) down he goes. (1.4) He fell down again! (0.8)	The cat falls.
Louis	Fall:. [((HUMMING))]	
SLP	[$_2$He fell down again.] (3.9) Good job. (0.5)	
Louis	Left. (1.0)	Louis holds up a left and a right sign.
SLP	Let's turn left. (0.4)	
Louis	Right. (0.2)	
SLP	Let's turn right (.) to go to the parking. (0.7) Here comes the big red car (.) hey, (.) Jeff and Anthony, (0.2) where is everybody? (0.5) Where are you guys? =	The SLP brings in the big red car from *Wiggles World*. Louis is looking in the toy box.
Louis	= ### (2.4)	
SLP	Wh@ere@ did they go Louis? (2.2) Where are all the ##? (2.1)	
Louis	Yields#. (0.8)	
SLP	Wheels? (0.2)	
Louis	Yield.	
SLP	You're looking for yield signs? (1.0)	
Louis	Yield. (1.0) **Just the one**. (0.3)	
SLP	Just the one we only have one yield sign. (1.0) O:h here come the Wi:ggles. Here they go, in the ca:r. (2.2) They're looking for parking on parking level two.	The SLP puts *Wiggles World* figures in the car.
Louis	Parking level one:.	Louis stops looking through toys and looks at the car.
SLP	No don't go on parking level two, go to parking level one. (0.9) O:kay: here we go:.(0.8) Whoa:::: okay! (0.3) We've parked, everybody	SLP drives the car to the house. She puts the toys in the house.

	ou:t. (2.5) Where are they going? (4.0) Jeff is sleeping again.(0.8) Hey, where is Jeff? (5.2)	
Louis	S:top. (0.8)	Louis is looking at a sign.
SLP	Sto:p? (0.7)	
Louis	**Rai:lroad ˚crossing˚**. (1.0)	Louis is looking at another sign.
SLP	Stop it's a railroad crossing? (0.7) That's right, be:: careful. ### (3.7) I found another stop. (3.1)	The SLP pulls out a stop sign. Louis looking through the toy box.
Louis	((TRAIN SOUNDS)) =	
SLP	= ((TRAIN SOUNDS)) We need a train. Shall I get a train? (0.5)	
Louis	>**Can I**< get the train ˚**please**˚?	
SLP	Okay, we can get the train. >Do you want< the stop sign? (2.9) >Here come< the Wiggles they're walking across the:: (0.5) crosswalk.=	
Louis	= **I want** train **please**.	Louis gets up. The SLP gets up.
SLP	You would like a train please? Do you want Thomas the Tank Engine? (0.5)	
Louis	**No**:. (1.5)	
SLP	Okay [wh-]	
Louis	[$_2$Trai:n.] (0.7)	Louis looks through the toy box.
SLP	Okay, I'll get a [train.]	
Louis	[$_2$#]## and Donald. (0.4)	
SLP	Sorry? (0.4)	
Louis	**I want** train and Donald (.) **please**.	
SLP	Train and Donald, I don't have Donald I've got Mickey Mouse train. (0.3)	Louis gets up to look at the toys in the closet with the SLP.
Louis	**Yes**. (0.4)	
SLP	>Okay, alright.< Let's move back we can [#]	
Louis	<VOX> **[$_2$Hi] Mickey. @@ [Hey watch where you're going.]** </VOX>	Louis goes back to the toys in the box.
SLP	[$_2$That's great!] Let's get the Mickey [Mouse train.]	SLP pulls out a train set.
Louis	<VOX> **[$_2$Sorry uncle Donald.] (0.3) Okay. (0.4)** </VOX>	
SLP	I'm sorry but oh but Donald it's okay? (1.4)	Louis reaches into the box with the train set.
Louis	<VOX> **Oh boy**. </VOX> (0.9)	Louis pulls out toys.
SLP	@@@@ Oh boy there's Mickey Mouse! (0.3)	
Louis	Mi:nnie::. (1.0)	
SLP	Did you [find-]	

