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A CORPUS STUDY OF THE DEVELOPMENT OF THE ADJECTIVE PHRASE IN FRENCH CHILDREN

Avery Elizabeth Baggett
University of Kentucky, avery.baggett@gmail.com
Author ORCID Identifier:
https://orcid.org/0000-0001-8959-6848
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Dr. Mark Richard Lauersdorf, Major Professor

Dr. Allison Burkette, Director of Graduate Studies

A CORPUS STUDY OF THE DEVELOPMENT OF THE ADJECTIVE PHRASE IN FRENCH CHILDREN

THESIS

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Arts in the College of Arts and Sciences at the University of Kentucky

By

Avery Elizabeth Baggett

Lexington, Kentucky

Director: Dr. Mark Richard Lauersdorf, Professor of Linguistics

Lexington, Kentucky

2021

https://orcid.org/0000-0001-8959-6848

ABSTRACT OF THESIS

A CORPUS STUDY OF THE DEVELOPMENT OF THE ADJECTIVE PHRASE IN FRENCH CHILDREN

In this thesis I attempt to answer three questions:

H1) Do children use proportionally more prenominal or post-nominal placement of adjectives than adults?
H2) Are children more conservative or more creative in their behavior in alternating prenominal and post-nominal placement of adjectives?
H3) If colored terms are more frequent in child speech will they pattern more like prenominal adjectives or more like post nominal adjectives, as in adult speech?

To do this, I examine two general semantic viewpoints, opting to use Scontras & Goodman (2017) subjectivity hypothesis. Next, I provide a general overview of First Language Acquisition research and then I turn to specifics of French adjective semantics and syntax, paying particular attention to factors that influence the preferential placement of an individual adjective. I next turn to some psychological factors, making certain types of adjectives especially difficult or easy to learn. I conclude by extending the work of Fox (2012).

All this information is to provide the reader theoretical background to understand children's adjective placement. The real answers come through a corpus investigation of how French children are treating adjectives in the earliest stages of development. Methodologically I answer my three questions by using three corpora from the CHILDES database (MacWhinney 2000). I also create an adult control group from a spoken French corpus. I run mixed effects models to project the behavior of adjectives past the sampling age using R.

In the end, I discover that children are more conservative at this early stage. This can be seen by the greater number of post-nominal adjectives. I define conservative behavior as sticking more closely to either position (prenominal or post-nominal) than adults. For example, if a child uses an adjective more closely to 100% prenominal or 0% prenominal than adults, the child is being more

conservative than an adult. I also find that children use proportionally more color terms than adults and are more creative with some common color terms. Size and color terms were found to be quickly learned.

KEYWORDS: First Language Acquisition, French adjectives, Corpus Studies, Semantics, Syntax

Avery Elizabeth Baggett

December 17, 2021

A CORPUS STUDY OF THE DEVELOPMENT OF THE ADJECTIVE PHRASE IN FRENCH CHILDREN

By

Avery Elizabeth Baggett

Dr. Mark Richard Lauersdorf
Director of Thesis

Dr. Allison Burkette
Director of Graduate Studies

December 17, 2021
Date

DEDICATION

To my beloved, late grandfather, David Everett “Papa” Herring.

Whose perpetual kindness and generosity I attempt to emulate every day.

I wish you could have lived to see this moment.

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1 INTRODUCTION

While much work has been done on adjective semantics (e.g., Richards 1977; Frawley 1992; Dixon 2010) and adjective syntax (e.g., Alexiadou &Schafer 2014; Sleeman 2011; Flanagan 2014; Kemmerer 2000; Kemmerer et al. 2007), and first language acquisition of adjectives (e.g., Clark 2009; Brown 1973; Goldberg 2019), and these aspects of French adjectives (e.g., Fox 2010b, 2012, 2014a, 2014b), little work has been done on the intersection of these three topics. In this thesis, I will provide evidence collected from three corpora showing the development of Adjective Phrase (AP) among French monolingual children. In English, adjectives nearly universally appear before the noun (prenominally) except for poetic effect and a few other isolated cases. But in French, as discussed in Section 1.3, adjectives show preference for prenominal or post-nominal position based on lexical, syntactic, morphological factors.

I am primarily interested in the production of adjective placement in French children's speech, especially the rate at which they mirror adult production. When I was learning French in high school, I was taught a mnemonic device dictating the placement of my adjectives. I was told that adjectives expressing beauty, age, number, goodness, and size all come prenominally. Because language is a complex system, the French adjective system is not so simple. Before we get to any data or corpus-based analysis though, it is important to first discuss adjective semantics and syntax in depth. Then I turn to some basic facts about first language acquisition that are relevant to understand this thesis. Finally, I explored the work that has been done on adjective acquisition specifically.

In this thesis, I track the development of patterns in early child adjective acquisition in French. I do this by first aggregating three child language corpora from the CHILDES database. As described below, I extract the raw text, and re-parse data from all three corpora with what I erroneously believed a more accurate parser. In the chapters that follow, I compare a sample of adult speech to the child production data, and perform an analysis in which I synthesize

semantics, syntax, and first language acquisition to test my hypotheses. The questions I will be seeking to answer are as follows:

H1) Do children use proportionally more prenominal or post-nominal placement of adjectives than adults?
H2) Are children more conservative or more creative in their behavior in alternating prenominal and post-nominal placement of adjectives?
H3) If color terms are more frequent in child speech, will they pattern more like prenominal adjectives or more like post-nominal adjectives as in adult speech?

1.1 ADJECTIVE SEMANTICS & SYNTAX

While there are many ways to dissect adjectives into categories, the most important distinction, for now, is that of predicative adjectives versus attributive adjectives (Bolinger 1967). Predicative adjectives are those that occupy the main syntactic object slot in a sentence, as in the example, “The Mona Lisa is beautiful”. Attributive adjectives, on the other hand, modify a noun so they are syntactically adjuncts. We can see the distinction in the example, “The Mona Lisa is a beautiful painting”. Necessarily, the smallest legal attributive adjective sequence must include two words – an adjective and a noun. As the objective of this study was to examine adjective order relative to a head noun, predicative adjectives will not be discussed further. In the next section, I delve into some general aspects relevant to this work of adjective semantics and discuss two different category schemas for categorizing adjectives, namely the semantically driven view and the subjectivity view.

1.1.1 ADJECTIVE SEMANTICS

While the analysis presented in this thesis does not directly engage with semantic distinctions between adjectives, it is important to have a basic understanding of adjective semantics in order to disentangle the syntactic

differences in adjective order. Although many attempts have been made to categorize adjectives based on meaning (e.g., Richards 1977; Frawley 1992; Dixon 2010) and Syntax (e.g., Alexiadou & Schafer 2014; Sleeman 2011; Flanagan 2014; Kemmerer 2000; Kemmerer et al., 2007) there always seems to arise evermore granular exceptions when scholars have attempted to semantically divide adjectives into different categories.

Frawley (1992) listed six primary “property classes” that all adjectives could be divided into: quantity, physical property, human propensity, age, value, and color. Frawley (1992) was extending the work of Dixon (2010) from his seminal work, “Where have all the adjectives gone?”, collapsing Dixon’s categories of speed and dimension into the single category of quantity along with determiners, non-numeric, and numeric modifiers. Others in the field have suggested schemas including different dimensions and numbers of dimensions. For further examples of the different ways of dissecting adjectives semantically, Lester & Beason (2005) carve adjectives into general, age, color, and nationality; Leech et al. (1982) divide them into physical qualities, psychological qualities, and evaluative qualities; finally, Thorne (2012) categorizes them into physical detail, character, atmosphere, emotion, and factual information. (For review, see Flanagan 2014). Obviously, there is little overlap or agreement between these various frameworks of semantic categorization. Furthermore, none of these semantic sets seems at all universal. There is, however, a much simpler way to view adjectives.

Scontras & Goodman’s (2011) framework of subjectivity is, in my opinion, the most applicable to adjective classification in general and seems to me to fit the widest range of cross-linguistic data. Under this framework, adjectives that are more subjective appear farther away from the head noun, and adjectives that are more objective appear closer to the head noun. Here, by subjective and objective, Scontras & Goodman intends ‘objective’ to indicate properties which are generally more agreed upon by speakers, and ‘subjective’ adjectives are those that may inspire disagreement about their application. Color, for instance, is relatively inarguable as a property. On the other hand, beauty is, as they say,

in the eye of the beholder. For example, except in very specific contextual situations, “a beautiful red apple” is more grammatically acceptable than “a red beautiful apple”. It is worth taking some time to explore the limited contexts in which adjectives in the non-canonical order make sense. When two nouns sharing the more subjective quality contrast in the more objective quality, it is appropriate for a speaker to draw the focus to the contrasting objective adjective. Continuing with the apple example, if there are two lovely apples sitting on a table and one is red and the other green, it would be appropriate for me to specify that I would like the “red beautiful apple”. This non-canonical, yet felicitous, order is usually marked by an intonational stress.

One limitation of the application of this subjectivity theory is that, to my knowledge, it has not been extended to the analysis of adjectives with an optional syntactic position with respect to the noun. In French, the apple sentence would be as follows: la belle pomme rouge. We can see there is a problem: both the prenominal adjective, which is more subjective, and the post-nominal, which is less subjective, are equidistant from the head noun. Using some imagination, we can extend this theory by positing that subjectivity only plays a role when there is more than one adjective in a given position relative to a noun.

There are still several important semantic properties of adjectives to consider for my research questions which are formulated at the end of Chapter 1. One important semantic classification for adjectives is gradeable adjectives verses non-gradeable adjectives. Gradeable adjectives exist along a continuum of degrees. So, they can be either intensified or minimized. For example, soup can be either very hot or less hot. This fact can be expressed using an adjective of degrees that one soup is ‘scalding’, and the other soup is ‘lukewarm’. Typically, non-gradeable adjectives resist this treatment. Some pragmatically licensed situations allow them to be intensified or diminished. For example, an apple can be very green but only as compared to other green apples. Importantly, a gradeable adjectives scale can appear in three different environments: normative, perceptual, and functional. To illustrate the differences

in the possible meanings of ‘big’, consider a playing card filled edge to edge with a picture of an ant. Of course, the picture of the ant is larger than the referent of an ant in the real world. This is the normative comparison. In this context, the picture would be considered big (as compared to an ant in the real world). If, on the other hand, there is a stuffed animal of an ant as big as a regulation-sized American football, the ant on the playing card would be considered the smaller ant. This is the perceptual comparison. For the third comparison, if the stuffed animal ant needs to cross a twine rope bridge, the stuffed animal would be too large to complete the task in a functional context. This tri-partite distinction was first laid forth by Ebeling (1988) and extended to child acquisition in Ebeling (1994).

Thuilier (2014) sets up a distinction between ‘subsective’ and ‘intersective’ use of adjectives. Subsective adjectives are those which identify a set of all nouns in a category. Next, a smaller set is taken that identifies only entities in the set of nouns which share a trait expressed by an adjective. ‘Small’ is an example of a subsective adjective in most contexts, as in the phrase “a small skyscraper”. We can imagine every skyscraper in the discourse universe and take a proper subset of only those which are below average height and call this subset ‘small’. Our small skyscraper will necessarily come from this proper subset of the set of all possible skyscrapers. Intersective adjectives, in contrast, express semantic sets differently. Colors are an illustrative example. We can imagine a set of every green object in the universe, and a second set of every vase in our universe. A green vase then would be an entity that shares qualities with entities in both the set of green objects and the set of vase objects. Instinctively, all intersective sets are, by definition, subsets. The important point to note here is that all green things in the universe can be pointed to and identified, but all small things in a universe cannot be pointed to. Hence, smallness is inherently subsective and greenness is inherently intersective. A small skyscraper and a small microbe share nothing in common, and therefore smallness must be constrained to a context of entities. Many adjectives are inherently ambiguous with respect to whether they are subsectively or intersectively interpreted. For a classic example,

the phrase “a beautiful dancer” can be interpreted as either subsective or intersective. Following the computation of “green vase” above, the intersective reading “beautiful dancer” would be computed as follows:

1. Create a set of every physically beautiful object (from the speaker’s perspective).
2. Create a set of everyone who dances.
3. Choose any element which shares qualities with each set.

The subsective meaning, on the other hand, is computed similarly to the computation of “small skyscraper” above. The computation is as follows:

1. Create a set of everyone who dances.
2. Develop a cut off point for aesthetically pleasing dancing (from the speaker’s perspective).
3. Pull out any individual who exceeds the threshold defined by (2).

The adverbial meaning can typically be interpreted in an adverbial reading for the “beautiful dancer”, the adverbial reading would be “a person who dances beautifully”. A speaker can actually intend both these readings simultaneously, entailing that a dancer is both beautiful physically and dances beautifully.[1] Subsective adjectives tend to have this adverbial reading and intersective adjectives tend not to be able to be paraphrased with an adverb.

1.1.2 ADJECTIVE SYNTAX

There is much debate about the syntactic category ‘adjective’ existing as a cross-linguistic universal. Arguments have been made both in favor of and against the existence of this independent category, with some preferring to collapse adjective and adverb into a single syntactic class (for review, see

[1] À la Misty Copeland

Flanagan 2014). Syntactically, adjectives serve a purely adjunctive role, never acting as specifiers or complements (although they themselves can take complements). This fact means that, in the broadest sense, adjectives are non-obligatory constituents and provide extra information which is not in and of itself necessary for a sentence to be grammatically acceptable. While Indo-European languages are widely acknowledged to have a broad, open class of adjectives that are highly productive, Dixon (2010) discusses languages which have a much smaller, closed adjective class which is non-productive. Igbo (a Niger-Congo language) is an example of one such language, having roughly 8 adjectives in Dixon's example, organized into 4 pairs of antonyms.

Speakers of languages with a clear open adjective class have syntactic preferences regarding the ordering of adjectives. As mentioned earlier, barring any pragmatic contextual importance, a sentence like, "the fresh, ripe, cooked, green apples" sounds much more acceptable to English speakers than any other combination of the four adjectives modifying apples. As is the case for most linguistic constructions, there is no limit to the number of modifiers that can be applied to the noun in this example (Richards 1997).

In order to explain these syntactic ordering restrictions, some syntacticians have employed the use of lexical or semantic subcategories of the class adjective (Bache 1978; Quirk et al. 1985; Barber et al. 2009). Under either Frawley's or Scontras & Goodman's frameworks of adjective semantics as discussed above, this means that adjectives expressing either a particular semantic class or a particular subjectivity are differentiated into corresponding semantic gradations which behave similarly.

Because the category is difficult to define in purely syntactic terms, a clear universal definition of the category 'adjective' is hard to pinpoint. Flanagan (2014) cites Haspelmath (2012) with a view of syntax stating, "cross-linguistic categories do not exist" and suggests that adjectives (and other) classes are best defined on a "language particular level" (Flanagan 2014: 21). Following Croft (2001), Flanagan defines adjectives as, "any word which typically modifies a noun and

often contains terms which comment on the color, size and general nature of a noun" (2104: 21). While adjectives may share many abstract features cross-linguistically, in this thesis I will adopt a view of 'adjective' as a category with reference specifically to French.

1.2 PRE- AND POST-POSED ADJECTIVES IN FRENCH

In contrast to languages like Igbo, French most definitely has an open adjective category. Interestingly, adjectives can appear on either side of a noun, as opposed to English which is almost categorically prenominal in its adjective placement outside of some specific uses[2]. As mentioned earlier, for French specifically, adjectives that tend to come before the noun they modify tend to express the semantic categories beauty, age, number, goodness, and size (a mnemonic taught to most students learning French as a second language as BANGS). These adjectives often are highly token-frequent, exhibiting a low type-to-token ratio. Token frequency here refers to a relatively high word count for any given word. A low type-to-token ratio indicates that the adjective is used, on average, quite often in the daily speech of an average French speaker. Post-posed adjectives account for the majority of adjective lemmas present in French, making them highly type-frequent and relatively token-infrequent, yielding a high type-to-token ratio. Additionally, prenominal adjectives tend to be monomorphemic, have fewer syllables, and are morphologically simpler (in that they tend not to be the product of conversion or other derivational processes) (Thuilier 2014). Longer descriptive words, those resulting from conversion or other derivational processes, and rarer and newer words tend to come post-nominally. Adjectives that appear both pre- and post-nominally appear more often prenominally (Thuilier 2014). An adjective appearing prenominally can lend

[2] Some examples post-nominally in English include, but are not limited to, modifying indefinite pronouns (e.g., "We saw something scary") comparative constructions (e.g., "I want a dog fluffier than a terrier"); and in semantically distinct phrases such as, "the person responsible should pay a fine" and "A responsible person wakes up early".

a more figurative meaning, and the same adjective post-posed can take a more literal meaning. Take the following:

1) Un gros fumeur '*a heavy smoker'*
2) Un fumeur gros '*a fat smoker'*

Examples taken from Thuilier (2014: 289). Both examples mean 'a heavy smoker' in English, but the word heavy is ambiguous in English. Sentence 1 indicates a smoker who smokes quite a lot, while sentence 2 indicates a physically heavy person, who may only smoke once a week. Semantically, adjectives prenominally tend to have a subsective meaning and post-nominally tend to have an intersective meaning. Taking an example directly from Thuilier (2014: 288), we can see this difference in the three sentences below:

1) une petite souris *'a small mouse'*
2) un vrai complot *'a true plot'*
3) un vase fragile '*a vase fragile*'

Sentence (1) takes the set of all mice in the world and as discussed above, subdivides the set into those which are small. A small mouse is therefore any mouse that is in the set of all mice which is below the mean size (i.e., a member of the subset for mice below the mean size is "small"). Logically, this computation makes sense for size terms, as a small skyscraper bears no resemblance to a small virus or a small mouse, so there can be no set of all small things with no further reference – sizes are contextual compared to an ideal exemplar. Sentence (2) takes the noun and simply intensifies the meaning (i.e., reduces the possible entities to those which are most like the prototypical plot). Sentence (3) relies on the set of all vases, and a separate set of all fragile objects, and returns an element from the intersection of these two sets (a fragile vase).

FIGURE 1. SUBSECTIVE MEANING DIAGRAM

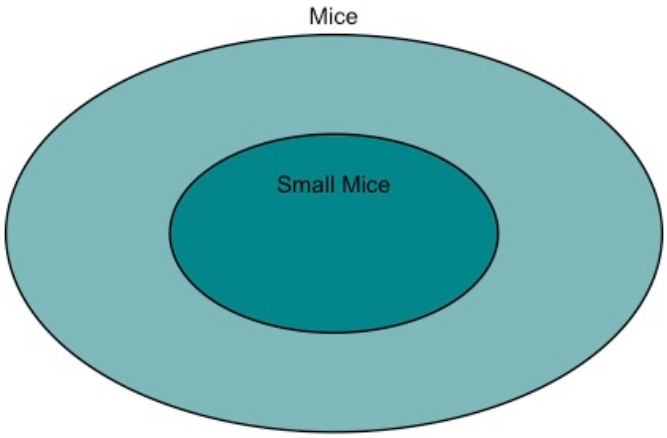


Figure 1. A diagram showing subsective meaning. Note that the solid line inside approximates half of all mice who are below the mean size for mice.

FIGURE 2. INTENSIFICATION MEANING DIAGRAM

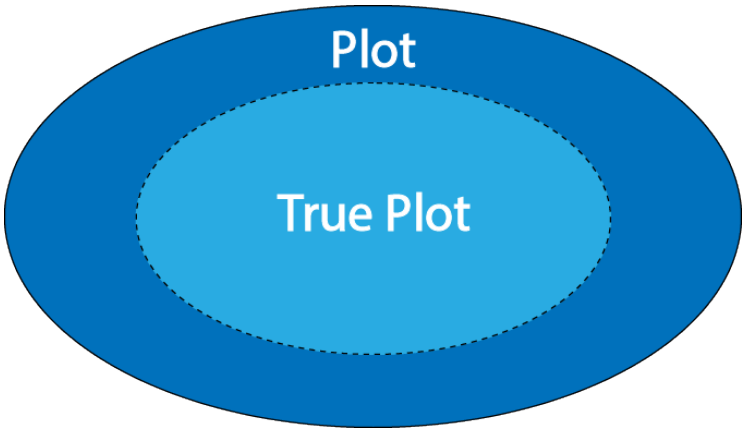


Figure 2. A diagram showing intensification. Note that inside the dotted line in this depiction indicates the most intense examples of the noun plot. The dotted line here contrasts with the solid line in the above example in that an average size for mice is fixed given that population of mice, whereas opinion may vary about the most canonical of plots.

FIGURE 3. INTERSECTIVE MEANING DIAGRAM

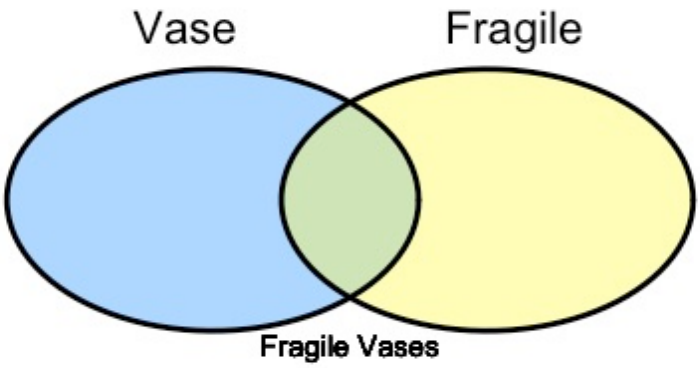


Figure 3. A diagram depicting intersective meaning. Note that the left circle represents all vases, and the right circle points out all fragile items. The overlapping portion picks out any individual sharing both qualities of vase-ness and fragility.

Most prenominal adjectives can be post-posed, but the reverse is not true (Fox 2012; Thuilier 2014). Thuilier (2014) proposes that there doesn't seem to be a canonical default position for the syntactic category of 'adjective' in French, but rather that any given adjective has a preference for one position over the other. There are several constraints Thuilier examines that factor into a given adjective's placement in an utterance by French speakers. She finds that semantics are not sufficient to account for all the alternations in French and argues that syntactic and lexical constraints must be added to fully cover the alternation phenomenon. The only categorical rule proposed by Thuilier is that if an adjective has a dependency (for example, Thuilier offers the sentence, "une musique agréable à écouter") it must occur after the noun it modifies (2014: 291). Conjunction also tips the scale in favor of a post-nominal position. For example, "un canapé petit et confortable" is slightly preferred over the possible, "un petit et confortable canapé" (2014: 292).

Other syntactic constructions have a tendency to affect position. For example, if a noun has a prepositional phrase, an adjective tends to occur more prenominally, as an intervening post-nominal adjective may obscure the relationship between the noun and its prepositional phrase. To again use an example provided by Thuilier (2014), "un récent recueil de textes grecs" is preferred over "un recueil récent de textes grec" (292). In a separate study, Fox (2010b), found that approximately 10% of adjectives from the French tree bank appear in both positions. Within this group of alternating adjectives, some alternate more freely than others, indicating again that some specific adjectives are more resistant to movement than others.

To understand why there seems to be different preferences for different adjectives, it is helpful to consider these modern constructions with respect to their historical context. Historically, adjectives in French were ordered prenominally, but over time the preferred adjective position came to be more or less exclusively post-nominal in modern French. Adjectives with the lowest type-to-token ratio, have resisted change over time and remain preferentially in the prenominal position (Bybee 1995; 2006). Newer, rarer, loan words and new

adjectives resulting from morphological processes tend to prefer post-position (Thuilier 2014).

