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L2 Vocabulary Learning in Early Infancy: A Case Study of a Czech Child Exposed to English

Bachelor's Thesis

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L2 Vocabulary Learning in Early Infancy: A Case Study of a Czech Child Exposed to English.
(Bakalářská práce)

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Prohlašuji, že jsem tuto bakalářskou práci vypracovala samostatně a uvedla úplný seznam citované a použité literatury.

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Abstract and annotation

The topic of this bachelor thesis is language development in early infancy, specifically the development of lexicon in bilinguals. The literature review examines sources on childhood bilingualism and on lexical development in the first years of life. Naturally, it focuses on children's language comprehension. The goal is to discuss lexical development in bilingual infants in comparison to monolinguals. Furthermore, the literature review discusses methods that test lexical comprehension in infants. It compares the methods used in the past and those used today.

In the second part of the thesis, a qualitative case study of one infant is reported. The subject is a Czech infant who has been regularly exposed to a limited amount of second language input, English, since birth. The child's L1 and L2 comprehension at the age of 18 months is assessed and compared.

Keywords

Abstrakt a anotace

Tato bakalářská práce se zaměřuje na vývoj řeči u dětí ve věku 0-18 měsíců. V přehledu literatury bude uveden přehled zdrojů, které se zabývají raným vývojem řeči u dětí. Cílem je pojednat o lexikálním vývoji u bilingvních kojenců ve srovnání s monolingvními. Samozřejmě se zaměří na to, čeho je dítě v daném věku schopno z hlediska porozumění jazyku. Dále budou v přehledu literatury diskutovány metody, které testují lexikální porozumění u kojenců. Porovná metody používané v minulosti a metody používané dnes.

Jedná se o kvalitativní případovou studii zaměřenou na jednoho kojence, jehož rodným jazykem je čeština. Hlavním cílem této práce je posoudit porozumění L2 u patnáctiměsíčního kojence, který je od narození pravidelně vystaven omezenému množství vstupů druhého jazyka. Porovnáváno je porozumění kojence v L1 češtině a L2 angličtině.

Klíčová slova
bilingvismus, druhý jazyk, učení slovní zásoby, kojenec, porozumění jazyku, angličtina, čeština

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1   Introduction

The main focus of this thesis will be on early bilingual lexical development of an infant in the first 18 months of life. The aim of this thesis is to show what children are able to learn during this 18-month-long period and how their language, and specifically knowledge of words, develops. Several studies concerning the early language and lexical development in infants have been conducted (Werker & Byers-Heinlein 2008, Brice & Brice 2009, Bergelson & Aslin 2017, Swingley 2012, Kuhl 2000, Barrett 1996) and are used in this study to support the main ideas and thoughts.

This thesis examines how and in what extent a child from a monolingual community with only limited exposure of L2, in this case English, can learn the second language, specifically its vocabulary.

Researching a bilingual infant is very different and, in some way, more complicated than researching monolinguals. Articles such as Werker & Byers-Heinlein 2008, Conboy & Montanari 2016, Bosch & Sebastián-Gallés 2001, or Pearson *et al.* 1993 mention fundamental differences between monolingual and bilingual infants, and they focus on how to correctly measure the vocabulary size of bilinguals. Without knowing how to properly measure the vocabulary size of a bilingual infant, people believe bilingualism is bad for infants and leads to language disorders or delays.

A challenging aspect of this case study is the heterogeneity among bilingual individuals and groups. The characteristics and nature of bilingualism cannot be simply deduced out of the results of an individual. The results would differ with another individual or, for example, a group (Werker & Byers-Heinlein 2008, 147).

A very important aspect of this case study are the methods how to test infants' vocabulary. A more than appropriate tool for this is the MacArthur Communicative Development Inventory (the CDI) which tests words which a child either understands or understands and says (Fenson *et al.* 2000). A short form of the CDIs is used as the CDI is for monolingual children and I research a bilingual. Another vocabulary checklist, Dovyko, is used to measure vocabulary size in Czech. This form is used in its full form since it tests a Czech native boy.

MacArthur Short Form CDI is the most important tool for answering one of this study's research questions. Is a child from a monolingual Czech community with regular but limited exposure of L2 able to learn the language vocabulary? The subject of this study, baby

Jan, was regularly exposed to English for 18 months. It was only a limited exposure as I am the only person who interacted with Jan. No one else in his environment has sufficient knowledge of English to provide additional input for Jan.