Louis	<VOX> [$_2$**Find them all.**] </VOX>	Louis has two Minnie figures and Mickey.
SLP	There are two Minnie Mouses! (0.9) Mice. (0.2) There're two Minnie mice. =	
Louis	= <VOX> **I'm here.** (0.3) Goo:fy:. </VOX> *(0.8)*	Louis looks for another toy in the train box.
SLP	You're looking for Goofy? I don't think I have Goofy.	
Louis	*((*HUMMING*))* <VOX> **@@ Hiya Goofy. [@@ Hiya Goofy.**] </VOX>	
SLP	[$_2$I-] (0.8) there was another stick but I don't think we have Goo:fy let's make the train track. (1.4)	SLP starts laying tracks.
Louis	<VOX> **Hiya Goofy.** </VOX> =	
SLP	= There you go Louis. (0.2) [Here's some train tracks.]	Louis lays tracks.
Louis	<VOX> Hiya Mr. Grover @@ **Hiya Goofy**. </VOX>	
SLP	Hiya Goofy. Hi Mr. [(0.3) Grover]	
Louis	<VOX> **[$_2$Hey there] Mickey, whoa**. </VOX> (0.5)	
SLP	Grover? (0.5) Yes [I'm over here. Hello. (0.6) But we can get Grover here. (1.5) Hello. (0.7) Mickey I came- I came to build the train tracks with you. (1.0) Le:t's >go on the< train tracks. (6.3) There's the gate. (0.5) Shut the gate.]	The SLP puts on Grover puppet then takes it off. Louis is looking through the box and pulling out toys occasionally.
Louis	<VOX> [$_2$**Watch where you're going. Sorry uncle Donald. Okay. We promise.**] (1.4) **Let's play a game! Ye:ah!** </VOX>	
SLP	[Let's play a game? (0.2) Yeah? (1.2) We need a straight piece over there Louis.]	The SLP pulls out a track piece and points to where it needs to go.
Louis	[$_2$((HUMMING))] <VOX> **Okay now. Spray the things that I marked on the board.** </VOX> (1.2)	Louis puts down track piece but it gets stuck.
SLP	Uh oh. Push harder, push harder. (1.7) Good job, okay there we go:. [Let's get a couple more.]	SLP pulls out more track pieces.
Louis	<VOX> [$_2$**Oh guys**] </VOX> (0.7)	
SLP	Okay:, that's good. (1.7) Alright. (0.3) Hey, we're missing [one piece of track.]	The SLP is looking for a piece of the track.
Louis	<VOX> [$_2$**Uh oh:.] Sorry uncle Donald** </VOX>=	
SLP	= We need one more piece of track. (1.5)	
Louis	((HUMMING)) <VOX> **Oh my! Time to go! [@@@]**</VOX>	

SLP	[$_2$Oh boy time to go?]	
Louis	<VOX> **@@ Let's go Pluto. ((BARKING))** </VOX> **(0.4)**	
SLP	>Let's go< Pluto where are you going? (0.8) Pluto, where are you going? (0.4)	
Louis	<VOX> **Coming Mickey.** </VOX> *(0.3)*	Louis is playing with figures from Mickey Mouse.
SLP	Coming Mickey? (0.3)	
Louis	<VOX> **Oh. Bye Daisy.** (0.9**) Bye Daisy**. </VOX>	
SLP	Bye Daisy, where are you going?	
Louis	<VOX> **@@ Goodbye.** </VOX> (2.2)	
SLP	@@ See you guys la:ter. (1.8) [Louis I found one more piece of track.]	The SLP holds out piece of track.
Louis	<VOX> [$_2$**Over here Mickey**.] </VOX> ((HUMMING)) >**Can I**< have the track **please**?	Louis grabs at the piece.
SLP	Yep, you can have some [track there you go.]	The SLP releases the piece and takes some of the Mickey Mouse figures.
Louis	<VOX> [$_2$**Here comes Daisy::**.] </VOX>	
SLP	Hey, (0.5)	
Louis	<VOX>**@@ Hiya Daisy**. </VOX>	
SLP	Hiya Daisy, how [ya doing?]	
Louis	<VOX> **[$_2$How's business?]** (0.4) **Oh business is busy, busy, busy. I'll be back to visit when I get a free minute.** </VOX>	
	End of excerpt	