There is, of course, an exception class of adjectives which remain preferential to the prenominal position, as they are both highly frequent and monomorphemic, making them excellent candidates for resisting change, as per Bybee (1995; 2006). Bybee (2006) argues that highly frequent constructions (be they morphemes or larger constructions) resist linguistic change or regularization that other constructions may undergo as an incoming productive pattern emerges. Bybee's theory extends exemplar theory to account for more aspects of language than only phonology such that it can explain the relationship between a young language learner's experience and their production of various structures. Essentially, the more a listener hears a particular structure, the stronger the connection between the perception and production of its elements become, which leads to fossilization of said structure over time (to quote Bybee 2006: "Making [frequent structures] easier to access whole and thus less likely to be subject to analogical reformation").This effect of token frequency (Bybee's Conserving Effect), as applied to the syntactic alternations discussed here would indicate that high-frequency sequences (e.g. a given adjective appearing in a particular position) become more entrenched, leading to the maintenance of those high-frequency morphosyntactic structures.

1.3 FIRST LANGUAGE ACQUISITION

In Eve Clark's (2009) book, *First Language Acquisition*, the text lays out the basic syntactic development of the young language learner. This framework is an excellent way of considering questions about adjective acquisition. Clark asks, "To what extent does language typology affect the process of learning? What helps or hinders children's acquisition?" (p. 177). Clark offers a series of language-specific factors which variously hinder or facilitate the acquisition of varying aspects of a particular language including semantic complexity, formal complexity, regularity, and frequency. It is generally agreed upon (Brown 1973;

Clark 2009; Goldberg 2019) that children exhibit a general pattern of language development. Following the outline of development as laid out in Clark (2009), I will first discuss the specific stages of development, and follow that with a discussion of the pattern that emerges from interaction of syntactic and semantic development over time.

While the names of the stages of development sound simple, they describe important hallmarks of each stage. First, there is the 1-word stage. This may be considered a baby's first words. The words typically consist of culturally acceptable interjections such as salutations, common words for mistakes, and expressions of gratitude and regret. Also present in this stage are names of close family members and concrete nouns, as well as content verbs. This stage is important because it marks the beginning of the child mapping streams of sound onto discrete linguistic units and then mapping those linguistic units onto some kind of meaning. Importantly, for the case of adjectives, although multi-word utterances are not present at this stage, gesture may play an important role in a child's speech. Although children at this stage of acquisition may not have a specific word for a deserted grammatical or relational concept, they may use gesture as a kind of proto-syntactic proxy for other words to express a more complex meaning than would be possible with a single-word utterance (Capirci et al. 1996; Clark 1998).

Children have two distinct ways of learning words during this stage: fast mapping and slow mapping (Turball 2015). Fast-mapping allows the child to quickly decipher a broad meaning onto a new word. Fast-mapping tends to also be a very constrained and concrete definition (as an example, a child first mapping meaning to the word 'dog' may restrict the word 'dog' to mean only their family's pet). This process can partially explain the rates of over- and under-extension. Slow-mapping, by contrast, allows the child to refine her initially narrow (under-extension) or initially broad (over-extension) definitions upon each repetition. Carrying the dog example forward and to also illustrate over-extension, a child may begin to understand 'dog' as all four-legged animals and may err by falsely extending the label 'dog' to horses and cows. This process

gives space to figure out polysemy and exceptions. Each process is deeply important to the young language learner as they both provide the child a quick way to extract new words in the environment and a method to fine-tune that word over time (Carey & Bartlett 1978).

Children quickly learn to employ two words to have even greater communicative success. A 2-word phrase such as, “Mommy cookie” can mean a child either offering her mother a cookie, or requesting one from her mother, but by addressing the speaker directly, a child may be much more likely to receive the desired outcome. During the 2-word stage, we can finally see the beginnings of rudimentary syntax. It is in this stage where we see the beginnings of verb development, as well as the possibility of modification. We also see some adverb and adjective[3] usage develop during this stage, “daddy up” is a common example (Braine & Bowerman 1976). While the odd adjective may appear in the 1-word stage, they only really proliferate in the 2-word stage[4]. For example, from Braine & Bowerman (1976), Jonathon, at the age 1;1[5] produced the following “property + X utterances: “big balloon”, “little hat”, “hot sand”, “blue shirt”, etc.

Children show tendencies to prefer one of two types of 2-word combinations: two open class content words or one open class content word with a demonstrative or pronoun. The first words children make are from open classes; function words appear later (from Bassano et al. 1998). The latter strategy may facilitate articulatory fluency. If a child wants to produce a word, she has already said several times, motor planning for articulatory sequences is facilitated by the muscle memory of the word’s production. Children are quite attentive to word order from even earlier developmental stages, but it may in fact be the case that there is a tradeoff between articulatory fluency of individual words and the syntactic length of an utterance. If a child attempts to produce a

[3] Although Braine & Bowerman (1976) advises against syntactic labeling in favor of semantic role parsing, the example “daddy up” may be considered to be Noun + Adverbial element but is more clearly understood to be Actor + Action.
[4] While it is still hotly debated in the literature, whether or not children can really be said to have syntactic categories, for the convenience and broad understanding of terms such as noun, verb, and preposition, I will continue using these labels.
[5] It is standard in first language acquisition literature to express age either in months, or as year followed by a semicolon followed by month. For example, an 18-month old child may be represented as 1;6.

longer utterance containing more open class words, she may risk an interlocutor interpreting all or part of her speech as unintelligible (Clark & Kelly 2006).

After an infant has solidified her target language's phonemic inventory and after she has learned the phonotactic structure sufficiently enough to extract single words, her next task is to map meanings from those extracted words. For example, in the English language the construction "it is X", X can be an adjective such as 'green', but for a child who does not know the English word 'green', 'green' might refer to a name as in "it is grandma"; a passive verb as in "it is eaten"; a quantifier as in "it is all"; a progressive verb as in "it is working"; or a pronoun as in "it is mine"; etc. The same can be said for French as well. Carrying the same example forward in French, the sentence "il est vert", has the same issues for a child who does not already know the word 'vert'. Similarly, 'vert' in this context could refer to a locative, as in "il est ici"; a passive verb as in "il est mangé"; a motion past tense verb as in "il est née"; or an adjective, which is the proper mapping. The picture gets ever more complicated when the adjective modifies the noun, as in "c'est une pomme verte".

Clark (2009) and Braine & Bowerman (1976) say it is unwise to ascribe syntactic categories to children's speech until they reach the 3-word stage and are using novel words in multiple contexts such that they treat words categorically with respect to syntax. After becoming comfortable with two word combinations, children begin to expand their utterances. Complexity comes not only from the sheer number of words or morphemes used, but also in the types of constructions which children acquire. For example, a short relative clause is syntactically more complex than a longer sentence without embedding (Clark 2009). This is due to the recursive nature of embedding clauses under the matrix verb. It is during this time that we truly begin to see the proliferation of verbal structures and adjective modification (Ninio 2004). This is also the stage at which children rely more on slow-mapping than on fast-mapping to tease apart the nuances of meaning in language, including polysemy. If children learn word by word, we should never see errors, but if they learn by pattern, we expect to see errors. In fact, children make two types of errors: omission and commission.

Errors of omission are instances in which children omit adult-like morphological affixers, and errors of commission, which occur later in development, are also known as over-regularization or over-generalization. This type of error involves the misapplication of an affix to an irregular stem (such as ‘runned’ in English). In the beginning, children make surprisingly few errors in speech. Later, precision drops significantly with errors of omission and commission becoming relatively common. After teasing apart rules and patterns from their exceptions, children’s performances climb again until their speech becomes indistinguishable in terms of syntactic and morphological competence from adult speech (content notwithstanding). This overall tendency is referred to in the literature as the ‘U-shaped’ learning curve. This U-shaped curve shows that children are both creative and conservative with respect to language learning (Goldberg 2019). Children are creative when producing errors of commission, as they are inventing a word they have certainly not heard in their environment. Children show evidence of conservativism in their errors of omission, preferring to stick to a word they have experienced but not in the correct adult-like form.

It is during the 3-word and beyond stage that children begin to employ syntactic bootstrapping to more radically expand the variety of constructions available to them. Syntactic bootstrapping is the process by which children use known syntactic categories to bootstrap other known words. For example, if a child knows that a noun can act as a subject before a verb, such as “Doggy jumps”, they can then replace other nouns and other verbs to fill these slots. So, if a child hears an embedded clause, and recognizes that within that clause is a noun and a verb, then the child can create an internal hypothesis recognizing that construction as a sentence inside another sentence. This is also the stage in which we begin to see the use of pragmatic implicature (Clark 2009). The emergence of pragmatics is important for mastering subtle differences in meaning as well.

1.4 PSYCHOLOGICAL UNDERPINNINGS

Ninio (2004), points out that attributive adjective processing involves at least two cognitive steps. In the first step, a child must first correctly identify the target object that is the referent of the noun. Second, they must correctly identify the appropriate attribute that the adjective is referring to. As such, attributive adjective-noun pairings appear later than other constructions in children's speech including predicative adjective constructions. Children can experience difficulty in both producing attributive adjective strings and comprehending utterances from other speakers. In fact, it has been suggested by Braine & Bowerman (1976) and Ninio (2004) that apparent two word attributive adjective modifications are in fact closer to copular predicative constructions with an absent copula. For example, if a child produces the two word phrase, "big house" the best understanding of the syntax would be the sentence, "the house is big". Similarly, Tomasello (1992) commented on a female child at 1;7 stealing a sip of beer and commenting "good beer" which was probably indicating that the sip she had was good, rather than commenting that the beer was of a good variety rather than a bad variety.

While many experiments in attributive adjectives have relied on production data, Ninio (2004) tested comprehension of attributive noun-adjective constructions. The target language in this experiment, Hebrew, has a unique distinction between attributive and predicative constructions. Adjectives are rigidly fixed to appear post-nominally in both cases. The distinction between attribution and predication is made by omitting a clitic determiner on the adjective in the case of predicative constructions, while attributive constructions include the clitic on the adjective, for example, "ha-dubi ha-gadol" means "the big teddy bear", and "ha-dubi gadol" means "the teddy bear is big". Children were tested by being shown four pictures of two types of objects displaying one of two adjectival qualities and asked to indicate which of the four pictures depicted the correct NP. It was expected that children would rely more on the noun and would choose either of the two pictures with the corresponding noun referent. Errors in which a child attended more to the adjective were expected to be very rare. Children in

this study did indeed correctly identify the noun significantly more often than the correct adjective (in the event that an error of one type was made). Interestingly, some children took a few seconds before self-correcting their response. While these children did more often produce correct results, the correction was almost exclusively on the basis of an initial choice with an incorrect adjective lending support to the two-step model of attribution processing. Essentially, attribution is hard, lending credence to Braine & Bowerman (1976) and Clark (2009)'s interpretation of attribution probably intended as a simplified predicative sentence.

It is an interesting quirk of adjectives, that attributive adjectives have tendencies to encode "old information" or information which has already been presented in the discourse. In contrast, predicative adjectives tend to provide new information into the discourse, which can later be moved into an attributive position (Richards 1977). An example from (Richards 1977) makes this plain: "the green cup is on the table" presumes that the color of the cup is already known, and the location provides new information, namely that the cup is on the table. If the sentence is flipped to read "the cup on the table is green", now the location of the cup is known, and the color is introduced.

Children's adjective use seems to be largely egocentric around the age of 2. Carey (reported in de Villiers & de Villiers 1978) found that children described a shot glass as 'tiny' from the perspective of a very small doll, even though the glass was too large as compared to the doll itself. Size adjectives are surprisingly tricky. There are three different contexts in which an item can be discussed as large or small (see also Section 1.1.1). In the normative context, an object may be too big or too little compared to another object of the same kind. In a perceptual context, big and little depend on comparison to another object that is physically present. Finally, in a functional context, an object is big or little compared to its use (Ebeling 1988). For example, a tablespoon is far too large for most dolls to use, but normal for a person to use. The perceptual context is the predominant context used by children around age 2. For example, when looking at two hats, the perceptual context is employed to judge which hat is the big hat

and which hat is the little one. This intuitively makes some sense, as all the knowledge required to make this judgement is the immediate visual perception of two objects.

Gelman & Ebeling (1998) performed a series of experiments in which they assessed children's performance in choosing the correct adjective in these different contexts. When compared to an adult control group, children had little difficulty switching from a normative to perceptual context but struggled to switch from a perceptual context into a normative context. The researchers attribute this asymmetry to the increasing cognitive demand experienced in the switch when two objects are next to one another, and one is subsequently taken away. That is, in the normative context, the only information that a child has to make the judgement is their mental representation of the basic level class for the object. Similarly, switching from normative contexts to functional was easily done by children (assuming they had the appropriate functional knowledge), but children struggled to switch back into a normative context. The authors offer another explanation which considers these results holistically: the normative case is unmarked. Perceptual and functional contexts are then considered marked as there are always additional percepts which accompany the target object. Therefore, children may struggle to switch from a context in which there is more information, into a context in which there is less.

Despite the demonstrations that early adjective-noun occurrences may be better analyzed as predicative constructions, (Kilani-Schoch & Xanthos 2013) note that there are language-specific considerations which may go against this pattern. The French adjective 'petit' has unique pragmatic and semantic functions, in addition to its base meaning 'small'. It is often used as a term of endearment, especially in child-directed and child-produced speech. Kilani-Schoch and Xanthos (2013) examined the input and productions from two children in naturalistic environments at home with their parents, who recorded speech for half an hour twice a month from 1;6-2;11. 'Petit' accounted for most of the adjective occurrences in this study. After removing 'petit' from their analysis, they discovered that 'petit' alone most often appears in attributive constructions,

and most other adjectives appeared predominantly in a predicative construction. They find that ‘petit’ was rarely used in predicative constructions (in both input and child production), and that without ‘petit’, most adjectives do in fact appear in predicative constructions.

Because ‘petit’ is so common in at least one context and serves several functions in child-centered speech, it appears first among all adjectives. Through their own mimetic usage of this adjective, children may then be expressing a desire to participate in the social communication strategies of their conversational partners, which in this case, results in a divergent trend in acquisition. For usage based theories of acquisition, pragmatics is a key discussion point, as acquisition then relies on the desire to be an effective social actor and conversational partner. In their study, pragmatic uses of ‘petit’ are key in explaining the differences in acquisition of attributive constructions. These pragmatic uses are defined by the following criteria:

1) If ‘petit’ always co-occurs with a certain noun in child-centered speech situations (e.g., ‘petit’ chagrin) (“little worry”)
2) If ‘petit’ co-occurs with a noun almost exclusively in child-centered language, but the noun doesn’t appear with ‘petit’ in adult-centered speech (e.g., ‘petit’ bec) (“little kiss”)
3) If a noun is not gradeable with respect to size, but is modified by ‘petit’ (e.g. “ton petit lait”) (“your milk”)
4) If ‘petit’ is used to modify a noun, and the same noun is used without ‘petit’ in the same context (e.g., “Le petit garçon là. Regarde le garçon il court”) (“The little boy there. Watch the boy he is running.”)
5) If attribution by ‘grand’ is impossible or creates a different meaning (petit bec vs. *grand bec)
6) If ‘petit’ differentiates between two otherwise identical noun phrases, it may alternate between semantic and pragmatic uses (especially in the case of reframing an object as child-centered, e.g., toys or pets).

List of examples culled from Kilani-Schoch & Xanthos (2013: 115-119).

Otherwise, if ‘petit’ is used contrastively with other adjectives or can be paraphrased, the function is predominantly semantic. All that to say, all the phenomena described in acquisition literature are perhaps strong tendencies which may or may not be true rules for a given community of speakers, in this case, native learners of French.

Second to ‘petit’ color terms are acquired very early (Fox 2012; Tribushinina 2008). By four months of age, babies categorically perceive primary colors regardless of how many color terms exist in their target language (Tribushinina 2008). According to Tribushinina (2008) colors form a “natural prototype” and thus are relatively easily mastered, at least from a comprehension standpoint. Color appears among the earliest adjectives because it is very salient, noun-like, and concrete. The specific language and cultural application of color labels must be honed to the target language over many years. Fox (2012) found evidence of this in her study. She found that perceptually, children easily matched an object with the same color but struggled to match an object with a different color. In French, Fox (2012) notes that color terms appear generally post-nominally unless the color is something inherent to the nature of the noun. Take the following examples from Fox (2012: 56):

“Des bonbons verts” (‘green candies’)

“Les vertes prairies” (‘green meadows’)

Candies can come in a variety of colors, but a healthy meadow is naturally green, hence the movement of ‘vertes’ to pre-position.

Language is an inherently social activity (Goldberg 2019). Babies come into the world not knowing anything, but quickly realize that language is the best tool for expressing desires, getting their needs met, rejecting commands, and understanding the world, as well as being generally understood. These three fields of study (semantics, first language acquisition, and psychology) all help explain the process by which children learn the grammar of their language and

the appropriate social responses of their language community. Specifically for the present work, these factors help describe how French children learn syntactic preferences for adjective placement. Acquiring the specific preferences and tendencies of adjective placement ultimately aids children in their goal of being understood by the people around them.

Fox (2012) and Fox (2014a) marry the three topics of French adjective semantics, syntax, and acquisition. She found that children are especially sensitive to adult frequency. She also found a three stage pattern: 1. Memorization of static phrases. 2. Abstraction between one adjective and different nouns. 3. Further expansion of abstraction to encompass more creative use of placement and allowance for exceptions. Fox found that 'petit' acted as an anchor adjective providing scaffolding for other early adjectives. The three children she investigated showed different behaviors. Guillaume relied heavily on recency, preferring to take the more conservative route. Louise exhibited more creativity, breaking from her parents' speech more often. Finally, Rayan was less consistent than her parents. Data were collected in two separate sampling sessions taken eight months apart, at home in naturalistic interactions between the children and their parents. For a control group, Fox analyzed the input speech of the parents. By the second sampling session, all children showed a few instances of multiple modification but only with a dimension term with another adjective. In the end, Fox (2012) and Fox (2014a) marry the three topics of French adjective semantics, syntax, and acquisition, with some results that are interesting for the questions I am posing here. Fox (2012) discovered three over-arching patterns emerge: memorization of static phrases, abstraction of adjective-noun strings to create novel adjective-noun strings, and finally, a development of nuance and flexibility to create fuller, more adult-like meanings. Fox (2014a) found that input speech was sufficient to account for development of adjective placement directly refuting Universal Grammar in favor of a Usage-based model.

My research takes new approaches from Fox's. For one, I take a more data-driven approach, in that I collect data from a much larger population (N =

83). Secondly, I use a different semantic categorization schema, relying not on semantic classes, but instead on subjectivity of each adjective. Thirdly, I do not take into account input data from interlocutors, preferring to use a general adult 'ideal' grammar derived from usage-based data collected from a corpus of spoken French. Fox (2012) used the French TreeBank, which is a corpus of written French, while I used a corpus of spoken French to see if there are differences in the comparison to adult speech. Fox (2014a) lays the groundwork for this by arguing in favor of a usage-based approach over an innate grammar. Finally, I look at a younger population than Fox (2012), attempting to trace the very beginnings of adjective development. I am grateful to these works as I can set aside the nature versus nurture debate in acquisition and focus on the actual development of adjectives in French.

2 METHODS

2.1 INTRODUCING THE CORPORA

Data were retrieved from the Child Language Data Exchange System (CHILDES) repository in the Talkbank database (MacWhinney 2000). Three separate corpora were chosen based upon the number of speakers, the age ranges of these speakers, and the methods of data collection employed. The three corpora are as follows: Lyon (Demuth & Tremblay 2008); Palasis (Palasis 2009); and MTLN (Le Normand et al 2013).

The Lyon Corpus includes language data from five monolingual French-speaking children, aged 1;0 to 3;0 years old, collected in spontaneous, naturalistic interactions between each child and their mothers in the home. Data were collected longitudinally between 2002 and 2005, with researchers observing 1 hour of interaction for each child every two weeks for a total of 185 hours of speech across all five children. Data were transcribed orthographically using Computerized Language Analysis (CLAN) formatting (MacWhinney 2000).

The Palasis Corpus includes language data from a total of 22 French-speaking children[6] aged 2;5 to 4;0 from the same kindergarten class. Data were collected in semi-naturalistic child-child interactions and child-interviewer interactions sampled from the same kindergarten class. Interviews were conducted among groups of 3 to 5 children. Data were collected longitudinally between 2006 and 2007 with researchers observing 20 hours of speech across a total of 13 sessions. Data were transcribed orthographically using CLAN formatting (MacWhinney 2000).

The MTLN corpus (named for lead researcher Marie-Thérèse LeNormand) consists of language data from a total of 56 monolingual French-speaking children, aged 2;0 to 4;0. Data were collected in 1990 from single naturalistic interactions with each child and an adult family member in the home. The purpose of this corpus's creation was to serve as a normalized database of

[6] One child's first language was Russian, and another child's first language was Portuguese

speech for comparison to children exhibiting Specific Language Impairment. This is the only non-longitudinal study but given the larger number of children in the study, the corpus can be used for apparent-time investigations of language development (Sankoff 2006). Data were transcribed orthographically using CLAN formatting (MacWhinney 2000).

Because of differences between the corpora, a source-corpus identifier for each given adjective was coded into the resultant data such that it could be included as an effect for subsequent statistical modeling. There are several other important distinctions among the corpora that inspired the inclusion of the corpus source effect. Different interactions were sampled. Some collected child-child interactions; some collected child-parent interactions; and some collected child-interviewer interactions. As seen above, some corpora were sampled in home and Palasis was sampled in school. Some data are naturalistic, and some are semi-naturalistic. Despite these differences in data collection, the number of children and the general similarities of the corpora should provide enough signal to outweigh the noisiness among the different collection methods.

2.2 DATA PROCESSING

The CHILDES data was processed first through a Python script that aggregated the three corpora analyzed using R (RStudio Team 2020). The Python script was necessary because of slightly different coding conventions between Palasis and MTLN and a drastically different coding schema for Lyon. Python was used because different corpora had different versions of the markup language used. As an example, the Lyon data used a different way of expressing the age of the speaker than the other two corpora. Python allowed all the data to be processed at once, regardless of what version of the markup language was used in the original data files. This in turn allowed the production of a single JSON formatted data set to be processed by R for statistical analysis.

2.2.1 PYTHON PROCESSING

The data from these corpora were first stripped of CLAN POS-tagger annotations. A Python script (See Appendix B) was written to accomplish this task, as well as to automate the re-tagging with an updated part of speech tagger compared to the one provided in CLAN (Explosion AI 2020) such that the data were parallel to one another and could be analyzed as a unified source of child language data. After manual inspection of approximately 10% of the output from this Python script against the original CLAN-tagged data, it was found that several adjectives were incorrectly tagged by the Python script. In the end, modifications were made to the Python code to use the original CLAN tags. Still, there were a few tagging issues left. Tagging issues were of two types: true adjectives not labelled adjective (a problem with recall accuracy) and other parts of speech labelled adjective (a problem with precision accuracy). Recall accuracy was relatively high, but precision accuracy was relatively low. In part this was due to stripping of punctuation. A blacklist was created to exclude these misidentified words, and the Python script was rerun with the addition of this blacklist. A complete list of the blacklisted words can be found in Appendix C.

A lemmatizer was used to remove inflectional markings (Explosion AI 2020) from adjectival words. All associated metadata were preserved from the original datasets. Among these metadata are age of speaker, speaker ID/name, sex, speaker role, and speakers' native languages. For computational simplicity, ages were converted to a decimal number. For instance, a child of 2;7 years would be 31 months/12 months to yield the age 2.58 years. The output of this Python script was a JSON file including the aforementioned metadata, as well as the fully inflected noun, with its lemmatized adjective adjunct, and the contextual utterance that the adjective-noun combination appears in. (For an example of a JSON object, see Appendix D.)