To find out whether Jan understands more words than those from MacArthur CDIs, Jan's input was being recorded and then transcribed. A table of words from these transcriptions was created and content words from this table were used to test Jan's English vocabulary more.

Parents of bilingual children are often worried whether bilingualism has or could cause any negative effects on the development of the children's L1 (Byers-Heinlein & Lew-Williams 2013). Frequently asked questions are focused on language disorders or difficulties, language delay and any kind of confusion, but there are also some positive questions, for example, if a bilingualism could make the children more intelligent. The case study tries to answer one of the more negative questions and that is if bilingualism can cause any language disorders.

A Czech adaptation of MacArthur CDIs, vocabulary checklist Dovyko, was created to measure children's vocabulary size (Paillereau *et al.* 2023). It helps parents and researchers find out if a child does or does not have language disorders. In this study, Dovyko was used to, of course, measure the Czech vocabulary size and it was also used to detect any negative effects of English on the language development of Czech.

Since I am also a native speaker of Czech, Jan's input was affected by Czech language. In the thesis I try to detect any non-native features in my speech, in Jan's input, and describe them accordingly. I also describe my own experience with English language, how long I have been learning and studying it.

The thesis is organized as follows. The first part of the study, from chapter 2 to chapter 6, is a literature review. In the second chapter the focus is put on bilingualism and its effects on children. It deals with often asked questions about bilingualism, if it can cause any language disorders or, on the other hand, make a child more intelligent. In the third chapter I describe broadly early language development in children from 6 to 24 months old and also language use. The chapter provides several methods of testing infants' language development. The fourth chapter defines main differences between monolingual and bilingual children, such as their vocabulary size and the correct ways to measure it. The fifth chapter outlines how even a short-term exposure of second language is affective and stresses the essentiality of social interaction when learning a second language. The last chapter of this literature review

focuses on methods of testing infants' language comprehension, perception and infants' vocabulary, methods that are used further in this study. At the end of chapter 6 the research questions of this case study are defined.

The second part of this thesis focuses on the experiment I conducted with baby Jan, a child from a monolingual Czech community that was regularly exposed to English for 18-month-long period. I describe Jan's birth, slightly his family and who he spends time with, myself as the interlocutor, the language input and its features and methods I used to test Jan's vocabulary, both English and Czech. I used the methods described in chapter 6, audio recordings and transcriptions of these recordings to find out how many words Jan understands. The results are then described in chapter 8.

2 Is early bilingual development good or bad for a child?

Before we address the lexical development itself I will consider questions which trouble many parents who are raising their children in two languages. Parents of bilingual children are asking a lot of questions about how bilingualism can affect their child, whether the effects may be bad or good, or maybe both.

The parents of the boy who is researched in this case study also asked a lot of questions. They are both functionally monolingual, neither uses an additional language in their everyday life. Nevertheless, they allowed their child to be exposed on regular basis to a second language spoken by a close relative. At first, they were worried about their child's language development. That is why I want to start this paper by addressing some of their concerns. My comments are based on a review article by Byers-Heinlein and Lew-Williams (2013).

Byers-Heinlein and Lew-Williams (2013, 1) point out that, what people think about bilingualism is not based on the facts or experience but simply on myths and misconceptions. The field of bilingualism is still very young and not as explored and understood as other fields might be. Pearson *et al.* (1993, 95) say that results from group studies on bilingual children, for example Kenji Hakuta's research on development of bilingual children from 1986 or George Saunders's research from 1988, were conflicting, meaning some showed advantages for bilinguals and other showed disadvantages. The situation in the field being what it is, it is not surprising that members of lay public fall for unsubstantiated myths.

2.1 Can bilingualism confuse the child?

The thing which the boy's parent were most worried about was the question whether bilingual language exposure can lead to confusion in the baby's mind. The problem this question creates is the meaning of confusion. What do parents mean by this question when they ask it? It is not entirely clear.

However, there is one type of behaviour that is typically regarded as confusion and that is so-called code mixing. When children code mix, they use words from both languages in one sentence (Byers-Heinlein & Lew-Williams 2013, 2). Many researchers do not see this behaviour as confusion at all (Byers-Heinlein & Lew-Williams 2013; Werker & Byers-Heinlein 2008; Pearson *et al.* 1993). First of all, there is a good reason why children mix their language – if a child, whose lexical resources are still limited, cannot find the right word in

one language, they use the available word from the other language. In addition, there seems to be a system in code-mixing. Even though a child produces a mixed utterance, he or she increases the number of words of a given language which matches the language of an interlocutor, a parent or a stranger (Werker & Byers-Heinlein 2008, 145).