Table J8

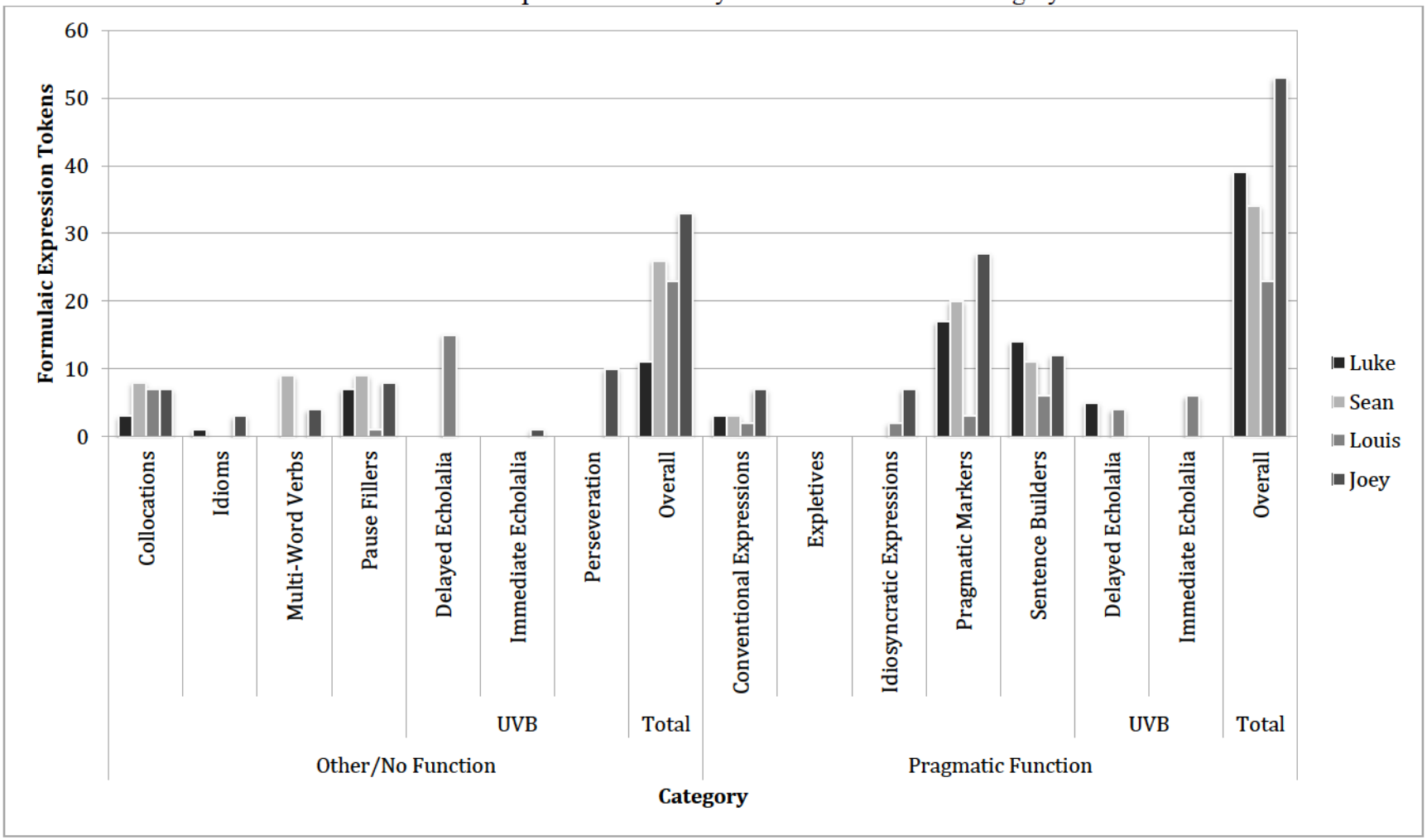
List of Sequences Identified in the Quantitative Analysis Segment: Louis