2.2.2 R PROCESSING

The remaining data cleaning and analysis was conducted in R. There were several further manual corrections to the data at this stage including removal of words with unusual punctuation/bracketing and the removal of two incorrectly assigned adjective tags. Two nouns were caught that had not been added to the blacklist, but because of their infrequent use they were manually discarded from the main data frame. The two words in question were ‘pompier’ (firefighter) and ‘anime’ (cartoon). One adverb was also discovered. All instances of ‘bien’ (well) were excluded. Although, this word can be used adjectivally, the overwhelming use is adverbial, and the data set was too large to decipher each adjectival use. Some adjectives were tagged as attributive, when in fact they were predicative. This mistake most often occurred because of a lack of comma. The most common example of this type of mistake occurs in the following sentence: “il est bleu Mama” (it’s blue Mom). Clearly, the child is not referring to a blue mother but instead addressing his mother. Additionally, a simple R loop added a column marking adjective occurrences labeled as either pre- or post-nominal.

Child adjective use was restricted to data from speakers under 8;0, though as there was no data between 4;0 and 8;0, the scope was effectively limited to ages 4;0 and younger. As mentioned above, ages were decimalized. For example, a child born January 1st and recorded on September 1st of their second year would be reported as having an age of 1.75. Ages were then centered in preparation for subsequent linear regression models. This was accomplished by subtracting the lowest age from all other age data points. For example, if the youngest child was born on January 1st and sampled in their second year in September, and if the youngest child was 1.5 years old, the centered age for the first child would be 1.25. Because child language acquisition happens so rapidly, ages were multiplied by 12 to get more granular age data, such that ages were analyzed in months as opposed to entire years. Using the same child from before, the centered 1.25 age would be 1.25 * 12 = 15 months.

As the most interesting aspect of French adjectives is the ability for them to appear before or after the noun they modify, a subset of the data was created to include only adjective lemmas that alternated position in the corpus data (i.e. appeared at least once both prenominally and post-nominally). In the end, this resulted in 38 adjectives which appeared in both pre- and post-nominal positions. These adjectives are listed in Table 5 (see Section 3.4 and Appendix A).

SECTION 2.2.3 SUPPLEMENTAL TOOLS

Morphological complexity was considered, but ultimately set aside as a potential predictor on rate of acquisition. To prepare the data for the potential inclusion of morphological complexity as a factor in the analysis, a program called DériF (Namer 2013) was used to determine adjectival derivation status as a proxy for morphological complexity. DériF analyzes a lemma labeled with its part of speech tag out of context, recursively working in stages until reaching a root, which cannot be further decomposed. The program uses a pattern matching algorithm based on dictionary-like modules based upon the lemma's form (i.e., affixation, conversion, neoclassical compounding, etc.) to identify any processes of derivation. Ultimately, only one adjective, 'rose', was determined by this software to be unambiguously derived from another word (namely, the noun 'rose; in reference to the flower) and so derivational status was not considered in subsequent statistical analyses.

An online tool called Syllaber was used to automate syllable counting of each lemma (KALFA 2019). Syllaber uses a standard French syllable cutting algorithm and an additional algorithm to ensure phonotactic validity as inferred from standard French orthography. Importantly, this tool does not count word-final rhotic or liquid consonants as independent syllables. For example, 'quatre' (four) would be considered as one syllable; 'incroyable' (unbelievable) would be counted as three syllables[7].The output of Syllaber was aurally checked for

[7] As French syllabification, particularly in the case of word final segments, and even more so in the case of child acquisition, is somewhat debated, accuracy of output was the most important consideration in choosing this particular tool over other similar software which may perform the syllabification differently (Demuth & Kehoe 2006).

correctness using the accessibility tool called Voice Over, which is a native screen reader unique to Apple/MacOS. Adjective lemmas were listened to as read by the French-specific screen reader, and counts were taken from this audio to verify the output of Syllaber. As ‘petit’ accounts for over half of all observations of adjectives which vary (59%, N=1055), and because this particular adjective has a fixed syllable count, a separate syllable count value, *P,* was assigned to only the instances of ‘petit’ in order to better understand the effects of syllable count on the data more generally.

A separate subset of the data containing only color terms was identified for analysis (see also section 1.1). This was accomplished by finding an exhaustive list of the color adjectives used by the children in the corpus data through manual identification and extraction of the color adjectives from all adjective lemmas spoken by children. Then those same color terms were extracted from the adult control corpus to get raw counts for computation. Color terms were counted, and a percentage of prenominal occurrences was calculated n prenominal occurrences/n total occurrences of color adjectives for both adult and child datasets. The comparison between the two can be seen in Figure 7 (see Section 3.4).

Adult data from the three child-language corpora were initially extracted for comparison in order to examine some specific language input experienced by the children. However, the purpose of this thesis is not to compare child-directed speech with child speech production, and discussion of child-directed speech is not integral to this work, thus that data was not further considered. The goal of this work is to investigate the early years of adjective acquisition, to assess when, on the acquisition timeline, children begin to exhibit adult-like usage of adjectives. In the end, it was decided that an external source of data would provide a better adult language sample for the determination of what adult-like use of adjectives looks like. The oral section of Le Corpus d’Études du Français Contemporain (CEFC) was used as the source of adult comparison data (Benzitoun et al. 2016). The oral CEFC is a corpus of 4 million words that comprises14 source corpora containing the transcribed speech of over 2,500

adult speakers from all regions of France. This corpus was used as a control for comparison with children's adjectival behaviors.

3 RESULTS

In the end, 2,043 adjective tokens were found across the three child-language corpora and, within the tokens, 94 types were found. A total 334,022 words were uttered by children and 1,834,972 words uttered by adults. For the adults, 10,708/1,834,972 or 0.58% of the words used were adjectives. For the children 2,043/334,022 or 0.61% of the words used were adjectives. To give a better idea of the distribution of the child-language data, in Table 1 the data is also broken down into 6-month increments for each gender. Of the adjectives used, 1,604/2,043 or 78.51% were used prenominally and 39/2,043 or 0.02% were only used once by children. Of these adjectives that were used just once, 21/39 or 53.85% were used prenominally. There were 10,708 adjective tokens in the adult control group. When processing the adult control data, only adjectives that appeared in the child data were included in the control group (any adjectives that appear in the adult data but not in the child data were ignored). Of these, 8,691/10,708 or 81.16% of tokens appeared prenominally. If we restrict the child-language data set to adjectives with token counts of 6 and above, the total child prenominal usage is 80.37%. Matching these adjectives to the adult data, adults use these same adjectives 87.51% prenominally. The purpose of looking at token counts of 6 instances and above is in line with Fox (2014a). While hapax legomena and frequency counts of 5 and below can be revealing, adjectives with 6 tokens and higher provides a more sound statistical comparison. For all of the color terms found in the data, children used color terms at 174/2034 or 8.52% of the total tokens and adults used color terms at 413/10708 or 3.86% of the total tokens. I encourage the reader to look at Appendix A for a complete breakdown of all adjective types, tokens, percent prenominal use, and the same information for the adult control group.

TABLE 1. SUMMARY OF ADJECTIVE USE BY 6 MONTH INCREMENTS

Age Range	Male	Female	Total Adjectives	Total Words
19 to 25	15	57	73	29321
25 to 31	94	239	332	62522
31 to 37	197	429	627	101070
37 to 43	212	434	645	92256
43 to 48*	173	193	366	48853
Totals	*691*	*1352*	*2043*	*334022*

Table 1. A breakdown of adjective usage by gender and age given in 6 month increments with the total number of words uttered for each age group. The age ranges given include the lower limit and go up to but does not include the upper limit, except where indicated. The asterisk (*) marks that this age increment goes from 43 to 48 months and includes 48 months.

3.1 LOGISTIC MODEL 1 (FULL DATA SET)

A model was developed to extend the predicted placement of any adjectives that alternates between prenominal and post-nominal position out to 98 months or 8;2. All the adjectives that appeared at least once in each position in the child-language data were included in this model. There were 38 types in total which met these criteria, from the total child production data set. Sex was chosen as a fixed effect to see if there was a difference in acquisition rate between males and females. The modified noun was included as a fixed effect to see if lexical preferences of adjective placement was dependent on the head noun. Adjective lemma was chosen as a fixed effect, given each adjective's preference for one position over another. Syllable count was added as a fixed effect to see if longer words were acquired later or if the position of longer words was acquired later. A random effect was included for each speaker to account for any variability between speakers. A random effect was included to determine if the corpus from which the data came had any surprising effects. Finally, a random slope of (1+Age)/Speaker was included to trace development of adjective placement over time by speaker.

A generalized logistic mixed effects model (estimated using NL and nloptwrap optimizer **(**Non-Linear Optimizer Wrapper), calculation simplifies the

access to the optimizer, thus, simplifying the formula on the back end of R to allow the model to converge given the relatively small data set for the number of effects) was fit to predict adjective position with speaker age (in months), sex, and syllable count. (Formula: adjective position ~ speaker age + speaker sex + syllable count). This model was run on all observations of adjectives which varied in their syntactic positions in the data (N=38 lemmas). The model included random intercepts for noun lemma, adjective lemma, and corpus source, as well as a random slope for speaker age (in months) and speaker ID. (Formula: list (~1 | sex, ~1 | noun, ~1 | adjective, ~1 | syllable, ~1 + speaker age (in months) | speaker ID, ~1 | corpus)).

The model's intercept, corresponding to speaker age (in months) = 0, speaker sex = female, and syllable count = 1, is at -0.43 (95% CI [-2.07, 1.20], p = 0.604).[8] Within this model, the effect of speaker age (in months) is positive but is not statistically significant at the $p < 0.1$ level ($p = 0.110$). As compared to the reference levels of each predictor, no other fixed effects proved to be statistically significant predictors of adjective placement (sex (male) p=0.3); syllable count (3) p=0.61), though syllable count (P) (p=0.12) and syllable count (2) (p=0.16) is not significant at the $p < 0.1$ level, similarly to the effect of age. The standards used are the default standards for nloptwrap optimizer. 95% Confidence Intervals (Cis) and p-values were computed using the Wald approximation. The results of the first model are illustrated in Table 1.

[8] An age of 0 here represents an age of 1;7 after the application of the subtraction of the lowest age from all ages as described in Methods above.

TABLE 2. SUMMARY OF RESULTS FROM MODEL 1 (FULL DATA SET)

	Adjective position		
Predictors	*Odds Ratios*	*CI*	*p*
(intercept)	0.65	0.13 – 3.33	0.604
Age	1.05	0.99 – 1.11	0.110
Sex [male]	0.75	0.39 – 1.45	0.398
Syllable count [P]	48.11	0.35 – 6615.28	0.123
Syllable count [three]	2.27	0.10 – 52.71	0.611
Syllable count [two]	4.25	0.55 – 32.91	0.166
Random Effects			
σ^2	3.29		
$\tau_{00\ noun}$	6.07		
$\tau_{00\ data.speaker.name}$	1.01		
$\tau_{00\ adjective}$	5.86		
$\tau_{00\ corpus}$	0.05		
$\tau_{11\ data.speaker.name.age.month}$	0.00		
$\varrho_{01\ data.speaker.name}$	-1.00		
N_{noun}	353		
$N_{adjective}$	40		
$N_{data.speaker.name}$	145		
N_{corpus}	3		
Observations	1787		
Marginal R^2 / Conditional R^2	0.512 / NA		

FIGURE 4. SHOWS ADJECTIVE POSITION AS PREDICTED BY MODEL 1.

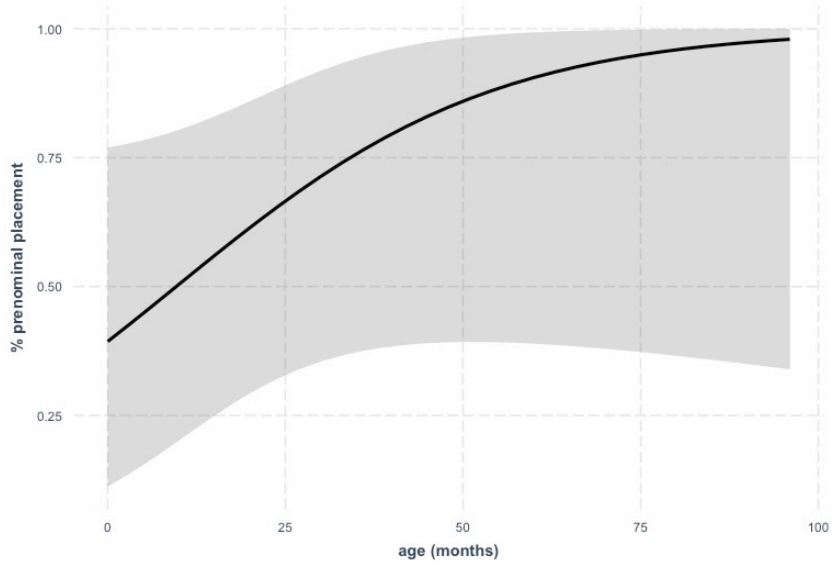


Figure 4. Generalized logistic mixed-effects model predicted % prenominal adjective placement for age. Note that 0 here corresponds to 1;7, or 19 months (the lowest age observed in the data).

As discussed in Chapters 1 and 2, ‘petit’ is the earliest adjective learned and serves many different functions, particularly in child-centered speech. ‘Petit’ alone accounts for 59% of all adjective tokens. To see if ‘petit’ posed issues for the predictive power of the original model, I ran two new models. The first model was run on just the behavior of ‘petit’ over time, and the second model was run on all other alternating adjectives (N = 37) over time.

3.2 LOGISTIC MODEL 2 (‘PETIT’ ONLY)

A model was developed to extend the predicted placement of any adjectives that alternates out to 98 months or 8; 2. Because ‘petit’ accounts for almost 60% of the total data, a subset of data was taken of just occurrences of ‘petit’ from the total child production data set. The total number of child-language tokens for ‘petit’ is 1,144. Sex was chosen as a fixed effect to see if there was a

difference in acquisition rate between males and females. The modified noun was included as a fixed effect to see if lexical preferences of adjective placement was dependent on the head noun. Adjective lemma was not included, as it was fixed at ‘petite’. Syllable count was not included as it was static at two. A random effect was included for each speaker to account for any variability between speakers. A random effect was included to determine if the corpus from which the data came had any surprising effects. Finally, a random slope of (1+Age)/Speaker was included to trace development of adjective placement over time by speaker. I fit a logistic mixed effects model (estimated using NL and nloptwrap optimizer) to predict adjective position with speaker age (in months) and speaker sex as fixed effects (formula: adjective position ~ speaker age + speaker sex).

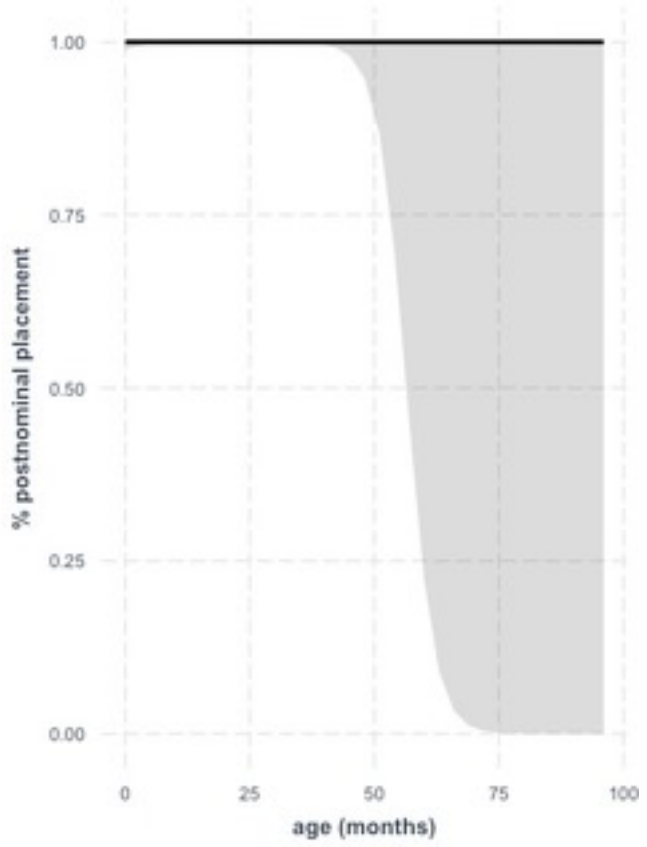
The model included random intercepts for noun, and corpus source, as well as a random slope for speaker age (in months) and speaker ID as random effects (formula: list (~1 | sex, ~1 | noun, ~1 + speaker age (in months) | speaker ID, ~1 | corpus))[9]. The model’s intercept, corresponding to speaker age (in months) = 0 and speaker sex = female, is at 13.42 (95% CI [4.48, 22.36], p = 0.003). Within this model, neither fixed effect was a significant predictor of the position of ‘petit’. The effect of speaker age is statistically non-significant and negative (p = 0.847). The effect of speaker sex [male] is statistically non-significant and positive (p = 0.447). The results of this second model are given in Table 2.

[9] The random effect’s structure here is simpler than the other models reported as there is only one adjective lemma and only one syllable count for this data given that ‘petit’ is the only adjective in this model’s input.

TABLE 3. SUMMARY OF RESULTS FROM MODEL 2 ('PETIT' ONLY)

	Petit position		
Predictors	*Odds Ratios*	*CI*	*p*
(intercept)	671284.84	87.94 – 5124055173.52	**0.003**
Age	0.97	0.69 – 1.35	0.847
Sex [male]	4.00	0.11 – 143.16	0.447
Random Effects			
σ^2	3.29		
$\tau_{00\ noun}$	378.07		
$\tau_{00\ data.speaker.name}$	184.07		
$\tau_{00\ corpus}$	0.00		
$\tau_{11\ data.speaker.name.age.month}$	0.34		
$\varrho_{01\ data.speaker.name}$	-1.00		
N_{noun}	201		
$N_{data.speaker.name}$	127		
N_{corpus}	3		
Observations	1055		
Marginal R^2 / Conditional R^2	0.110 / NA		

FIGURE 5. GENERALIZED LINEAR MIXED EFFECT MODEL FOR ‘PETIT’



3.3 LOGISTIC MODEL 3 (SANS ‘PETIT’)

A model was developed to extend out to 98 months or 8;2 the predicted placement of any adjectives that alternates between prenominal and post-nominal position. All the adjectives that appeared at least once in each position in the child-language data were included in this model. There were 37 types in total which met these criteria from the total child production data set. The total number of tokens for these adjectives is 899. Sex was chosen as a fixed effect to see if there was a difference in acquisition rates between males and females. The modified noun was included as a fixed effect to see if lexical preferences of adjective placement was dependent on the head noun. Adjective lemma was chosen as a fixed effect, given each adjective’s preference for one position over another. Syllable count was added as a fixed effect to see if longer words were

acquired later or if the position of longer words was acquired later. A random effect was included for each speaker, to account for any variability between speakers. A random effect was included to determine if the corpus from which the data came had any surprising effects. Finally, a random slope of (1+Age)/Speaker was included to trace development of adjective placement over time by speaker.

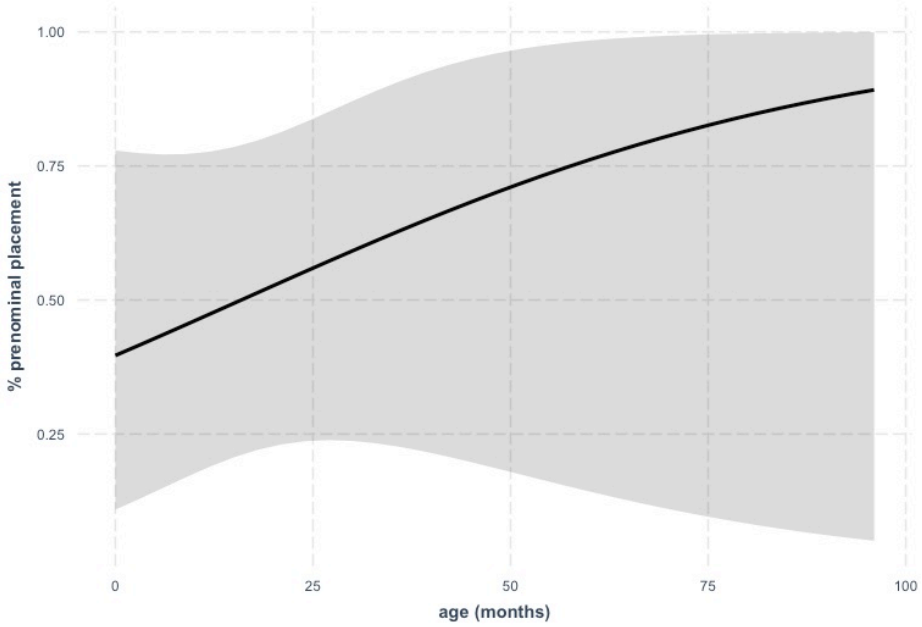
The final logistic mixed effects model (estimated using NL and nloptwrap optimizer) excluded observations of all variable-placement adjectives, except ‘petit’, and was fit to predict adjective position with speaker age (in months), speaker sex, and syllable count (formula: adjective position ~ speaker age + speaker sex + syllable count). The model included random intercepts for noun, adjective, and corpus source and a random slope for speaker age (in months) and speaker ID as random effects (formula: list (~1 | sex, ~1 | noun, ~1 | adjective, ~1 | syllable, ~1 + speaker age (in months) | speaker ID, ~1 | corpus)).

The model’s intercept, corresponding to speaker age (in months) = 0, speaker sex = female and syllable count = 1, is at -0.42 (95% CI [-2.10, 1.26], p = 0.623). Within this model, the effect of speaker age is statistically non-significant and positive (beta = 0.03, 95% CI [-0.04, 0.09], p = 0.400; Std. beta = 0.18, 95% CI [-0.23, 0.59]). Within the model, the effect of speaker sex [male] is statistically non-significant (p = 0.419); the effect of syllable count [3] is statistically non-significant (p = 0.833); and the effect of syllable count [2] is not significant at (p = 0.114). The results of this third model are given in Table 4.

TABLE 4. SUMMARY OF RESULTS FROM MODEL 3 (SANS ‘PETIT’).

	Adjective position		
Predictors	*Odds Ratios*	*CI*	*p*
(intercept)	0.66	0.12 – 3.51	0.623
Age	1.03	0.97 – 1.09	0.400
Sex [male]	0.76	0.39 – 1.49	0.419
Syllable count [three]	0.74	0.04 – 12.79	0.833
Syllable count [two]	4.37	0.70 – 27.21	0.114
Random Effects			
σ^2	3.29		
$\tau_{00\ noun}$	3.73		
$\tau_{00\ data.speaker.name}$	0.00		
$\tau_{00\ adjective}$	4.94		
$\tau_{00\ corpus}$	0.43		
$\tau_{11\ data.speaker.name.age.month}$	0.00		
$\varrho_{01\ data.speaker.name}$	-0.99		
ICC	0.73		
N_{noun}	233		
$N_{adjective}$	39		
$N_{data.speaker.name}$	114		
N_{corpus}	3		
Observations	732		
Marginal R^2 / Conditional R^2	0.026 / 0.741		

FIGURE 6. SHOWS ADJECTIVE POSITION AS PREDICTED BY MODEL 3.



3.4 COLOR TERMS

Most color terms from the datasets were used at least once prenominally by children. A graph of the comparison of color terms for children and adults is shown below in Figure 6. The more frequent color terms, rouge (‘red’) (N = 57); vert (‘green’) (N = 41); rose (‘pink’) (N = 16) appear to adapt to an adult-like grammar more quickly in children’s development. Bleu (‘blue’) (N = 30), as shown below, is an unusual case in that it shows a large disparity between child prenominal use and adult prenominal use, despite being used frequently by children. In general, more common color terms seem to mirror adults’ speech more quickly and less frequent color terms seem to appear in the pre-position more often than in adult speech.