2.2   Can bilingualism cause language disorders, difficulties, or delays?

Another quite big concern of an infant's parents is what bilingualism can cause when it comes to language development. One of the problems which is most usually addressed is whether or not bilingualism can somehow make the child's first language development slower when compared to monolingual children. Other concerns include the baby's first language (L1) not developing properly, mostly speaking about problems with language comprehension and talking, and they also include the baby's L1 abilities not being the same as those of monolingually-exposed peers. Thus, this section focuses on the possible problems with language development in bilingual infants.

Byers-Heinlein & Lew-Williams (2013, 8), Werker & Byers-Heinlein (2008, 148) and Pearson *et al.* (1993, 102) agree that a misperception is usually created when the size of the infants' vocabulary is counted. The MacArthur Communicative Development Inventories (CDIs) are used for this measure. For monolingual infants the measure of their vocabulary is quite straightforward unlike for the bilinguals, since for monolinguals one nameable object is linked to one word. If we want to measure the vocabulary size of a bilingual child, we need two checklists, for two languages, and then a comparison of these two single-language checklists.

When we compare the two languages of a bilingual child, we need to look for translation equivalents or cross-language synonyms, which Pearson *et al.* (1993, 102) call 'doublets', and then we analyse Total Vocabulary and Total Conceptual Vocabulary. Doublets are those words which have one referent and are named in both languages. For example, the words 'dog' and 'pes' are doublets, since they have the same referent. The within-language synonyms, e.g. 'hi' and 'hello' are counted as two words (Pearson *et al.* 1993, 104). Total Vocabulary consists of all the words a child knows in both languages no matter the cross-language synonyms, and Total Conceptual Vocabulary consists of the number of named referents, therefore the doublets are counted as one word only (Byers-Heinlein & Lew-Williams 2013, 8; Werker 2008, 148).

So, let us imagine we are measuring the size of a monolingual English child and a Czech/English bilingual child. The monolingual child knows approximately 100 English words, and the bilingual knows 60 Czech and 60 English words, so the bilingual child's Total Vocabulary consists of 120 words. However, if we assume that 20 of those words are doublets, then Total Conceptual Vocabulary is made of 100 words. Hence, both children know 100 words. This is, however, how the misperception happens. Parents of the bilingual child might think that their child does have some language difficulties or delays, because the knowledge of English, in comparison to monolinguals, is considerably lower. But when measured together with the vocabulary of the second language, we can see there is nothing wrong with the bilingual child.

Byers-Heinlein & Lew-Williams (2013, 9) and Bedore & Peña (2008, 1) mention in their research that bilinguals are often overidentified or underidentified with language impairment because the educators do not have the right expectations of language development in bilinguals, or because it is quite a challenge for the paediatricians and speech-language pathologists to decide whether a child does have a language impairment. In some cases, the health care providers simply tell parents not to raise a child in a bilingual environment, even though what they say is not supported by the science of bilingualism. That is why many researchers (Byers-Heinlein & Lew-Williams, 2013; Bedore & Peña, 2008; Kohnert, 2010; Genesee *et al.,* 2004) focus in their papers on how to properly assess and identify bilingual children and how to use this knowledge in practise. They focus on bilinguals with language impartment but state that bilingualism itself does not cause language impairment.

There is, however, one disadvantage that is mentioned in research of Friesen & Bialystok (2012, 49) which has been tested on both monolingual and bilingual children between 5 and 9 years old. Since bilinguals have limited exposure to both their languages, whereas monolinguals do not, it results in poorer language proficiency, especially the formal language knowledge, again in both their languages. A grammaticality judgement task was used in this study to prove the hypothesis that bilinguals will outperform the monolinguals on the semantically anomalous sentences, but they will have no advantage on the ungrammatical sentences.

Children were given several sentences which were either grammatically correct (e.g., Apples grow on trees), ungrammatical (e.g., Apples growed on trees), or grammatically correct but semantically anomalous (e.g., Apples grow on noses). Bilingual children really outperformed monolinguals on the semantically anomalous sentences because these sentences

place more demands on bilinguals' executive control (more about executive control below in section 2.3). However, bilinguals' performance on the ungrammatical sentences was worse, since for identifying grammatical errors, a child has to use the formal language knowledge (Friesen & Bialystok 2012, 51).