Category	Sequence	Token
Collocations	Math journey back to school	1
Collocations	Railroad crossing	1
Collocations	School area	1
Collocations	School crossing	2
Collocations	Yield sign	2
Conventional Expressions	Are you okay?	1
Conventional Expressions	Just the one	1
Echolalia	Can I play?	1
Echolalia	I don't want a stick	1
Echolalia	Level two	1
Echolalia	No passing cars.	1
Echolalia	To the right.	1
Echolalia	Yield to pedestrians.	1
Idiosyncratic Expressions	No X	2
Pause Fillers	Hm	1
Pragmatic Markers	No	1
Pragmatic Markers	Woo	1
Pragmatic Markers	Yes	1
Scripts	Come on. Let's go.	1
Scripts	Find them all.	1
Scripts	Guys. Watch where you're going. Sorry uncle Donald. Okay. We promise. Let's play a game.	2
Scripts	Hi Mickey	1
Scripts	Hiya Goofy.	3
Scripts	Hiya Goofy. Hey there Mickey. Whoa.	1
Scripts	I'm here.	1
Scripts	Oh boy	1
Scripts	Oh guys	1
Scripts	Oh my! Time to go! Let's go Pluto. Coming Mickey. Oh bye Daisy. Goodbye.	1
Scripts	Okay now spray the things that I marked on the board.	1
Scripts	Over here Mickey. Look. Here comes Daisy. Hiya Daisy. How's business? Oh business is busy, busy, busy. I'll be back to visit when I get a free minute.	1
Scripts	Bye Daisy	1
Scripts	Care Bears welcome to Care-a-lot	1
Scripts	Hola, soy Diego.	1
Scripts	To the rescue	1

Sentence Builders	Can I X please	4
Sentence Builders	I want X please	2

Appendix K

Formulaic Expression Tokens by Function and Formal Category



Note. UVB refers to unconventional verbal behaviour.

Appendix L

Ratings of Formulaicity According to Wray & Namba's (2003) Criteria List

The table below lists the ratings of the formulaic sequences discussed in the qualitative analysis (see Section 6.3) according to the criteria indicative of formulaicity listed in Wray & Namba's (2003) checklist (see Appendix B). The sequences have been bolded in the excerpts. The ratings have been abbreviated as follows: SD, strongly disagree; D, disagree; A, agree; SA, strongly agree; DN, don't know; dash (-), not applicable.

Speaker	Sequence	A. Grammatically unusual	B. Lacks semantic transparency	C. Associated with situation or register	D. Function beyond meaning	E. Most commonly used by speaker	F. Prosodic pattern, action, or repetition	G. Grammatical or lexical marking	H. Encountered before	I. Clear derivation	J. Unintentionally misapplied	K. Different from level of competence
Joey	*Action Words*. *HearBuilder*. **This is nothing**.	SD	SD	SD	A	DN	SA	SD	SA	SD	DN	SD
Joey	And we'll see **where we take it from there**.	SD	SA	SD	SA	A	SA	SD	SA	SA	-	SD
Joey	**Do you wanna lie down with me in the blue room**?	SD	SA	SA	SA	SA	SA	SD	DN	SD	-	SD
Joey	**How come** we're not going to watch this?	SA	SA	SA	SA	DN	SD	SD	SA	SD	-	SD
Joey	**I have no clue**.	SA	D	A	SA	SA	SD	SD	SA	SD	DN	SD
Joey	Kay um. **What was I gonna say**? What do you wanna have?	SD	SD	SA	SA	DN	SA	SD	SA	SD	-	SD
Joey	**Let's do** menu.	SD	A	SA	SA	SA	SA	SD	SA	SD	-	SD
Joey	**May I tell** you something? Uh	SD	SD	SA	SA	SA	SD	SD	SA	SD	-	SD