FIGURE 7. COLOR TERMS FOR CHILDREN AND ADULTS

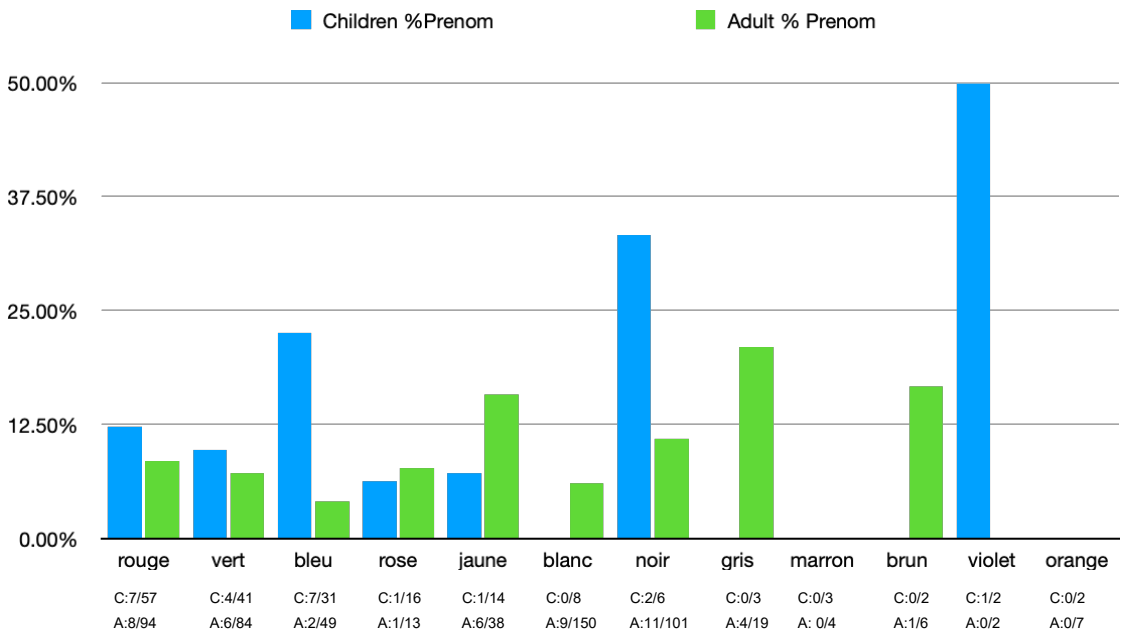


Figure 7. Percent prenominal use is displayed on the y-axis. The x-axis shows every color term which appeared at least once in children's speech. Adult comparisons are shown in green bars on the left of the blue bars showing children's percentages. Underneath each adjective is listed the prenominal count over the total count for both child and adult, abbreviated C and A respectively. Note that 0% here indicates exclusive post-position of the adjective instead of zero instances of that color term. Colors are listed from left to right in terms of frequency of production by children.

In Table 5 below of the most frequent adjectives in the child corpus data, observe that the most frequent adjectives appear to merge with an adult-like preference in use early, but the farther down the list, the stronger the preference for prenominal placement as compared with the adult data. Table 5 shows the top 15 adjectives that appear at least once in both positions. It is striking that a great number of the most common alternating adjectives also appear in the top 20 most common adjectives overall. Figures 7 and 8 show the progression over time of adjective placement of a subset of these most frequent adjectives (note that these graphs show no data when, in a particular month of development, no children produced the adjective. Only a few of these adjectives have a more

complete set of observations across the full range of ages). Ages were put into bins in 10 month intervals.

TABLE 5. TOP 20 ADJECTIVES BY FREQUENCY OF CHILD USE

Adjective	Child Prenominal	Child Total	Child % Prenominal	Adult Prenominal	Adult Total	Adult % Prenominal
petit	1054	1144	92.13%	2484	2574	96.50%
grand	203	209	97.13%	988	1060	93.21%
beau	71	73	97.26%	331	386	85.75%
rouge	7	57	12.28%	8	94	8.51%
gros	39	42	92.86%	396	427	92.74%
vert	4	41	9.76%	6	84	7.14%
bleu	7	31	22.58%	2	49	4.08%
neuf	10	28	35.71%	2	13	15.38%
bon	26	27	96.30%	941	961	97.92%
doux	0	26	0.00%	3	16	18.75%
parti	20	25	80.00%	0	0	0.00%
méchant	23	24	95.83%	2	4	50.00%
fini	19	20	95.00%	2	9	22.22%
rose	1	16	6.25%	1	13	7.69%
fermé	4	14	28.57%	0	14	0.00%
fort	5	14	35.71%	30	75	40.00%
jaune	1	14	7.14%	6	38	15.79%
même	13	13	100.00%	1035	1048	98.76%
sale	3	12	25.00%	18	24	75.00%
seul	4	12	33.33%	188	220	85.45%
rangé	1	11	9.09%	0	0	0.00%

Table 5. Top 20 adjectives by child frequency, irrespective of alternation. Raw counts are included for prenominal, and total, as well as percentage prenominal position. See Appendix A for complete adjective list.

TABLE 6. TOP 15 ALTERNATING ADJECTIVES

Adjective	Child Prenominal	Child Total	Child % Prenominal	Adult Prenominal	Adult Total	Adult % Prenominal
petit	1054	1144	92.13%	2484	2574	96.50%
grand	203	209	97.13%	988	1060	93.21%
beau	71	73	97.26%	331	386	85.75%
rouge	7	57	12.28%	8	94	8.51%
gros	39	42	92.86%	396	427	92.74%
vert	4	41	9.76%	6	84	7.14%
bleu	7	31	22.58%	2	49	4.08%
neuf	10	28	35.71%	2	13	15.38%
bon	26	27	96.30%	941	961	97.92%
parti	20	25	80.00%	0	0	0.00%
méchant	23	24	95.83%	2	4	50.00%
fini	19	20	95.00%	2	9	22.22%
rose	1	16	6.25%	1	13	7.69%
fermé	4	14	28.57%	0	14	0.00%
fort	5	14	35.71%	30	75	40.00%

Table 6. Top 15 Alternating adjectives in order of most frequent child production. Raw counts are included for prenominal, and total, as well as percentage prenominal position. Note that 'parti' did not occur in the adult corpus at time of sampling. Note, too, that every alternating adjective occurs in the top 20 adjectives by frequency.

FIGURE 8. A SELECTION OF 9 ALTERNATING ADJECTIVES OVER TIME

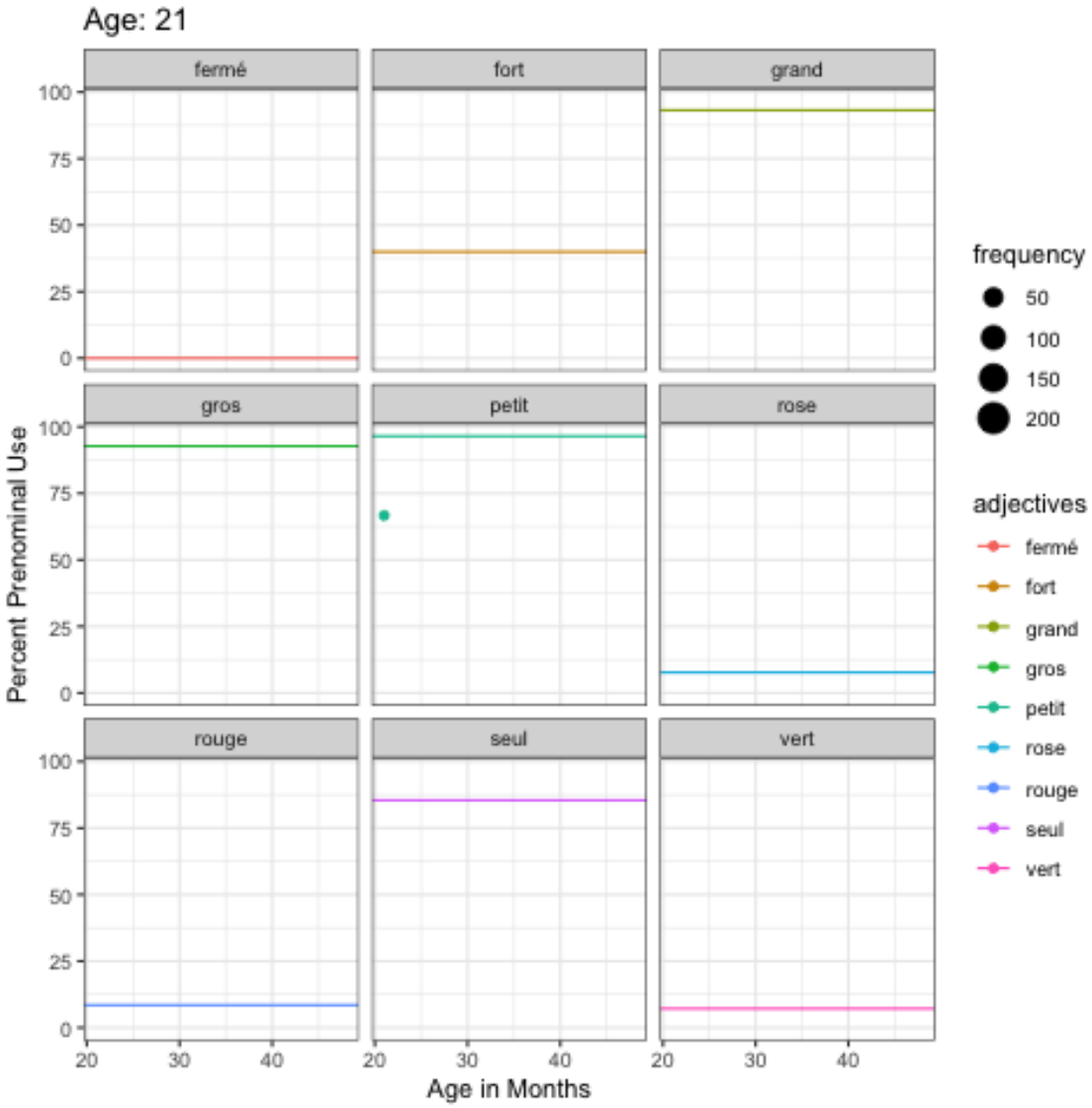


Figure 8. The bubbles themselves represent aggregate child adjective use by adjective lemma. Gaps in the graph indicate a lack of data at a given age. The horizontal lines in each facet show a benchmark of a presumed steady-state prenominal use by adult speakers. The x-axis shows the children's age in months. The y-axis represents the percent prenominal use. Each bubble represents the total frequency of each adjective. Thus, smaller bubbles indicate less statistically powerful measurements. Only adjectives with ten or more occurrences are included. Readers note: depending on program used for viewing, the reader may have to click play to see the animation.

FIGURE 9. A SELECTION OF 9 ALTERNATING ADJECTIVES OVER TIME

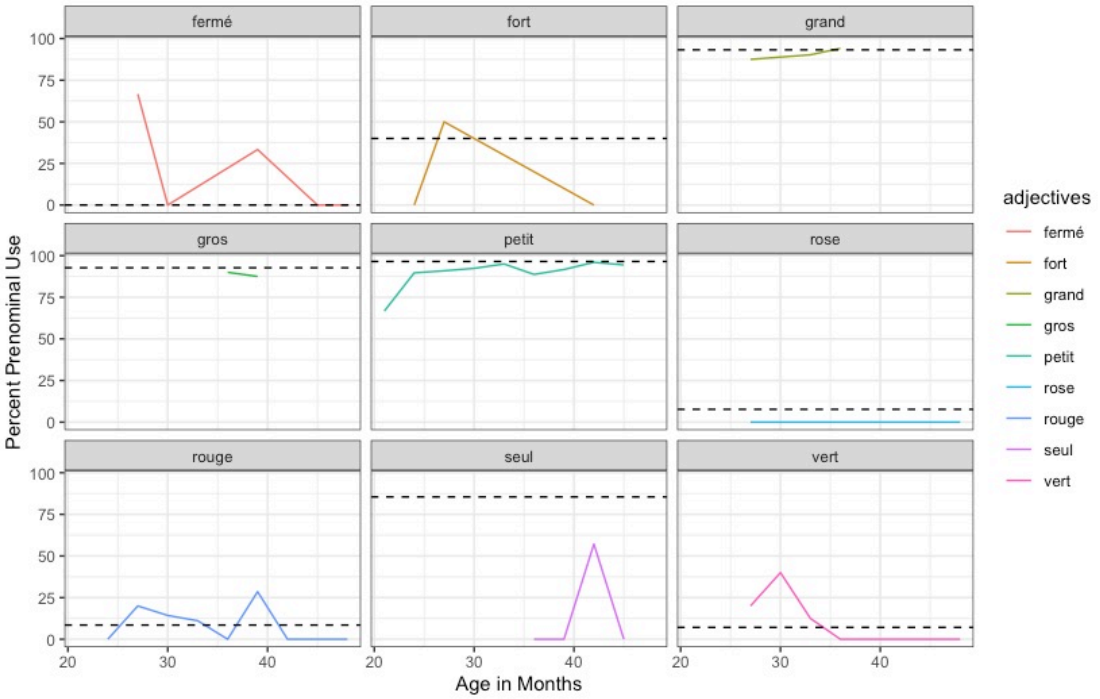


Figure 9. Each facet shows a line indicating the change in adjective usage by children over time for each adjective lemma. Gaps in the graph indicate a lack of data at a given age. The dotted horizontal lines in each facet show a benchmark of a presumed steady-state prenominal use by adult speakers. The x-axis shows the children's age in months. The y-axis represents the percent prenominal use. Only adjectives with ten or more occurrences are included.

FIGURES 10.1 – 10.38 ALTERNATING ADJECTIVES OVER TIME

Note that the area of the plotted circle for each point is proportional to the number of times that adjective was included in the dataset for the 5-month age interval. The following are graphs over time for each adjective per month rounded to the next nearest month. Also note that age beginning at 0 corresponds to the youngest child sampled, for these data 19 months or 1;7. Because of the overwhelming power of ‘petit’ and ‘grand’ the ratios had to be scaled down to fit in the graph, ‘petit’ and ‘grand’ can be directly compared, as can be every graph that is not ‘petit’ and ‘grand’. The graphs ‘petit’ and ‘grand’ cannot be directly compared with the other graphs. Finally, the y-axis is expressed in terms of a ratio between 0 and 1, with 1 indicating exclusive prenominal use and 0 expressing exclusive post-nominal use.

Figure 10.1 Longitudinal Graph of ‘Petit’

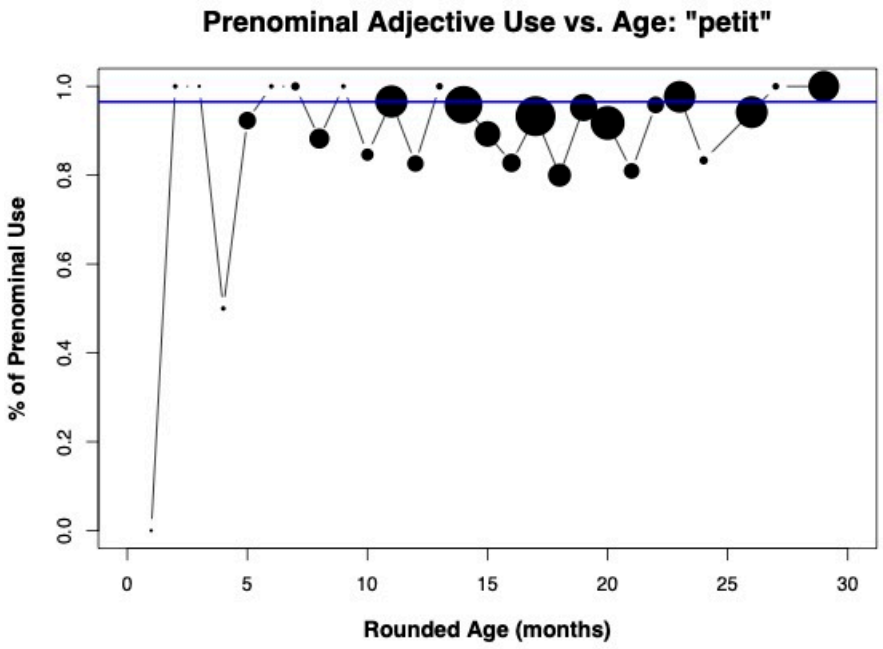


Figure 10.2 Longitudinal Graph of ‘Grand’

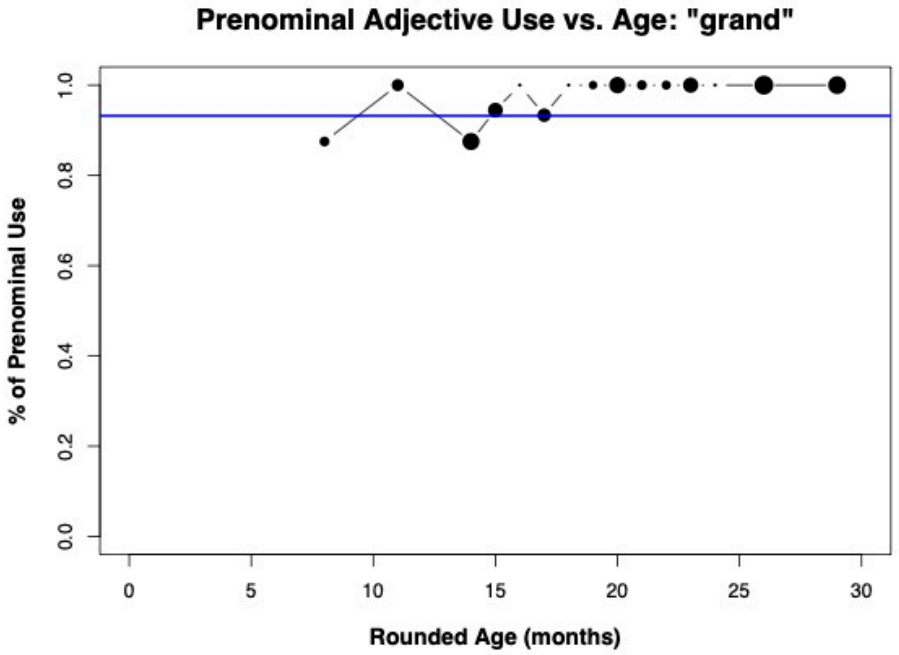


Figure 10.3 Longitudinal Graph of ‘Beau’

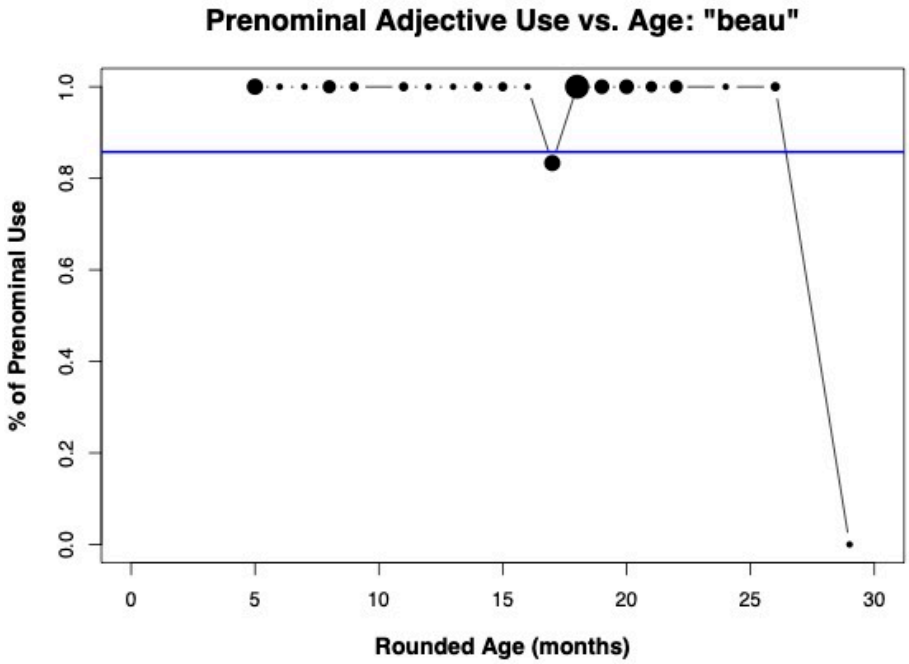


Figure 10.4 Longitudinal Graph of ‘Rouge’

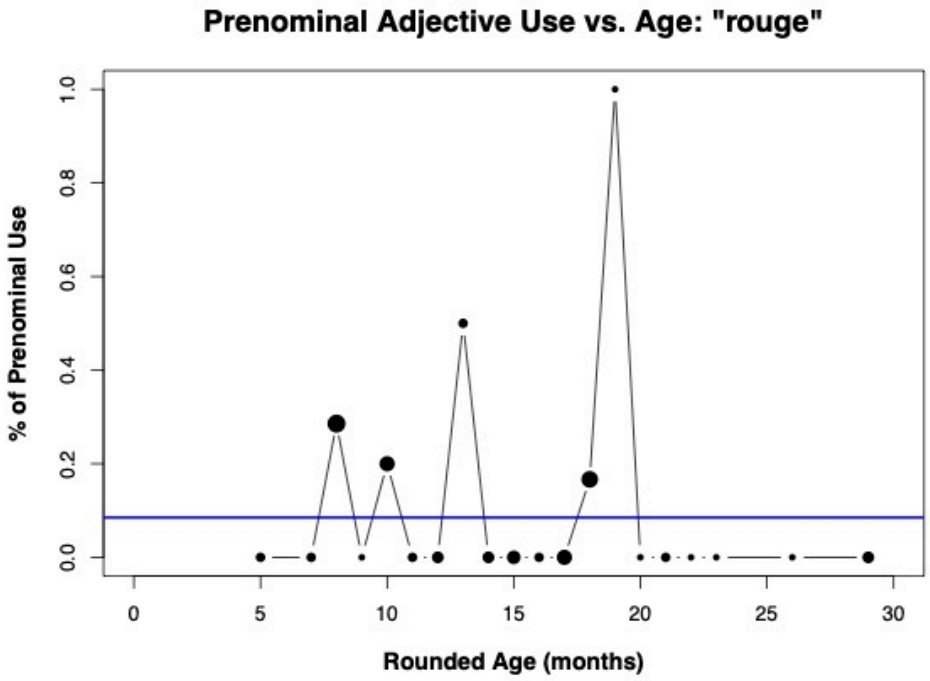


Figure 10.5 Longitudinal Graph of ‘Gros’

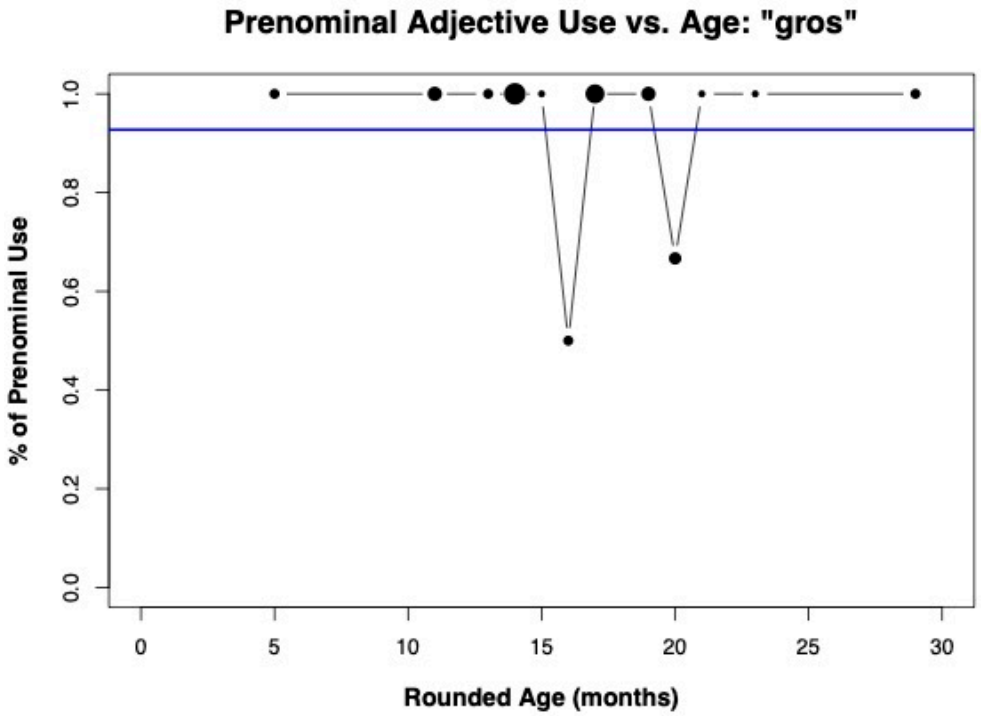


Figure 10.6 Longitudinal Graph of ‘Vert’

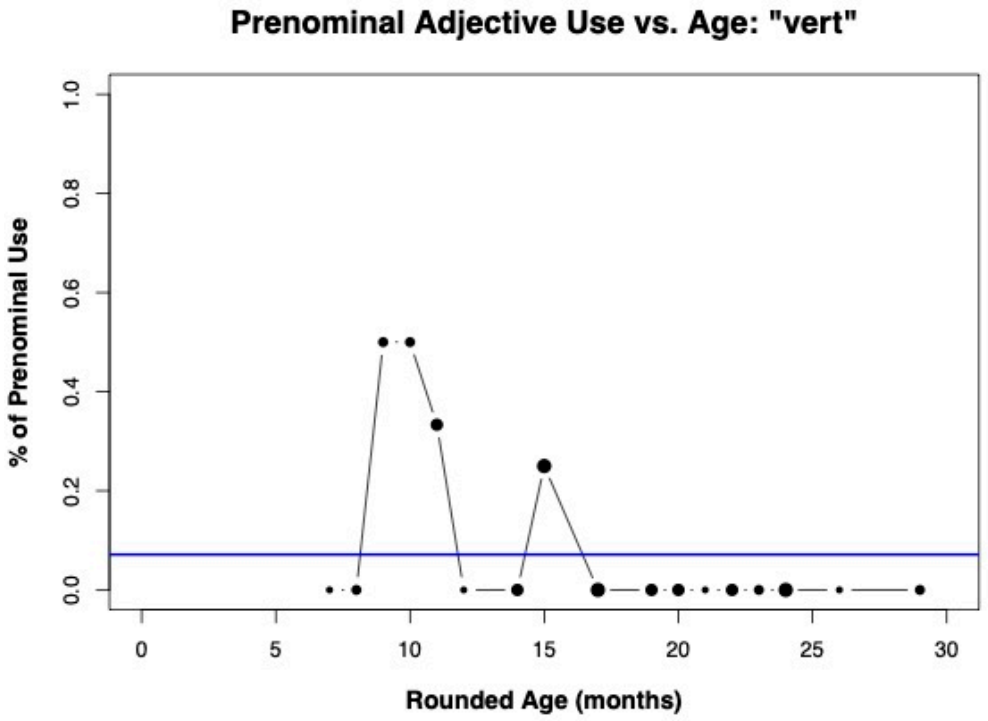


Figure 10.7 Longitudinal Graph of ‘Bleu’

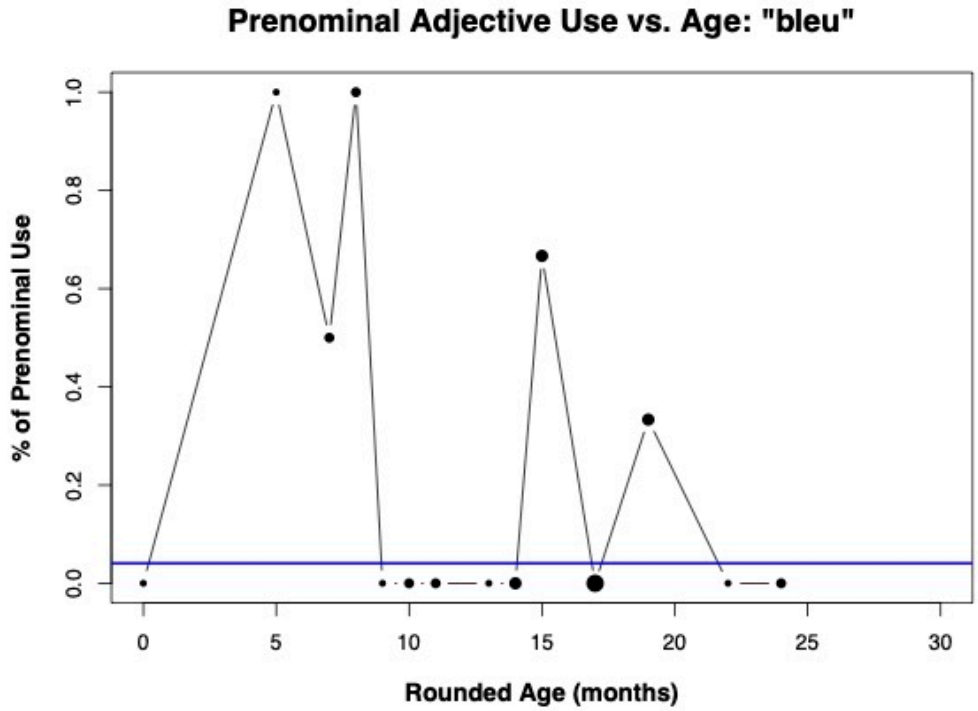


Figure 10.8 Longitudinal Graph of ‘Neuf’

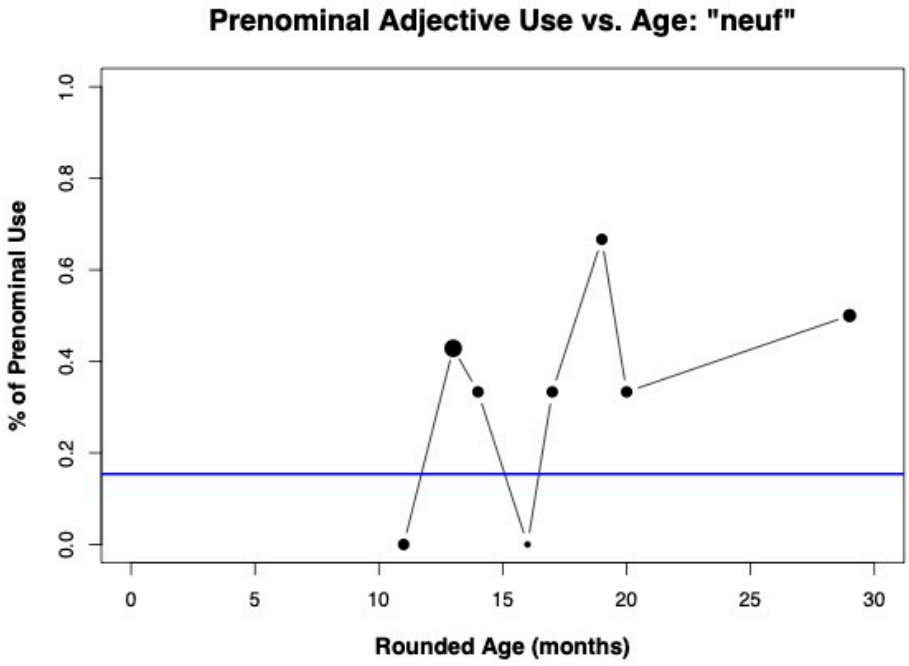
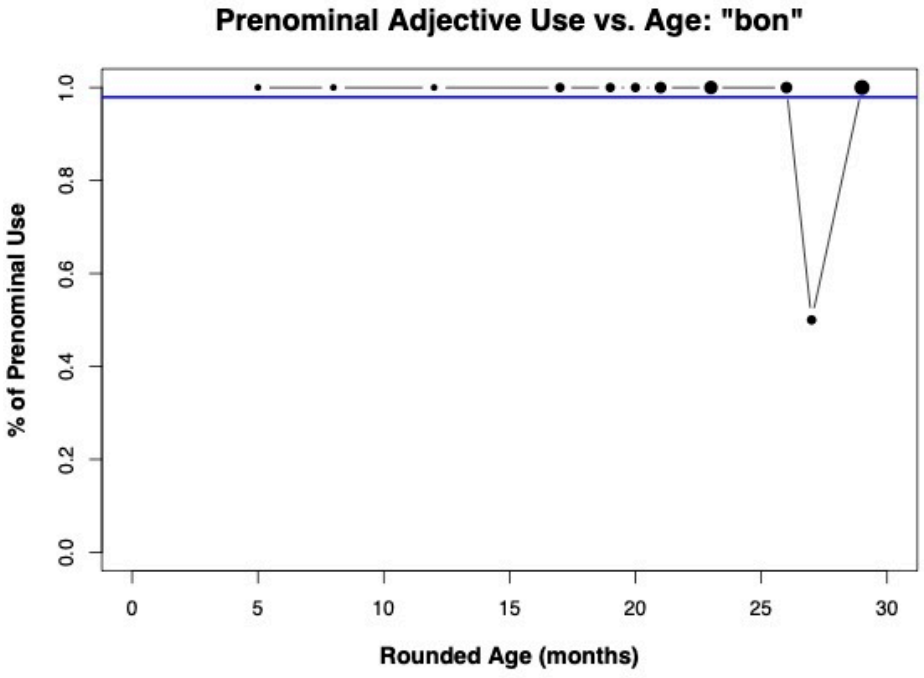


Figure 10.9 Longitudinal Graph of ‘Bon’



* D

Figure 10.10 Longitudinal Graph of ‘Parti’

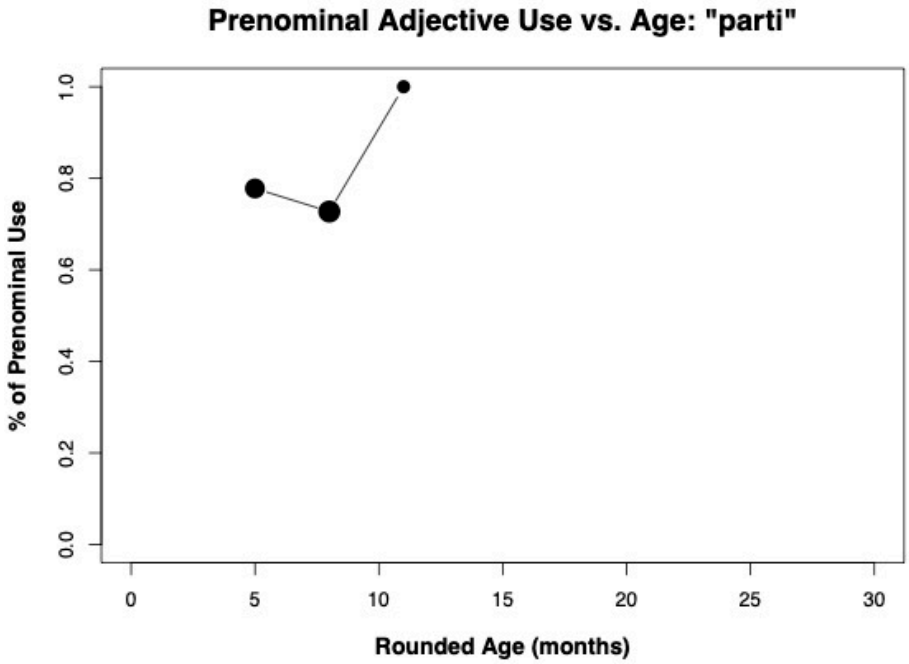


Figure 10.11 Longitudinal Graph of ‘Méchant’

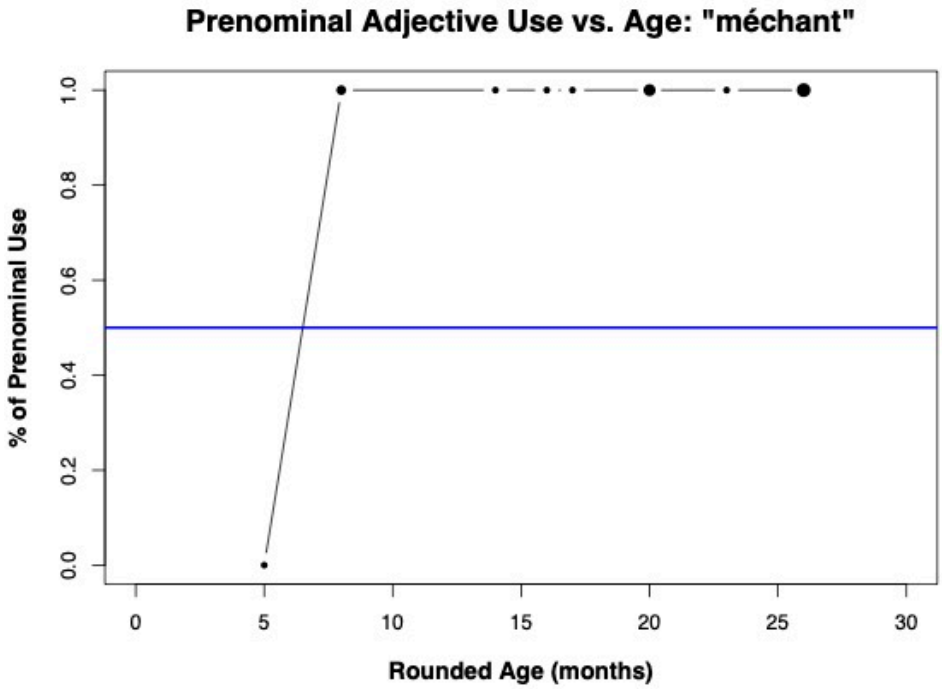


Figure 10.12 Longitudinal Graph of ‘Fini’

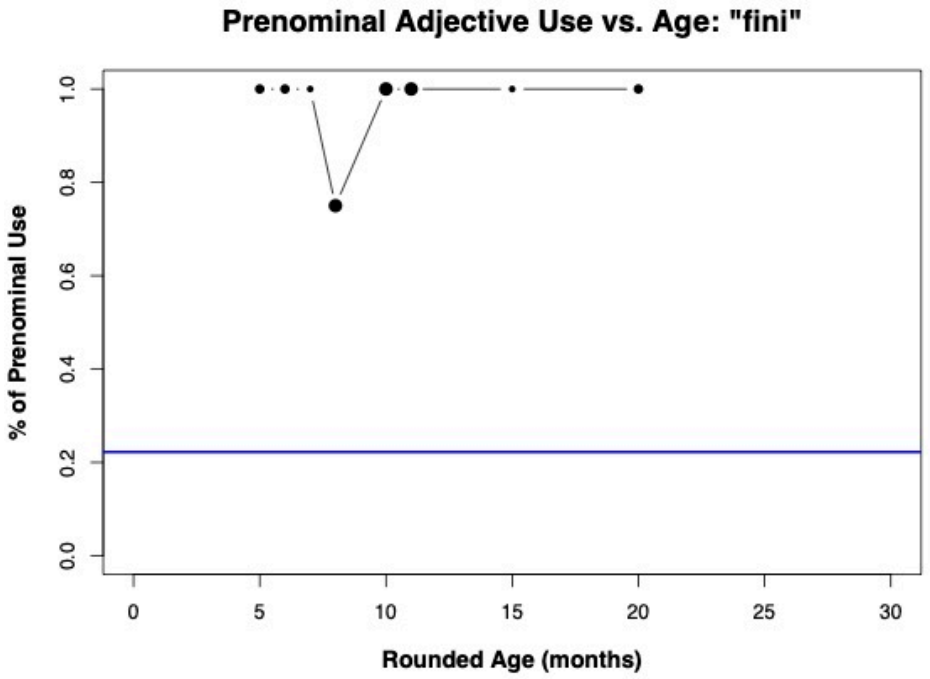


Figure 10.13 Longitudinal Graph of ‘Rose’

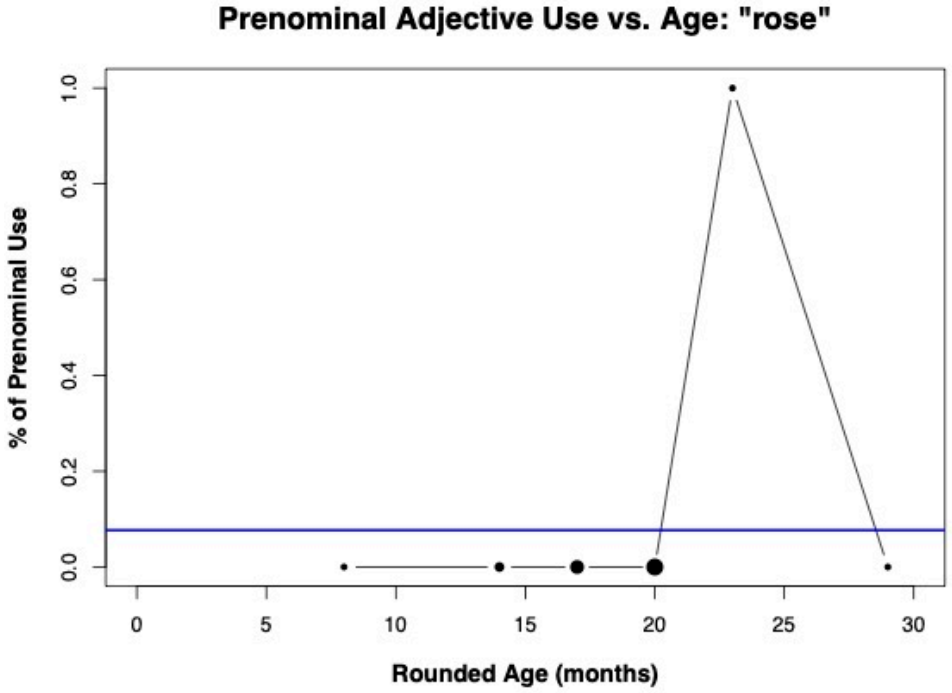


Figure 10.14 Longitudinal Graph of ‘Fermé’

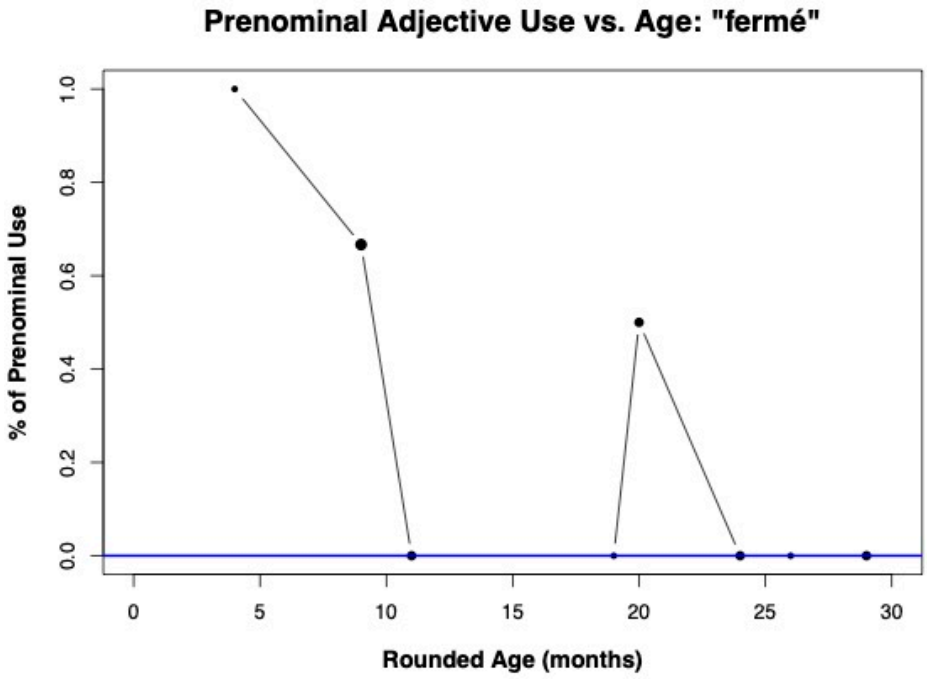


Figure 10.15 Longitudinal Graph of ‘Fort’

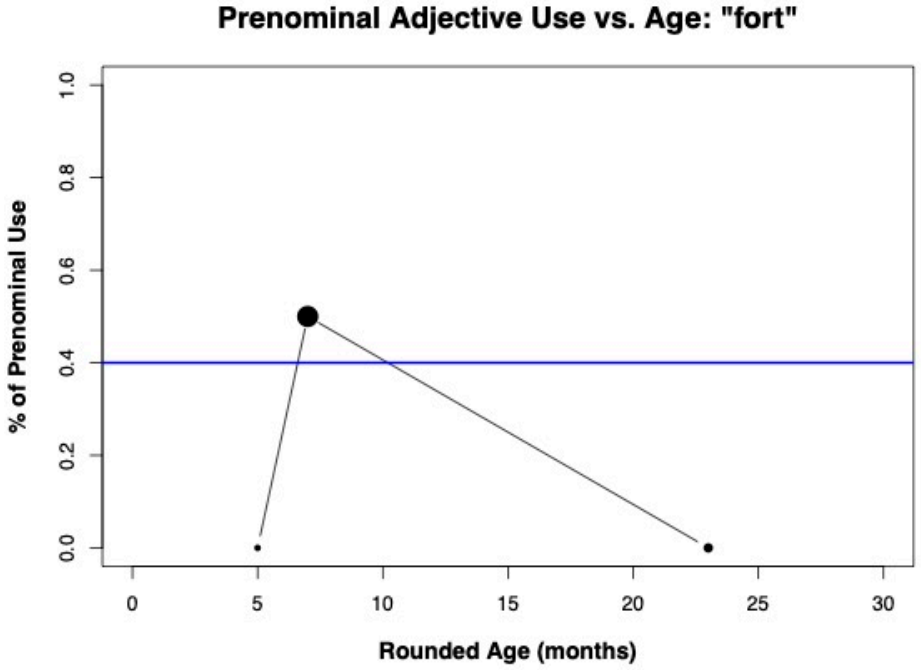


Figure 10.16 Longitudinal Graph of ‘Jaune’

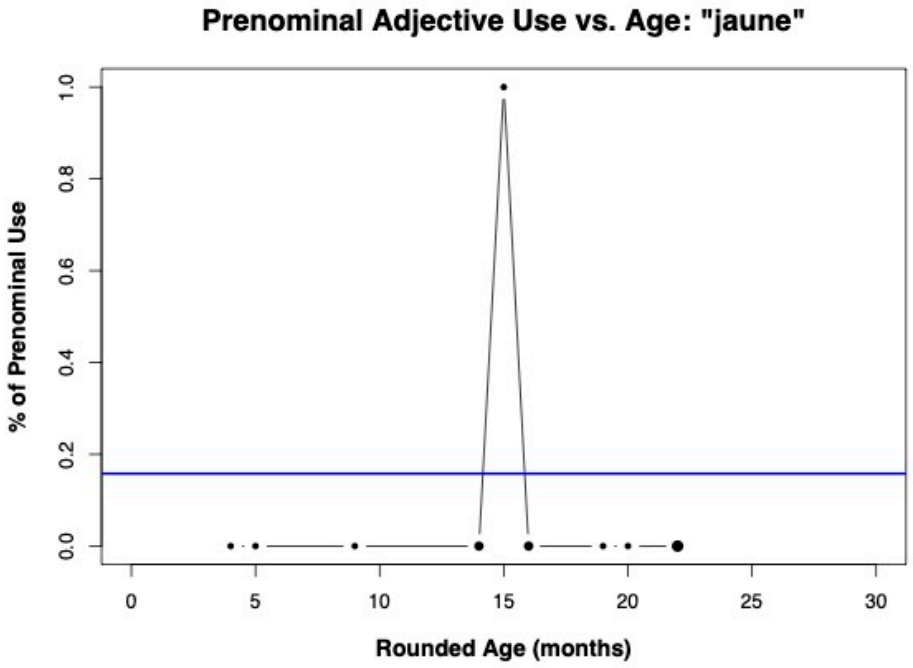


Figure 10.17 Longitudinal Graph of ‘Sale’