Speaker	Sequence	A. Grammatically unusual	B. Lacks semantic transparency	C. Associated with situation or register	D. Function beyond meaning	E. Most commonly used by speaker	F. Prosodic pattern, action, or repetition	G. Grammatical or lexical marking	H. Encountered before	I. Clear derivation	J. Unintentionally misapplied	K. Different from level of competence
Joey	Yeah. And go down to number two. **Find out** the one you want.	SD	SA	SD	SA	A	A	SA	SA	SD	DN	SD
Louis	**And here's Mickey**.	SD	SD	SD	SA	SD	SA	SD	SA	SA	-	A
Louis	**Can I have** Jeff please?	SD	SD	A	SA	SA	SA	SD	SA	SD	-	SA
Louis	Dog is leav- **The dog is leaving**.	SD	SD	SD	SA	SD	SA	SD	DN	DN	-	SA
Louis	**I don't want to give you Daisy** please.	SD	SD	SD	SD	SD	SA	SA	SD	SD	-	SA
Louis	**Look, here comes Daisy. Hiya Daisy. How's business? Oh, business is busy, busy, busy**. (unintelligible sentence in Mickey Mouse character voices) **Coming Mickey. Bye Daisy. Goodbye. Bye**.	A	SD	A	SA	A	SA	SD	SA	SA	-	SA
Louis	**No thanks**.	SA	SA	SA	SA	SA	SA	SD	SA	SD	SD	SD
Louis	No. **That's not right**.	SD	SD	SD	SA	SA	SA	SD	SA	SD	-	SA
Louis	Oh haloha **I was just** practicing my ukulele.	SD	SD	SD	SA	SA	SA	SD	SA	SA	SD	SA
Louis	Um **let me go get changed**.	A	SD	A	SA	DN	SA	SD	SA	SD	DN	SA

Speaker	Sequence	A. Grammatically unusual	B. Lacks semantic transparency	C. Associated with situation or register	D. Function beyond meaning	E. Most commonly used by speaker	F. Prosodic pattern, action, or repetition	G. Grammatical or lexical marking	H. Encountered before	I. Clear derivation	J. Unintentionally misapplied	K. Different from level of competence
Luke	**Guess what you are thinking about today**?	SD	SA	A	SA	DN	SA	SD	SA	SA	-	A
Luke	**Hey look** over there.	SD	SD	SA	SA	A	SA	SD	SA	SD	-	SD
Luke	Hm **I dunno** want to guess.	SD	SD	A	SA	A	SA	SA	SA	SD	SA	SD
Luke	I wish I could play with us Grover. **I thought** Elmo can help us.	SD	SD	SD	A	SA	SD	SA	SA	SD	SD	SA
Luke	Now, **I was gonna ask you** for you.	SD	SD	SD	SA	DN	SA	SA	SA	SD	-	A
Luke	Or My- stuff is. My friends are. Computer. **You've got mail. You've got mail. You've got mail.**	SD	SD	SA	SA	DN	SA	SD	SA	SD	DN	D
Luke	**Put it down**!	SD	SD	SA	SA	A	SD	SD	SA	SD	-	SD
Luke	**You're welcome**.	SD	SA	SA	SA	SD	SD	SD	SA	SD	-	SD
Sean	But but but they've got some sort of connection in them and then when you put it to this onto this **portal of power** they call it.	SD	SA	SD	A	DN	SD	SA	SA	SD	-	SD
Sean	**Hey look** there's bowling.	SD	SD	SA	SA	DN	SA	SD	SA	SD	-	SD

Speaker	Sequence	A. Grammatically unusual	B. Lacks semantic transparency	C. Associated with situation or register	D. Function beyond meaning	E. Most commonly used by speaker	F. Prosodic pattern, action, or repetition	G. Grammatical or lexical marking	H. Encountered before	I. Clear derivation	J. Unintentionally misapplied	K. Different from level of competence
Sean	**How 'bout** – **how 'bout** we do this? Like we put that one	SA	SA	SA	SA	DN	SA	SD	SA	SD	-	SD
Sean	**In order to** get it like.	SD	SA	SA	SD	A	A	SD	SA	SD	-	SD
Sean	It it it dep- it it doesn't really depend it- it doesn't really matter which type it is. The the types **depend on** which gates you can unlock.	SD	SD	SD	A	DN	SD	SA	SA	SD	SA	SD
Sean	It's **a whole other** story for for an old game like that.	SD	SD	SA	A	DN	SD	SD	SA	SD	-	SD
Sean	**Know what**? I'm just gonna do that.	SA	SA	SA	SA	A	SA	SD	SA	SD	-	SD
Sean	**Oh shoot**. I shouldn't go for that.	SD	SD	SA	SA	A	SA	SD	SA	SD	-	SD
Sean	**What if I were to** use something like this and just	SA	SA	A	SA	A	SD	SD	SA	SD	-	D
Sean	**Why'd you do that**?	SD	SD	SA	SA	DN	SA	SD	SA	SD	-	SD