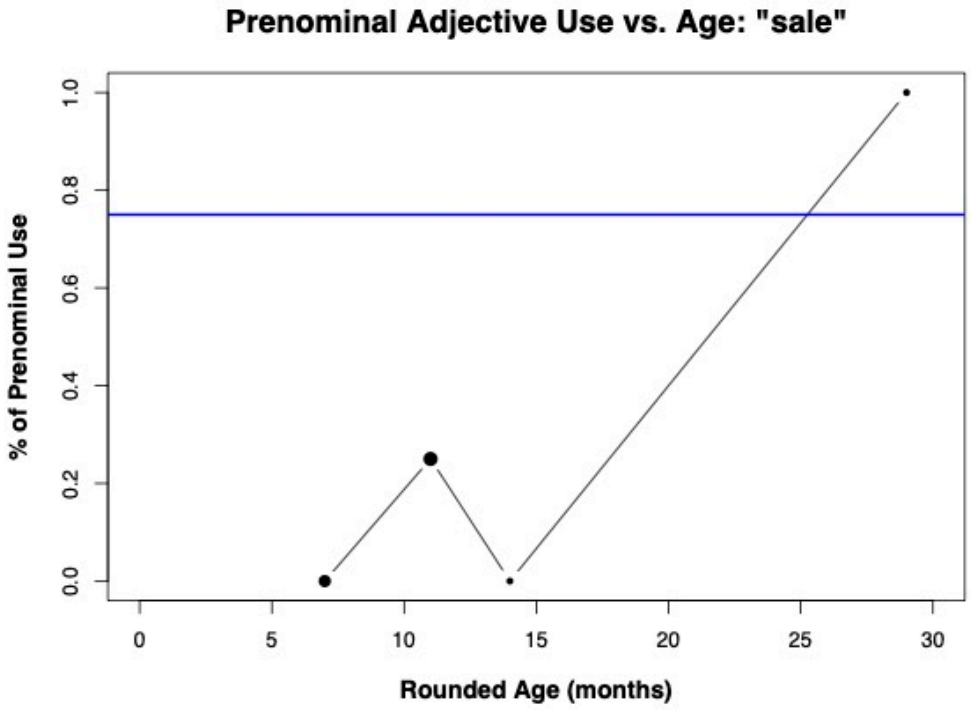


Figure 10.18 Longitudinal Graph of ‘Enlevé’

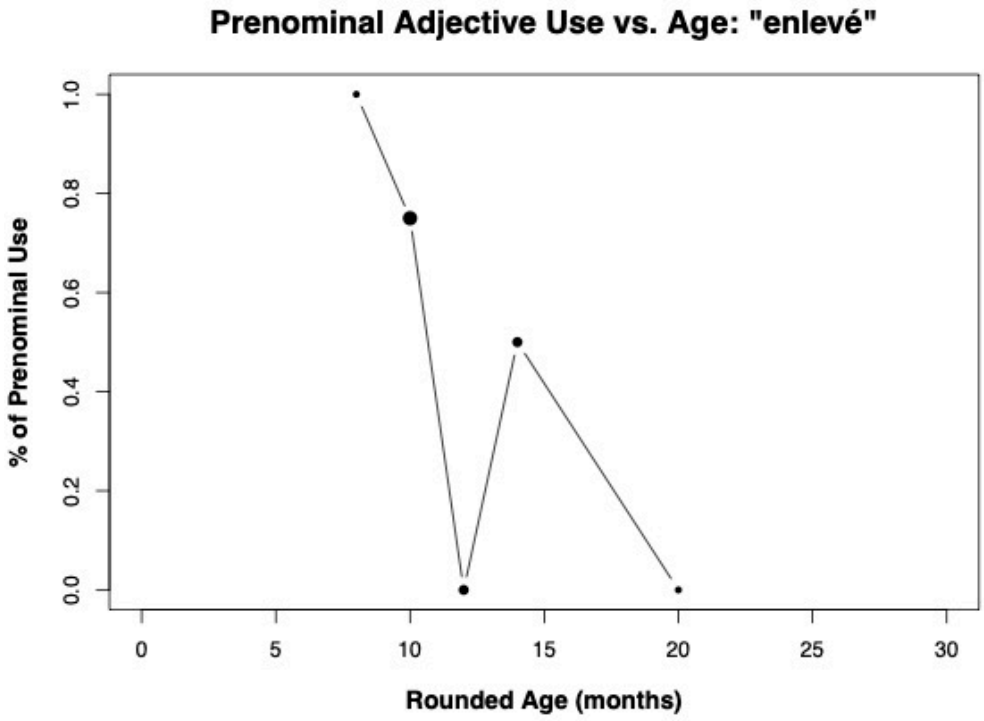


Figure 10.19 Longitudinal Graph of ‘Seul’

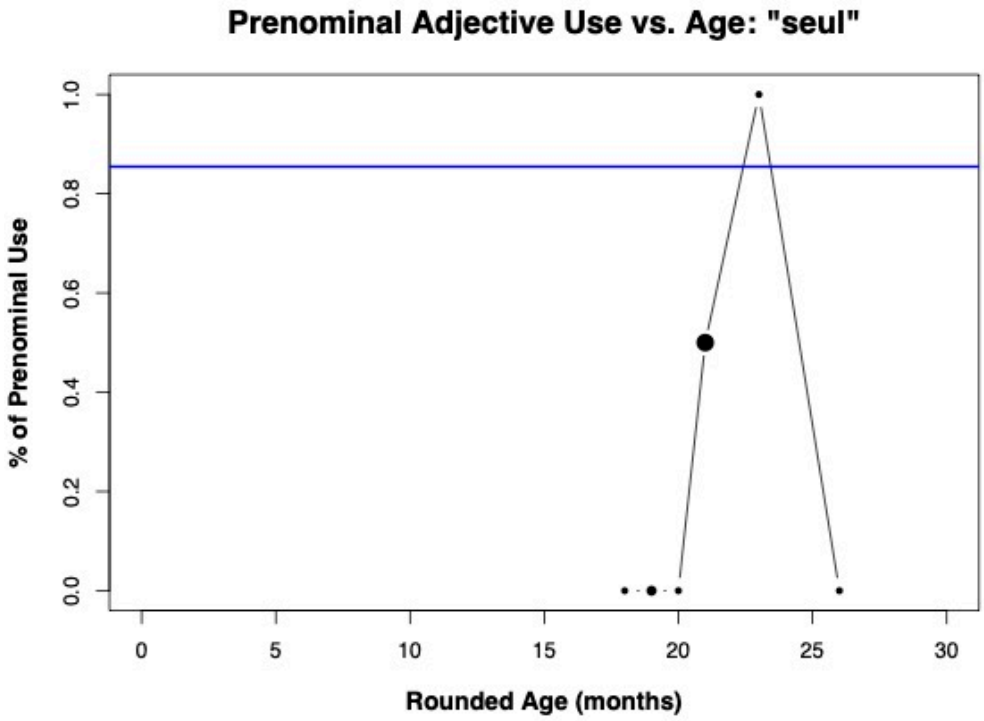


Figure 10.20 Longitudinal Graph of ‘Rangé’

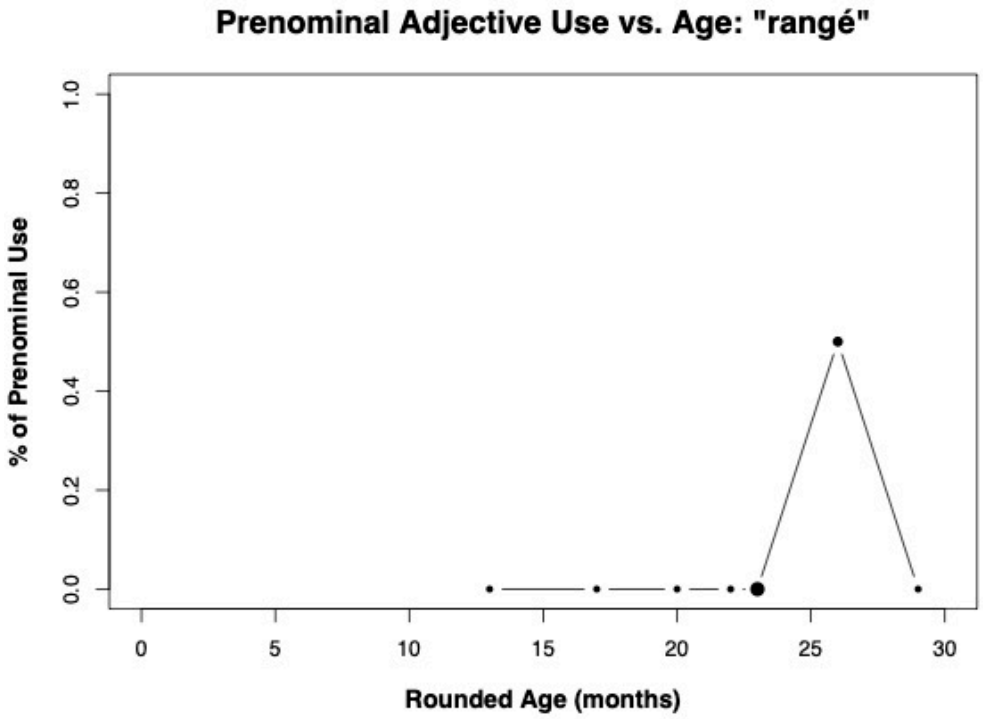


Figure 10.21 Longitudinal Graph of ‘Joli’

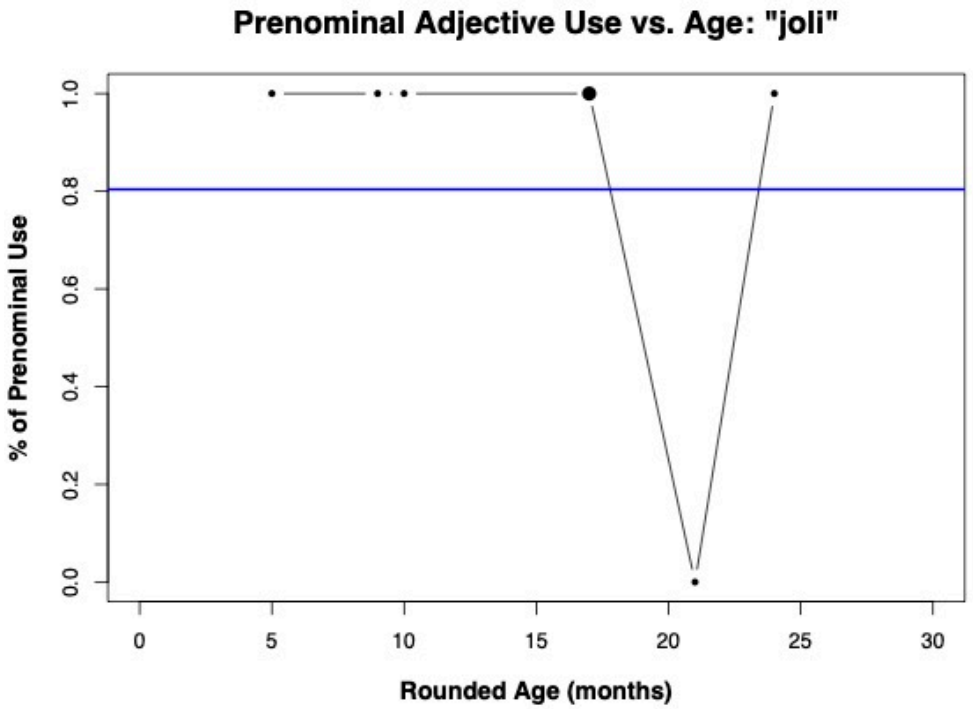


Figure 10.22 Longitudinal Graph of ‘Gentil’

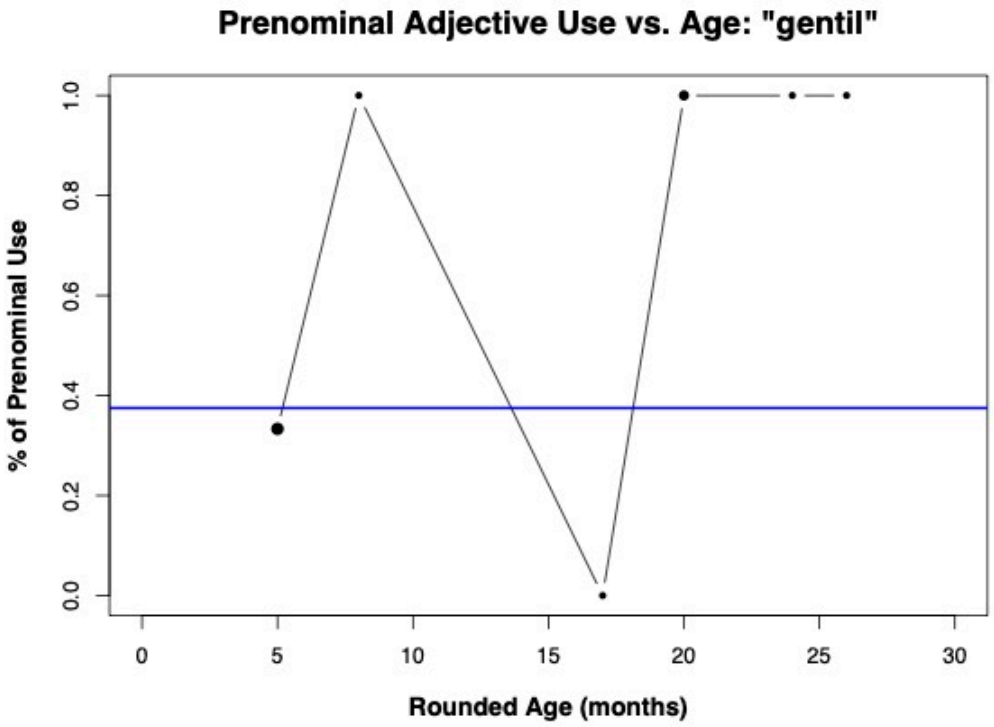


Figure 10.23 Longitudinal Graph of ‘Mettre’

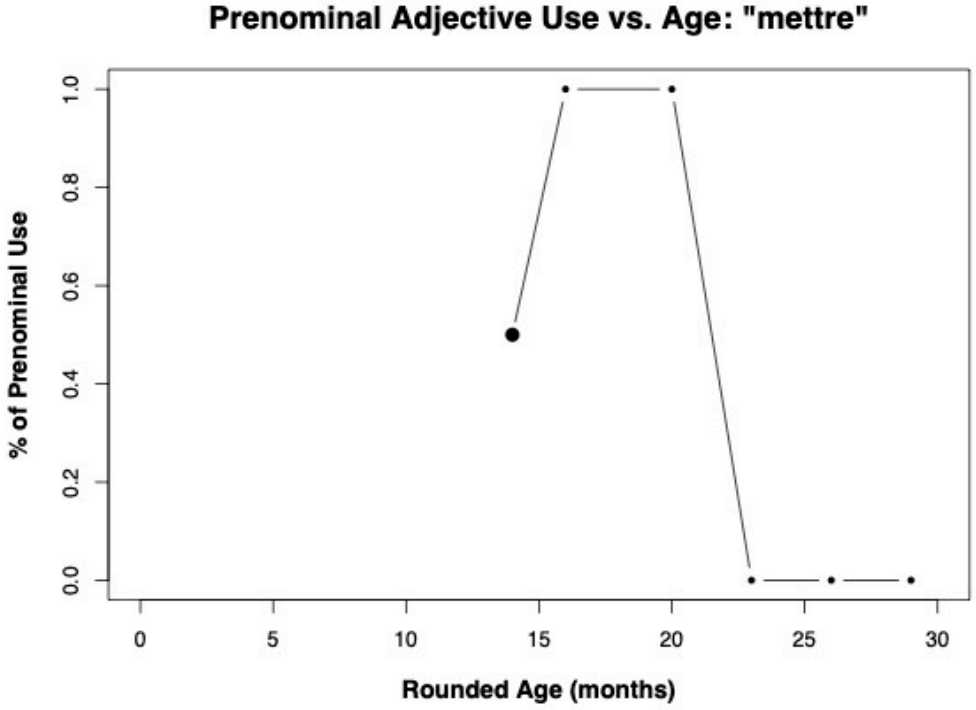


Figure 10.24 Longitudinal Graph of ‘Long’

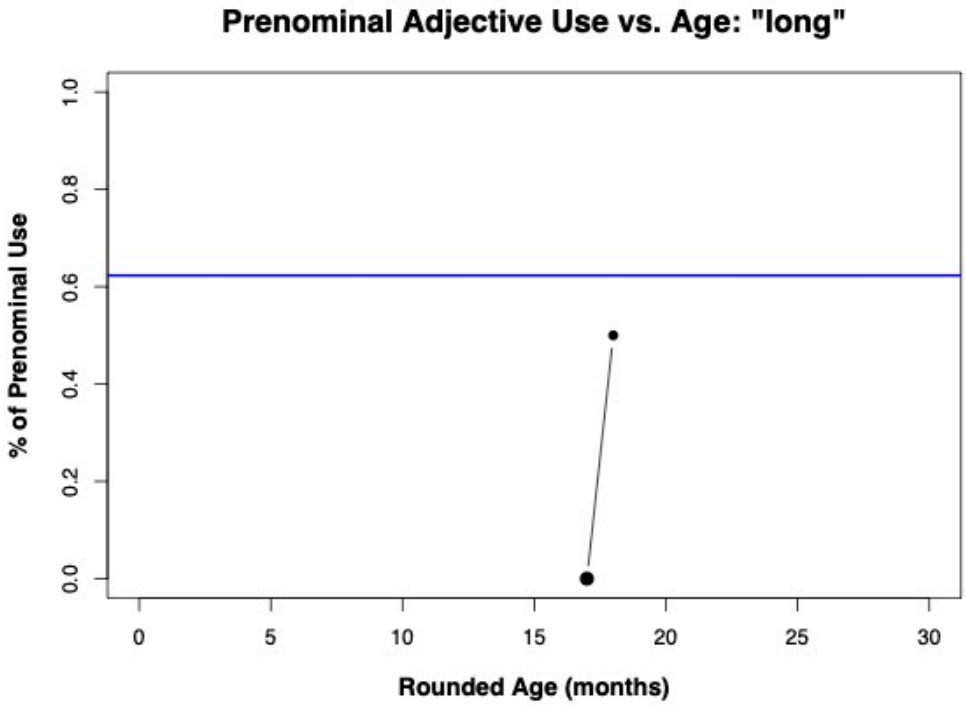


Figure 10.25 Longitudinal Graph of ‘Mal’

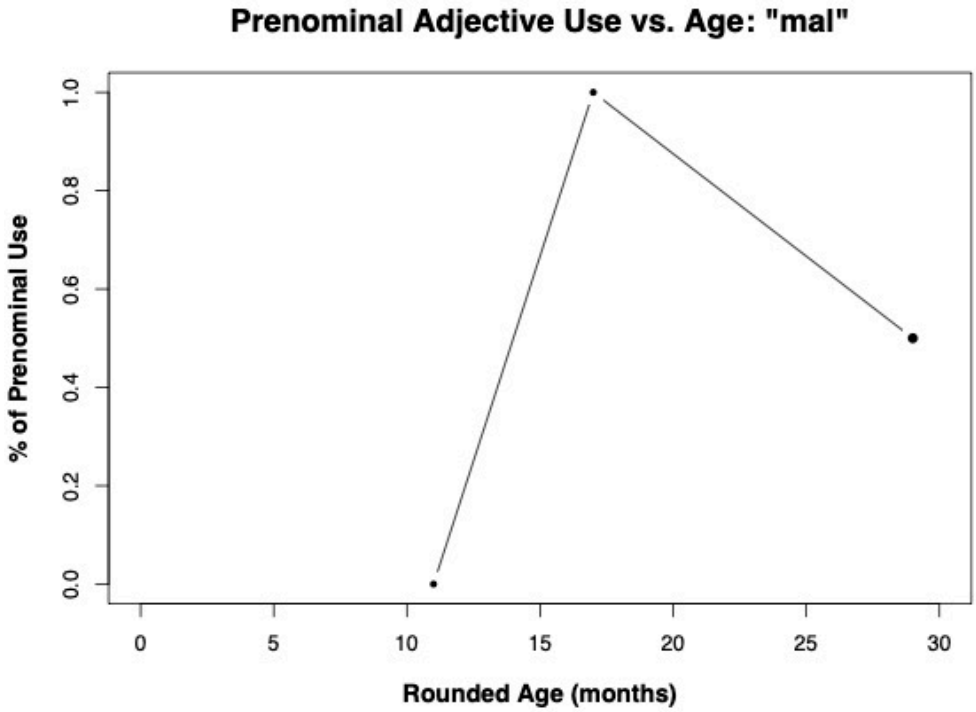


Figure 10.26 Longitudinal Graph of ‘Noir’

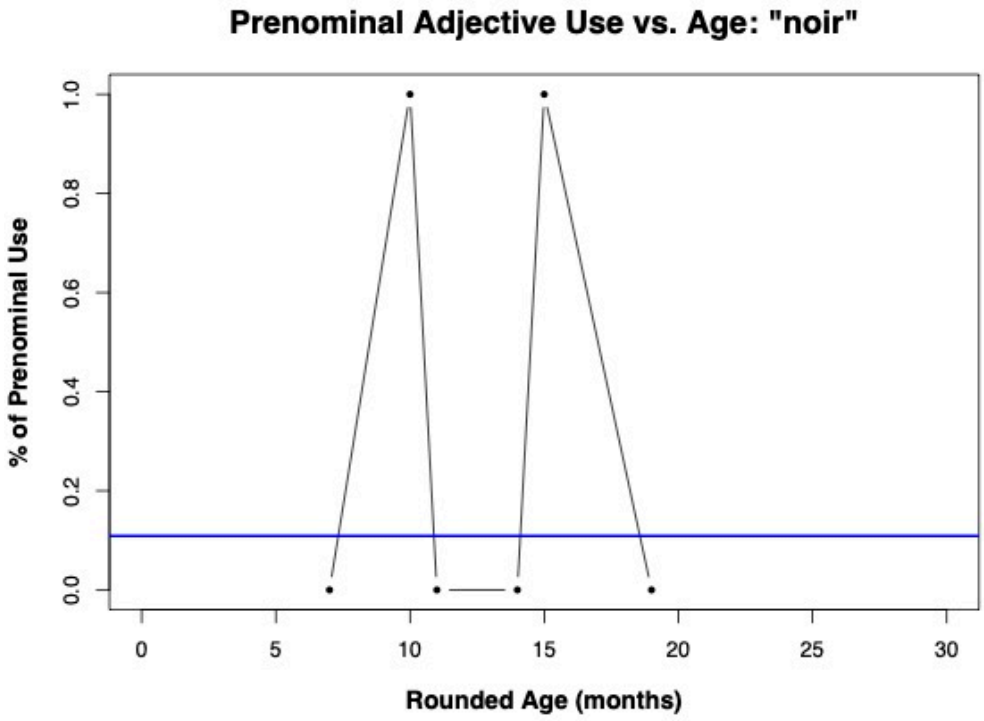


Figure 10.27 Longitudinal Graph of ‘Nu’

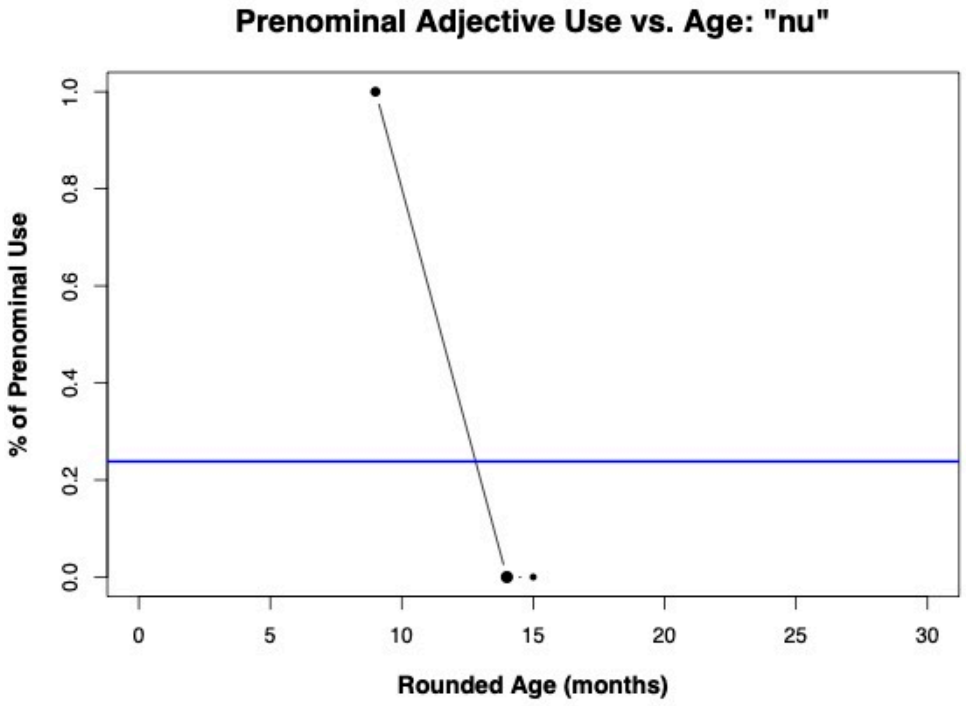


Figure 10.28 Longitudinal Graph of ‘Premier’

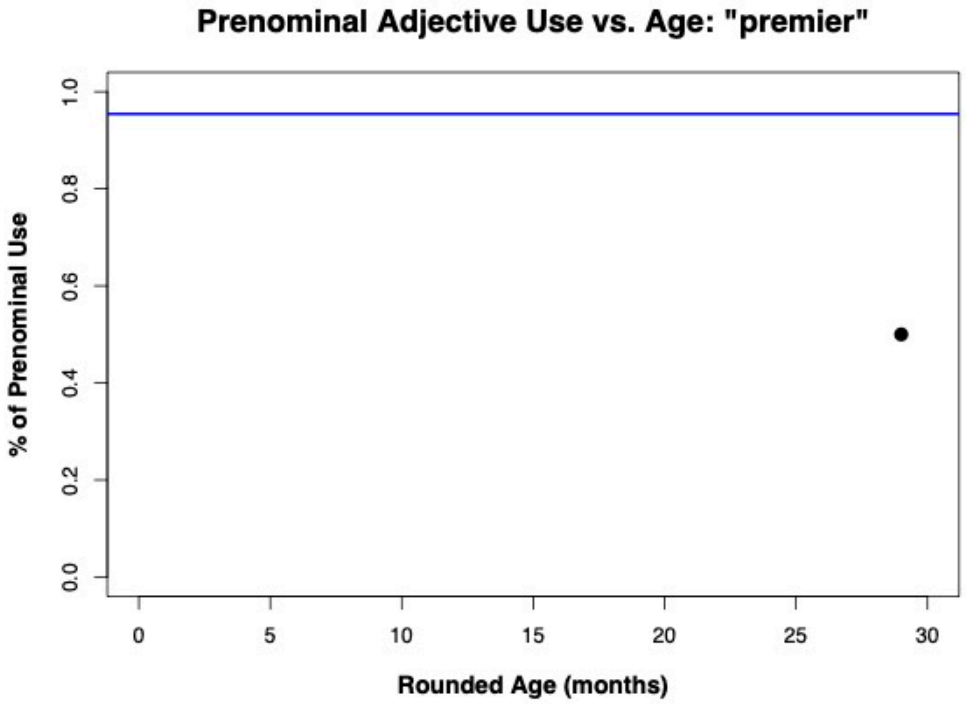


Figure 10.29 Longitudinal Graph of ‘Tien’

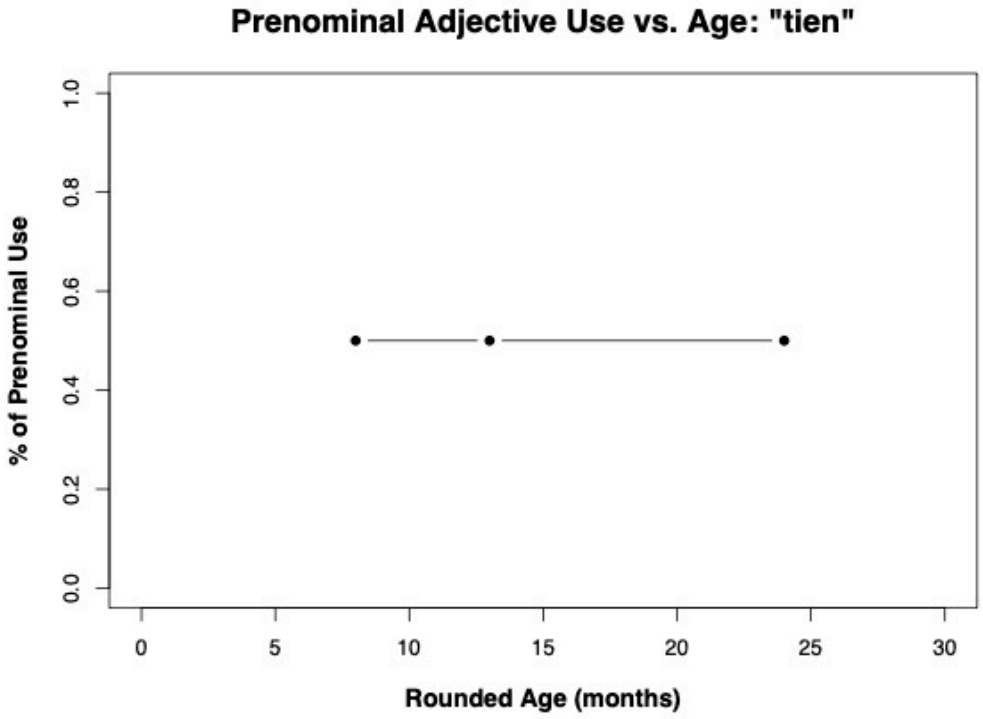


Figure 10.30 Longitudinal Graph of ‘Chaud’

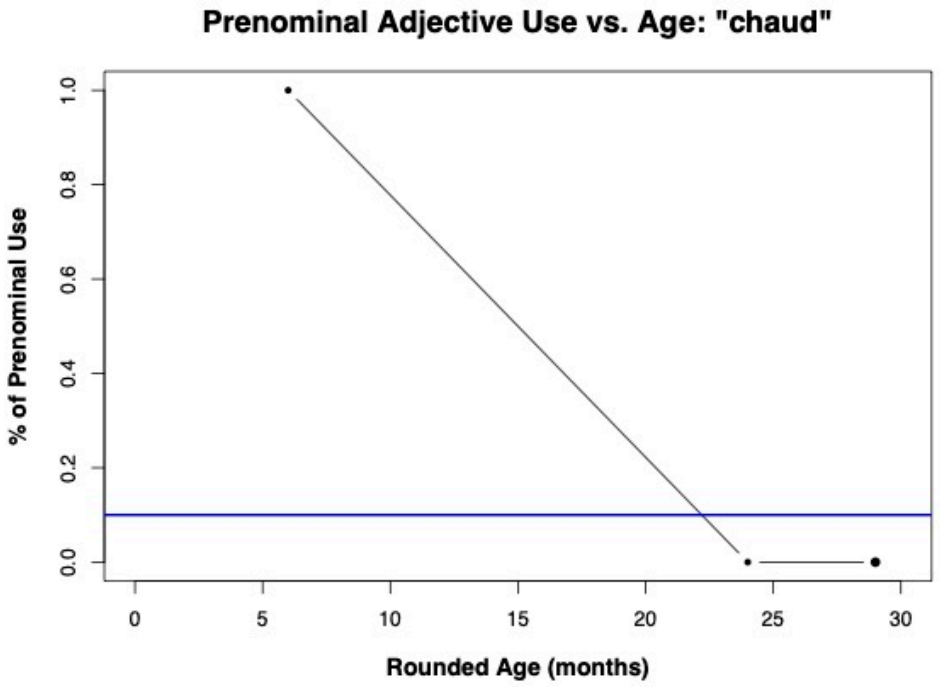


Figure 10.31 Longitudinal Graph of ‘Patibulaire’

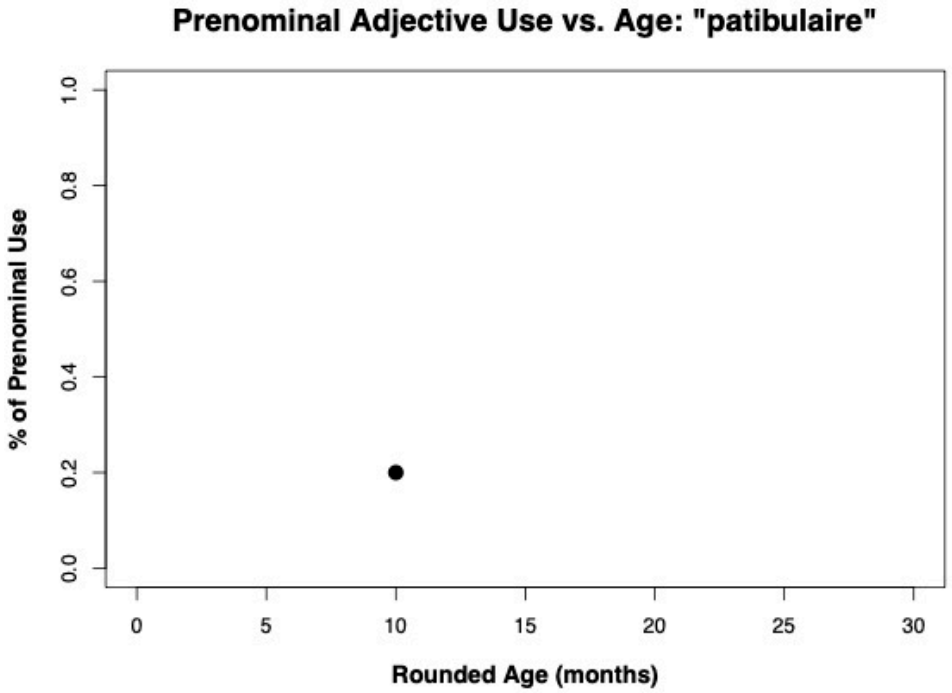


Figure 10.32 Longitudinal Graph of ‘Donné’

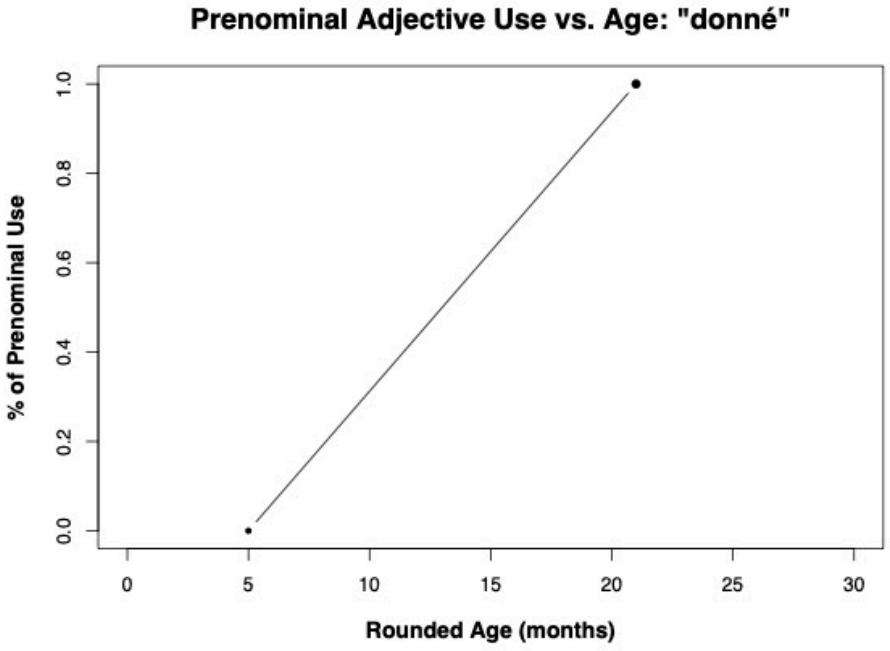


Figure 10.33 Longitudinal Graph of ‘Froid’

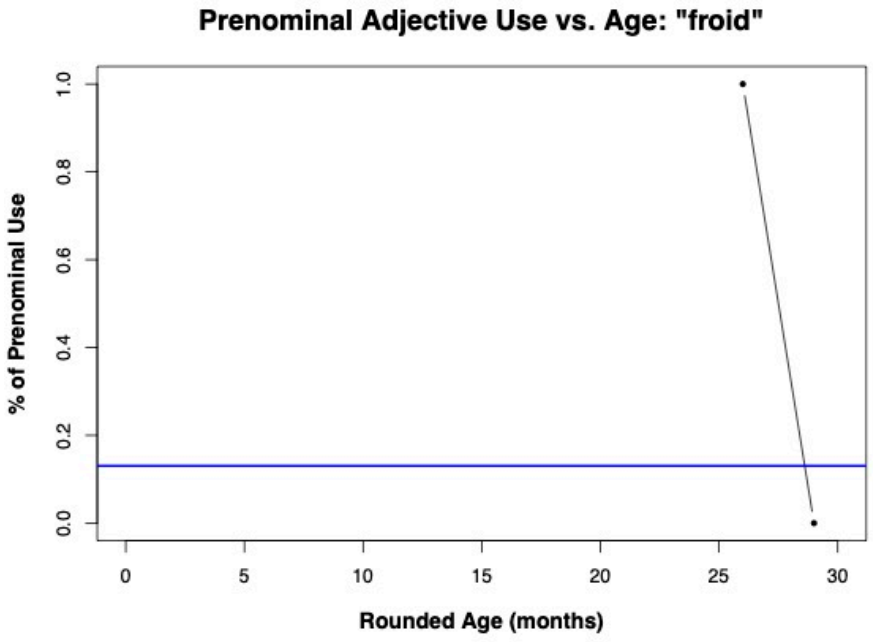


Figure 10.34 Longitudinal Graph of ‘Habillé’

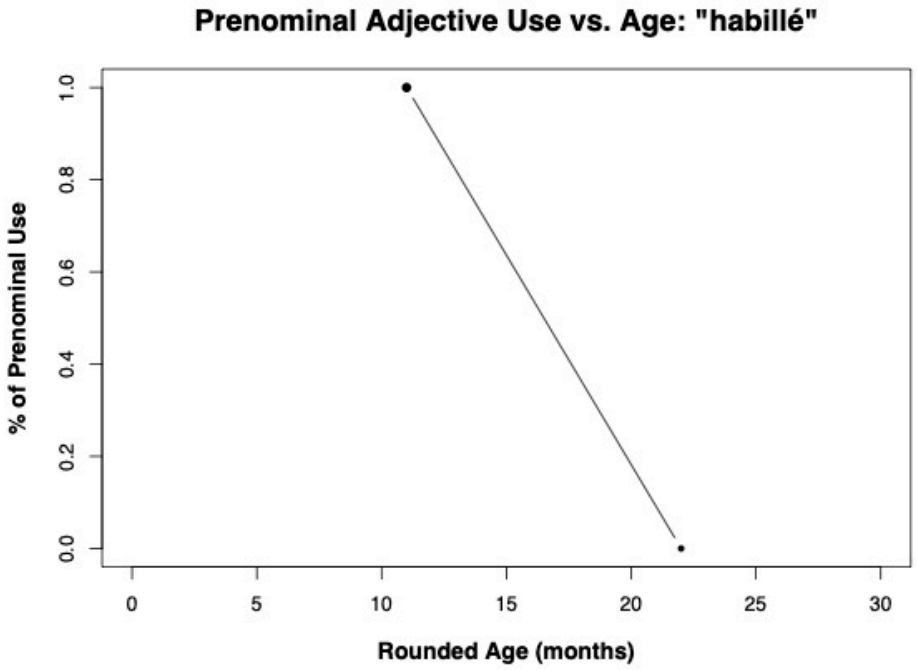


Figure 10.35 Longitudinal Graph of ‘Perdu’

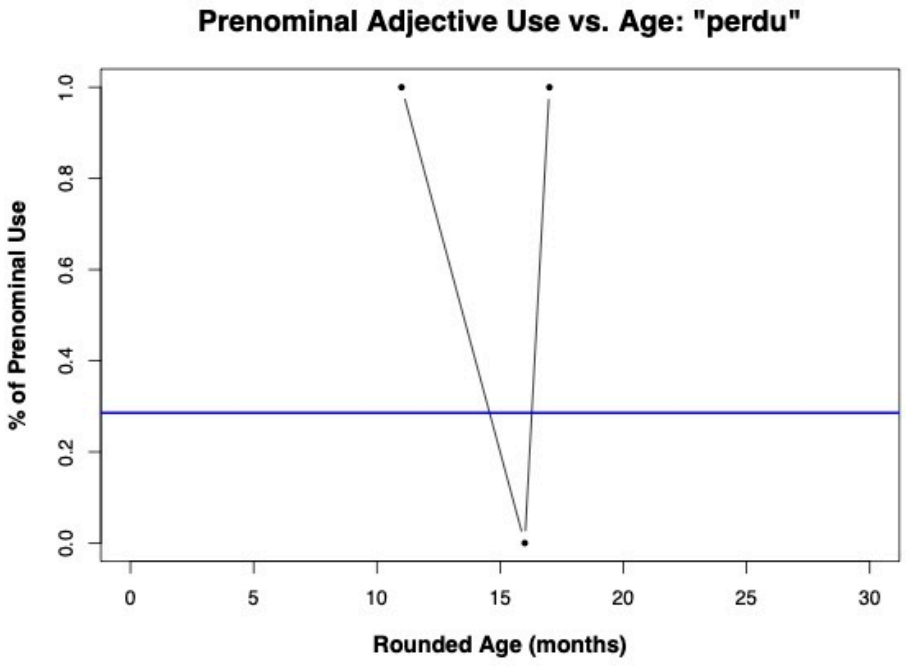


Figure 10.36 Longitudinal Graph of ‘Deuxième’

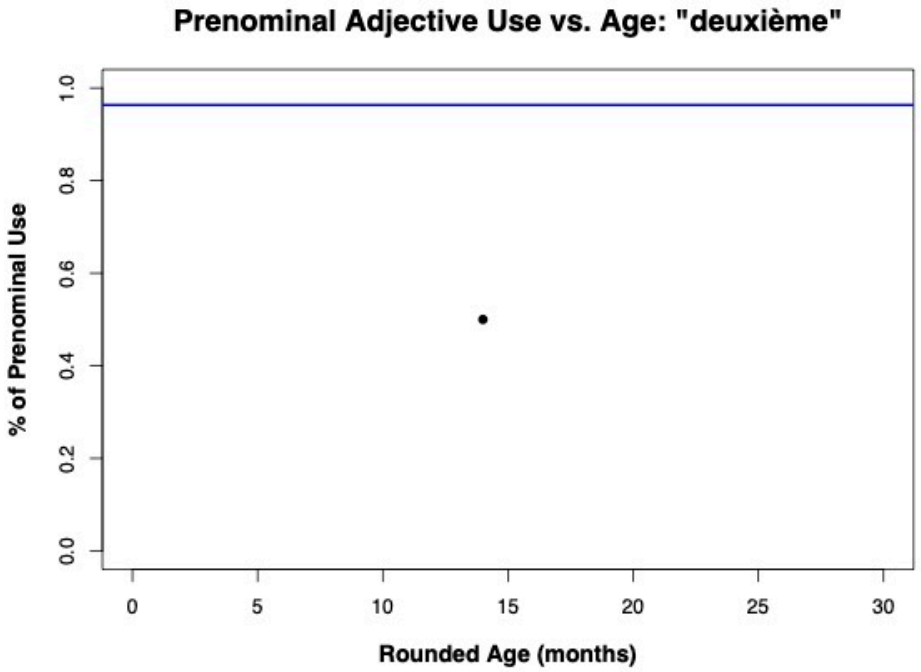


Figure 10.37 Longitudinal Graph of ‘Droit’

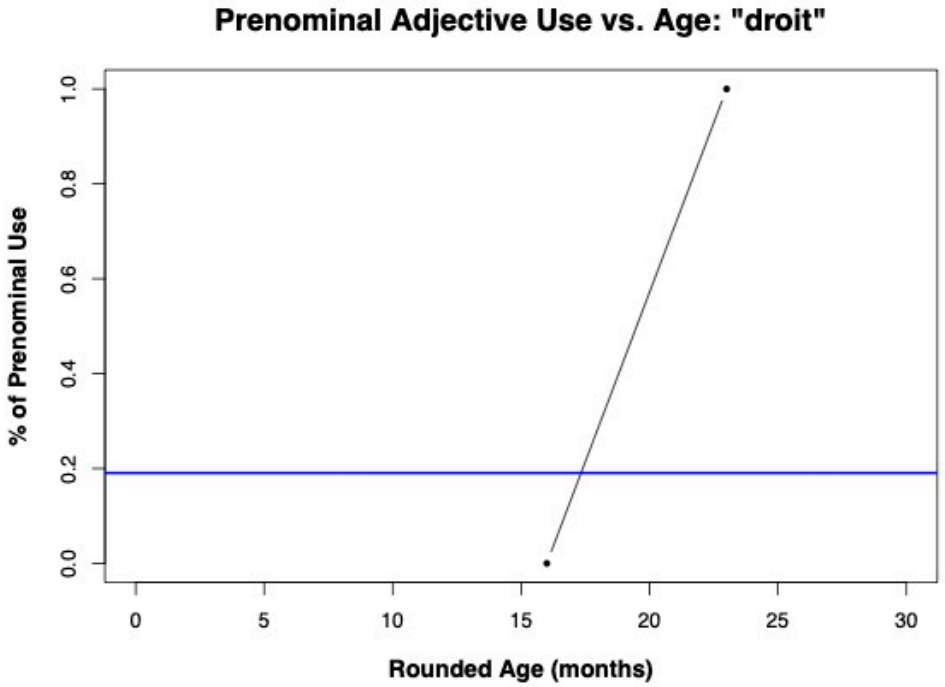
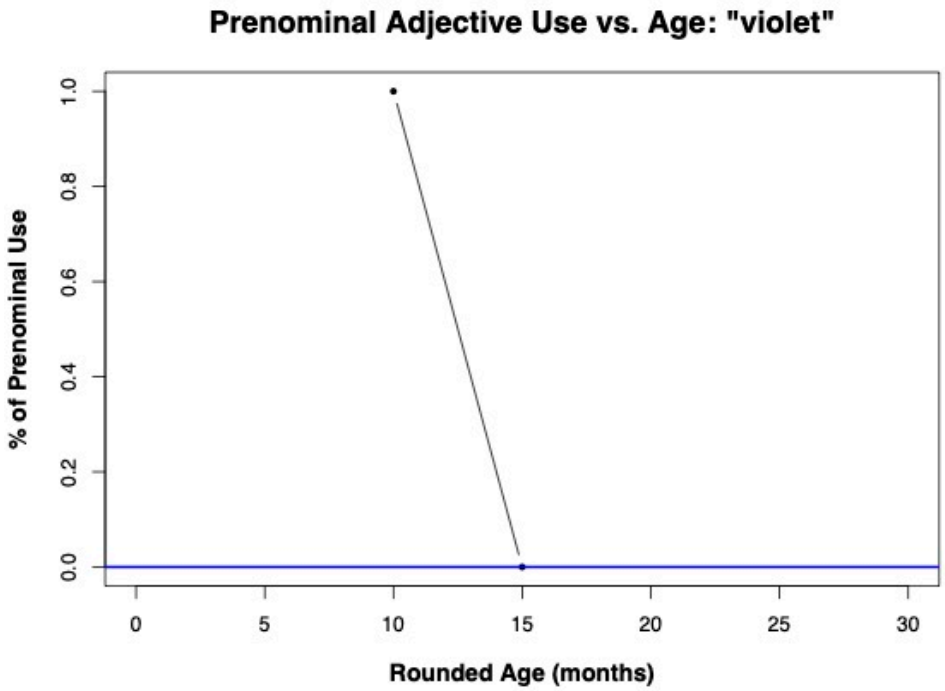


Figure 10.38 Longitudinal Graph of ‘Violet’



4 DISCUSSION

4.1 ANSWERING HYPOTHESIS 1

In the beginning of this thesis, I posed the following question: Do children use proportionally more prenominal or post-nominal placement of adjectives than adults? Overall, children used proportionally more post-nominal adjectives (439/2,043 or 21.49%) than prenominal adjectives (1604/2,043 or 78.51%) when compared to adults, but overall used more prenominal adjectives. The adults' ratios were marginally heavier toward prenominal adjective placement – post-nominal adjectives (2,017/10,708 or 18.84%) vs. prenominal adjectives (8,691/10,708 or 81.16%). If we look only at adjectives which occur at least six times in the children's data, the disparity between adult and child usage patterns becomes greater. Children use 381/1,941 or 19.63% of adjectives post-nominally and 1,560/1,941 or 80.37% of adjectives prenominally. For adults, post-nominal usage is 1,055/8,446 or 12.49% and prenominal use is 7,391/8,446 or 87.51%. The fact that the more frequent adjectives in child production appear more often post-nominally than adult behavior might indicate a sensitivity to type frequency. Adjectives used six or more times by children is 33 in number. And 37 adjectives were used only once by children and, of these, 18 occur post-nominally. This leaves the other 19 to be used prenominally. Of the children's hapax legomena, adults used the same adjectives at 682/1,213 or 56.22% prenominal and 531/1,213 or 43.78% post-nominal. These patterns seem to indicate that in the very earliest stages of adjective development, children seem to pay more attention to the default post-nominal position, because most types of French adjectives occur in the post-nominal position, children seem to be assuming that any new adjective they learn should be tested in the post-nominal position first.

Although the statistical models fit for the data did not return the age of a child as a significant predictor of adjective placement, it is still interesting that children seem adept at placing adjectives in the appropriate position from a relatively early age. Adjectives in French are a very heterogeneous group. With most

adjectives having a strong preference for one position over the other. With a small subgroup having a very lax preference, these adjectives are more easily persuaded into either position given several different factors. Such as morphological complexity, length, derivational status, noun/adjective dependencies, etc. **'**Petit' is a particularly interesting case, because – at least in this data set – the very first appearances are exclusively post-nominal. In the adult data set, 'petit' is used almost exclusively prenominally, so the large disparity lends credence to the argument that initially children are most sensitive to type frequency over token frequency. In mere months, children jump to near adult-like usage of 'petit' with predominant prenominal usage.

Children seem shockingly accurate in their earliest productions for the most frequent adjectives, such as 'petit', 'grand', and 'bon'. These adjectives also are relatively simple to process cognitively, however a more detailed analysis needs to be done on the dimension adjectives, 'petit', 'grand', and 'gros' to assess if children are using them correctly in terms of their perceptional, functional, or normative context (see section 1.5).

In line with Kilani-Schoch and Xanthos (2013) and Fox (2012), 'petit' gets acquired very quickly, only in the first sampled months does it show a post-nominal preference, more work needs to be done teasing apart the pragmatic and semantic uses in context.

4.2 ANSWERING HYPOTHESIS 2

In the beginning of this thesis, I posed the following question: Are children more conservative or more creative in their behavior in alternating prenominal and post-nominal placement of adjectives? Children exhibit patterns of both creativity and conservativism. This is not surprising given the general U-Shaped curve seen time and time again in acquisition literature (see section 1.4). Below is a table with adjectives exhibiting the greatest disparity between child versus adult usage.

TABLE 7. ADJECTIVES SHOWING THE GREATEST DISPARITIES

Adjective	**Child %**	**Adult %**
Beau	71/73 = 97%	331/386 = 86%
Bleu	7/31 = 23%	2/49 = 4%
Doux	0/26 = 0%	3/16 = 18%
Fermé	4/14 = 28%	0/14 = 0%
Méchant	23/24 = 96%	2/4 = 50%
Gentil	6/9 = 67%	6/16 = 38%
Sale	3/12 = 25%	18/24 = 75%
Long	1/6 = 17%	81/130 = 62%
Noir	2/6 = 33%	11/101 = 1%
Fini	19/20 = 95%	2/9 = 22%
Seul	4/12 = 33%	188/220 = 85%
Dur	6/6 = 100%	4/39 = 10%
Premier	4/6 = 67%	791/829 = 95%

Tables 5 and 6 (see Section 3.4) show that before age 4;0, children have a slight preference for the post-nominal position for the most frequent adjectives over the adult grammar. For the adjectives exhibiting more prenominal behavior, Goldberg (2019) might explain this as children's more creative use of adjective placement than adults. During the bottom of the U-Shaped curve, children are testing hypotheses about acceptable grammar in their target language and this testing explains their greater freedom of some adjectives in the child data. For the more post-nominal usage compared to adults, Goldberg (2019) may explain this by saying that children are exhibiting conservative behavior with respect to adjective placement, and that even though adults would find a post-nominal adjective agreeable (and possibly even preferential), children seem hesitant to swap positions.

From the graphs in Figures 9.1 to 9.38 we can see that the period from 34 months to 44 months or 2;10 to 3;8 seems to be a key point of exploration for children. This period seems to be the time when children are breaking free from mimicked placement to more expressive use of placement. During this time frame, we see the greatest divergence from adult grammar. This period corresponds to when a child's adjective placement may be perceived as being in

‘error’ to adult listeners. After this time frame, children seem to figure out a more natural placement based not on either assuming that all adjectives go post-nominally or simply repeating an adjective string heard before, but rather based on a richer exception-full adjective class.

During the sampling time, children are very egocentric and lacking in full Theory of Mind. This might explain why more subjective adjectives are used far more often than the prenominal adjectives. Look at the percentages for ‘beau’ (beautiful) and ‘gentil’ (nice). These words are very subjective, and children seem to place them prenominally much more frequently than adults. On the other hand, ‘sale’ (dirty) would appear to be very subjective, but children are treating them canonically as more objective adjectives perhaps children take the egocentric viewpoint that if they think something is dirty, everybody must think the same thing is dirty. Similarly, if a child thinks something is beautiful, of course everybody agrees, even ‘beau’ seems to be treated as more objective than adults.

It is fascinating that most deverbal adjectives are used by children more often in the prenominal position than in the post-nominal position. Take, for example, ‘fini’ was used by children at 19/20 or 95% prenominally and 2/9 or 22.22% prenominally in the adult data. Also, ‘fermé’ was used 4/14 or 28.57% prenominally by children and 0/14 or 0% prenominally by adults. Next, ‘gardé’, only used once by children and once by adults, was used 1/1 or 100% prenominally by children and 0/2 or 0% prenominally by adults. Finally, ‘perdu’ was used 2/3 or 66.67% prenominally by children and 2/7 or 28.57% prenominally by adults. Because most attributive adjective sequences were found as an object of a transitive verb, it is possible that children are analogizing the syntactic placement of participle verbs to preferentially treat deverbal adjectives as prenominal adjectives. It is also noteworthy that a significant number of deverbal adjectives used by children, such as rangé and carré were not found in the adult data at all. This could, again, be explained potentially by overgeneralization by syntactic analogy given the proximity of participial verbs

and attributive adjectives, more work needs to be done to develop this idea.

4.3 ANSWERING HYPOTHESIS 3

In the beginning of this thesis, I posed the following question: If color terms are more frequent in child speech, will they pattern more like prenominal adjectives or more like post-nominal adjectives as in adult speech? At 185/2,043 or 9.06% for children and 567/10,708 or 5.30% for adults, of all adjective productions it is evident that color terms do appear more often in children speech than in adult speech. This is probably partly due to adults' larger lexicon in general, but because I restricted my control group to only the adjectives spoken by children, the greater percentage of utterances involving a color term makes the assumption that children use more color terms sound. In general, color terms seem to follow the same patterns as seen above. The more frequent color terms seem to mirror adult usage much more quickly than less frequent color terms.

Children seem to prefer the default post-position for these rarer terms. 'Bleu' and 'noir' are interesting in particular because they show much greater prenominal usage than adult speech. While 'noir' was only said by children six times, it is interesting that two occurrences were in the prenominal position. For 'bleu', there were 31 occurrences and of these seven, occurred prenominally. It's possible that, psychologically, children see 'bleu' as being an innate characteristic of some objects. If this were the case, they would erroneously be placing the adjective in the improper position. Alternatively, 'bleu' may be seen by children as more subjective than the other color terms, particularly if there were many shades of blue in their environment. This would skew the children's preference for prenominal placement. Overall, though, color terms seem to get mastered relatively early, especially if they are used often by children. One hypothesis to explain this discrepancy is that color terms are used frequently in child directed speech, so children may be analogizing these terms to other really frequent adjectives like 'petit' and 'grand'.

Rare adjectives tend to be assumed to be prenominal. More common

adjectives converge onto adult expectations quickly. Key age for figuring out adult-like placement seems to be 10-25 months (+19). Deverbal adjectives appear to be very confusing for kids, in the future, I would like to try a different derivational morphology tool. The tool I did try, DERIF, claimed to find only one derived adjective – ‘rose’ – but I know this not to be the case. All the deverbal adjectives, such as ‘fini’ and ‘fermé’ are derived. Moreover, ‘marron’ is derived from the word for chestnut.

5 CONCLUSIONS

In this thesis, I have attempted to describe the earliest placement of adjectives by French-speaking children, compared with adjective placement in a control group of adult speakers. To establish a theoretical background for the investigation, I explored some past literature on the major theoretical interpretations of some semantic properties of adjectives, focusing on the theoretical concept of subjectivity of adjectives from Scontras & Goodman (2011). **I** discussed work done by usage-based acquisitionists to establish a general learning pattern of language without a built-in grammar. I believe Clark (2009) and Goldberg (2019) to have the most accurate model of early child language development.

I reviewed the specific lexical, morphological, historical, and syntactic factors that are believed to influence placement of individual French adjectives. Finally, I devoted special discussion to the cognitive difficulty in acquisition of adjectives by young children in general and attributive adjectives in particular, taking a close look at dimension adjectives and discussing why they are especially difficult for children to use correctly in context.

I had three basic questions about French adjective acquisition. The first was the relative proportion of prenominal to postnominal adjectives as compared with an adult sample. The second involves the creativity or conservativism exhibited by children in their adjective placement as they move along the acquisition timeline. The third took a subset of color terms to see if they were overrepresented in child speech, and if so whether color terms would be analogized to the more token-frequent adjectives that tend to come prenominally or if children would preserve the canonical post-position by paying more attention to type-frequency. I obtained my data from three existing corpora, collected in France, I merged the three corpora to treat them as one dataset. Using a Python script and R, I modeled the behavior of adjectives out to 98 months to project alternating adjective behavior outside of the sampled time. Next, I broke my data

down by use-over-time, a subset of color terms, and individual adjective behavior over time for the entire data set and, later, on the subset of alternating adjectives.

In my investigation, I discovered that in the earliest stages children seem to attend more to type-frequency, preferring to place new adjectives learned in the post-position, this was seen even in the word ‘petit’. Recall that in French most adjective types appear post-nominally, while the more token-frequent adjectives appear prenominally. So, the higher usage of the post-position in children over adults indicates a sensitivity to type-frequency. I also discovered that children seem to exercise both creativity and conservativism. Overall, children prefer to play it safe by placing adjectives post-nominally as most French adjective types appear post-nominally. It is a safer bet for a child to believe that a new word they encounter most likely goes in this position. Children were also more creative than adults with some adjectives exhibiting closer to 50% prenominal than adults. Using adjectives closer to the 50% prenominal mark indicates that children are more flexible in their adjective placement than an adult who uses that same adjective closer to either extreme. I found that, for color terms, they patterned similar to adult grammars relatively early if the color was frequent. For less frequent color adjectives, children were less adept at placing them the way an adult would.

In the future, I would like to find a way to include morphological complexity, I would like to have a more granular viewpoint of adjectives to see if grammatical gender makes a difference with acquisition rates. I would also like to extend this work by looking more at adjectives in context to better assess accuracy of dimension adjectives and assess subjectivity more closely.

6 APPENDICES

APPENDIX A : COMPLETE TABLE OF CHILD AND ADULT ADJECTIVE USE

Adjective	Child Prenominal	Child Total	Child % Prenominal	Adult Prenominal	Adult Total	Adult % Prenominal
petit	1054	1144	92.13%	2484	2574	96.50%
grand	203	209	97.13%	988	1060	93.21%
beau	71	73	97.26%	331	386	85.75%
rouge	7	57	12.28%	8	94	8.51%
gros	39	42	92.86%	396	427	92.74%
vert	4	41	9.76%	6	84	7.14%
bleu	7	31	22.58%	2	49	4.08%
neuf	10	28	35.71%	2	13	15.38%
bon	26	27	96.30%	941	961	97.92%
doux	0	26	0.00%	3	16	18.75%
parti	20	25	80.00%	0	0	0.00%
méchant	23	24	95.83%	2	4	50.00%
fini	19	20	95.00%	2	9	22.22%
rose	1	16	6.25%	1	13	7.69%
fermé	4	14	28.57%	0	14	0.00%
fort	5	14	35.71%	30	75	40.00%
jaune	1	14	7.14%	6	38	15.79%
même	13	13	100.00%	1035	1048	98.76%
sale	3	12	25.00%	18	24	75.00%
seul	4	12	33.33%	188	220	85.45%
rangé	1	11	9.09%	0	0	0.00%
enlevé	5	10	50.00%	0	0	0.00%
joli	9	10	90.00%	41	51	80.39%
gentil	6	9	66.67%	6	16	37.50%
mettre	4	9	44.44%	0	0	0.00%
blanc	0	8	0.00%	9	150	6.00%
dur	6	6	100.00%	4	39	10.26%
long	1	6	16.67%	81	130	62.31%
mal	3	6	50.00%	0	0	0.00%
noir	2	6	33.33%	11	101	10.89%
nu	2	6	33.33%	5	21	23.81%
premier	4	6	66.67%	791	829	95.42%
tien	3	6	50.00%	0	0	0.00%
chaud	1	5	20.00%	3	30	10.00%

patibulaire	1	5	20.00%	0	0	0.00%
dernier	4	4	100.00%	337	575	58.61%
dodu	0	4	0.00%	0	0	0.00%
vilain	4	4	100.00%	4	5	80.00%
donné	2	3	66.67%	0	0	0.00%
froid	1	3	33.33%	3	23	13.04%
gris	0	3	0.00%	4	19	21.05%
habillé	2	3	66.67%	0	0	0.00%
marron	0	3	0.00%	0	4	0.00%
nul	3	3	100.00%	2	5	40.00%
perdu	2	3	66.67%	2	7	28.57%
brun	0	2	0.00%	1	6	16.67%
défait	0	2	0.00%	0	0	0.00%
deuxième	1	2	50.00%	237	246	96.34%
droit	1	2	50.00%	20	105	19.05%
minuscule	0	2	0.00%	1	2	50.00%
orange	0	2	0.00%	0	7	0.00%
reposé	0	2	0.00%	0	0	0.00%
riquiqui	0	2	0.00%	0	1	0.00%
triste	0	2	0.00%	2	6	33.33%
violet	1	2	50.00%	0	2	0.00%
parti	2	2	100.00%	2	6	33.33%
absent	1	1	100.00%	0	2	0.00%
arrière	0	1	0.00%	2	14	14.29%
balancé	0	1	0.00%	0	0	0.00%
carré	0	1	0.00%	0	33	0.00%
châtain	0	1	0.00%	0	0	0.00%
coquin	0	1	0.00%	0	2	0.00%
creux	0	1	0.00%	0	0	0.00%
désolé	1	1	100.00%	0	5	0.00%
difficile	1	1	100.00%	0	46	0.00%
écrasé	0	1	0.00%	0	0	0.00%
écrit	1	1	100.00%	4	22	18.18%
entier	0	1	0.00%	0	63	0.00%
fâché	1	1	100.00%	0	0	0.00%
floral	0	1	0.00%	0	3	0.00%
fou	1	1	100.00%	2	25	8.00%
gardé	1	1	100.00%	0	2	0.00%
gluant	0	1	0.00%	0	3	0.00%
haut	0	1	0.00%	42	56	75.00%
immense	1	1	100.00%	13	25	52.00%
magique	0	1	0.00%	0	14	0.00%

meilleur	1	1	100.00%	61	68	89.71%
moyen	1	1	100.00%	7	47	14.89%
paire	1	1	100.00%	0	0	0.00%
pauvre	1	1	100.00%	19	33	57.58%
pénible	1	1	100.00%	1	6	16.67%
plat	0	1	0.00%	1	13	7.69%
plein	1	1	100.00%	111	161	68.94%
pointu	0	1	0.00%	0	2	0.00%
propre	0	1	0.00%	69	110	62.73%
râpé	0	1	0.00%	0	0	0.00%
réussi	0	1	0.00%	0	0	0.00%
sec	1	1	100.00%	1	13	7.69%
super	1	1	100.00%	147	215	68.37%
tapé	1	1	100.00%	0	0	0.00%
torse	1	1	100.00%	0	0	0.00%
tranquille	0	1	0.00%	5	26	19.23%
vrai	1	1	100.00%	197	204	96.57%

APPENDIX B : PYTHON SCRIPT

For complete directory access to the Python script please visit
https://github.com/dwhagar/AveryThesisProcessor

APPENDIX C : BLACKLIST

Below is a complete list of blacklisted characters and “words”:

-, 0a, 0est, 0maintenant, 0y, <, >, a., aglaé, ahah, aimerais, alors}., ame, ana, appareil+photo, appelles, arielle, aspirateur, assise, attends, aut, auto, aïe, bavarde, belle, ben_non, blues, bobo, bricole, bro}., bécasse, caca+poum, cache_cache, calmerais, camions, canard, canards, canne, casses, castor, ce>{que, celle, celui, chacune, champignon, chantes, chaussons, cher, cherchais, cheval, chien, ci, clarisse, cochon, coiffure, coin+coin, coin@o}., continues, coquette, coua@o, coupe+bordure}., cousin, couvercle, craignais, craque, croa@o, croco, crocodile, croissant, croque, cuisinier, dang, deda, derrière, dessert, dessines, dessous, dorée, douc, dromadaire, débranchais, déchires, défoule, dégustes, déménag, e>-que, e><que, e><que><que, e>{passe, egarde, elena, eliza, elles, en_dessous, en_effet, en_train, enant, enregistres, ens, ensemble, escargot, essence, est :{les, et :{une, et_après, et_hop, et_puis, et_voilà, et{dans, et{un, expliques, faire{comme, faon, fas ses, fermier, feuille}{une, finie, flic@o, flip_le_clown, floc@o, folle, fraise, fripouilles, frère_jacques, fée, gosse, hein, heuh, heure, hippopotame, hirondelles, hop, i, i_il>_te_plaît, ils{www, indien, inventes, iques, isa, isque, jacques}., jouer}., jusque, kangourou, koala, l, l>{vais, l>}{i, lait, lapin, lapins, lave, laves, les{www, lit, longue, louane, loup, luche, là-<de, là}., léopard, maine, mais :{ça, maisons}., mama, manque, marine, marionnette}., marrante, mets, meuh, mhm}., mi, mimine, minou, miss, mis}., moitié, montes, montres, moques, mouillée, ménagère, n, na@b, nablement, nades, nais, nanou, nant, natadybwa@u, neuf, nid, ninoune, nir, nons, non{il, non}., non}{non, nounours, nus, nutella, n{www, nénette, oh_hisse, oh_oui, ohlà, ohoh, oie, oilà, oiseau, oit>., on, onde, on{www, on}., ouaf, ouah, ouais, oui, ouille, oui{il, oui}., ouronne, ours, ouvais, ouverte, ouïe, pa@b, panda, pantalons, panthères, papa, papa}., papi, papillon}., papy, par_contre, parait, parterre, parti, pas_du_tout, pas{son, pelle, perroquet, personnages, petit_nounours, phoque, pied, pim_pon@o, pioches, pique, pique+nique, pirates, pitchoune, plein, pliés, poire, poisson, polichinelle, pomme, pomme+de+terre, poubelles, pouf, poule, poules, poum, poum@o, pour_que, poussin, pout@o, prendre}., proposes, puisses, purée, qu, quelque_part, ramènes, reconstruit, redis, regardes, regarde{c, requin, requins, restaurant, rev, roulettes, s, s@l, sable, salle+de+bains, semblant, serpent, si_et, si_il_te_plaît, singe, sorciers, souricette@wp, souris, sourit, souvenais, ssaie, sss :@o, sure, s{www, sèche+cheveux, tagada@c, tam_tam@si, tapis, tartine, terreur, ter}., tienne, tiens, tigre, tires, tit, tiv@c, tive, toc{ça, toi, tomate, tombé, top, touche, tous, tout, tout_le_monde, tout_le_temps, toute, toutes, touts, tra_la_la_la, train, transcrire}., trouves, truc}., trésor, tse@o, tu, tuŋgtuŋg@o, u>{es, u@l, un_p, une, vache, vas_y, vaux, vieille, viens, voitures, vole}., voltige, vroum, wouh, www}., www}{mais, www}{non, xxx, xxx}., yaourt, yyy, yyy{et, yyy{la, yyy{les, yyy{où, zèbre, {, }, à_partir, à{la, ça}., éclaire, éclaires, écoute, éléphant, éléphanteau, étable, ʃipʃip@o, ton, quelle, gu’elle, comprendre, ca__ya_est, maint, enant, ami, animal, beurré, cette, pendant, ambulant, ça_y_est, taupe, aies, anime, tricolore, juste, comprendre

APPENDIX D : JSON OBJECT

One example of a JSON object looks like the following:


```
{ "file": "./data/MTLN/naik39.xml",
   "data": {
      "speaker": {
         "sid": "CHI",
         "role": "Target Child",
         "name": "Naik",
         "sex": "male",
         "adult": false,
         "lang": "fra",
         "age": 3.25
      },
      "sentence": "euh la sorcière et la méchante mère .",
      "pos": [
         [
            "euh",
            "co"
         ],
         [
            "la",
            "det"
         ],
         [
            "sorcière",
            "n"
         ],
         [
            "et",
            "conj"
         ],
```

```
        [
            "la",
            "det"
        ],
        [
            "méchante",
            "adj"
        ],
        [
            "mère",
            "n"
        ],
        [
            ".",
            "."
        ]
    ],
    "postnominal": [],
    "prenominal": [
        {
            "noun": "mère",
            "adjectives": [
                {
                    "adjective": "méchante",
                    "lemma": "méchant"
                }
            ],
            "lemma": "mère"
        }
    ]
} }
```

7 WORKS CONSULTED

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VITA

Bachelor of Arts; Linguistics, University of Pennsylvania

Master of Arts (Expected); Linguistic Theory and Typology, University of Kentucky

Avery Elizabeth Baggett