This disadvantage was examined only on young children, not older than 10 years. We do not know whether this disadvantage remains or disappears with age. Other than this, as the research proves, bilingualism does not cause any language difficulties, delays, or disorders.

2.3 Can bilingualism make the child more intelligent?

Having the ability to speak several languages has always been an advantage for humans of any age. It is a benefit in many respects – getting a dream job, being able to communicate about anything with anyone while travelling, meeting new people or, when we mentioned bilingual parents, getting to know the family of your partner.

But there is more than just the ability to talk more than one language. Studies have shown that bilinguals can have advantages regarding their social life, especially social understanding. "In some ways, this is not surprising, as bilinguals must navigate a complex social world where different people have different language knowledge." (Byers-Heinlein & Lew-Williams 2013, 3). Amaal Ali (2023, 396) supports this claim in her article saying that bilinguals do have certain benefits when creating connections or friendships and nowadays, speaking multiple languages is more than beneficial. The knowledge of different languages can help the children appreciate and understand other cultures, create a positive mindset towards them and, therefore, help with making new friends from other culture backgrounds.

Byers-Heinlein & Lew-Williams (2013, 3) and Amaal Ali (2023, 387) also agree that bilingualism can have a positive effect on child's cognitive development, for example on information processing, problem-solving skills, or certain aspects of memory.

Deanna C. Friesen and Ellen Bialystok (2012, 47) focused on a different side for they researched metalinguistic ability in bilingual children. Thanks to this ability people can intentionally reflect on and manipulate language, which then becomes an abstract object. There are certain criteria in order to perform this ability. First, children must know about the arbitrariness of language, that the form is separated from the meaning. Then, executive control is necessary, so that the child can focus on a required linguistic feature without getting distracted by meaning, and once the children are able to do this, they must have sufficient knowledge of the language.

Bilingualism affects all three facets of this ability, but in distinct ways. It has been found that bilingual children understand the principle of language arbitrariness earlier than monolinguals. Both bilingual and monolingual children were asked to solve the Piaget's sun-moon problem, to acknowledge the arbitrarily chosen labels. The names of objects were switched, so the sun was called the 'moon', and the moon was 'sun'. Therefore, when the 'sun' would be up at night, it would still be dark. Bilinguals showed superior performance (Friesen & Bialystok, 48).

The research also showed that monolinguals have less executive control systems than bilingual children. The executive control system, for bilinguals, is responsible for selecting the target language without getting distracted by information from the other language. Since bilinguals have to manage two languages and, therefore, the practice is increased, they have the benefit of more executive control systems (Friesen & Bialystok, 49).

So, to summarize, we cannot simply say that bilingualism makes the children smarter or more intelligent. We can only state the fact that there are some advantages for bilinguals, children as well as adults.

3   Lexical development in children

This chapter's focus is on the early lexical development and early use of language in infants from 6 to approximately 24 months of age. Ever since babies are born, they are excellent at figuring out the rules and principles of language, no matter what language it is. In the first section of the chapter the focus will be on the period when children do not yet speak but learn the language from their experience, from listening to their caregivers and people in general. It focuses on infants who are 6 to 9 months old. The second section of this chapter focuses mainly on language use, therefore, on word production, from the first syllables to fully meaningful words. Several phenomena describing the period from 9 to approximately 2 or 2 and a half year are introduced.

3.1   Early lexical development

This section is focused on early lexical development and lexicon in infants during the first several months of life, specifically from 6–9 months. It is described how infants learn first words and their meaning even before they can walk, or even talk. Several experiments testing and analysing the infants' word comprehension and their learning strategies are presented and explained.

The development of language begins already during pregnancy when the fetus listens to stress and intonation and learns the prosody and sounds of the ambient language. Since the first day a child is born, he or she is able to learn and mostly perceive any native language (Brice & Brice 2009, 13). Already within the first few days of an infant's life, s/he is able to recognize many phonological aspects of words, distinguish consonant-vowel syllables, differentiate two- from three-syllabic words and tell the difference between two languages (Brice & Brice 2009, 13).

Bergelson & Aslin (2017, 12916) performed research about early lexicon in 6-month-old infants and were focused on two main questions. First, if the infants' word comprehension is somehow affected by semantic relatedness, and second, if the early language and word comprehension is tied to home environment. For the first part of research eye-tracking was used, and for the second part the results were gathered from home-recording audios and videos.

In the eye-tracking experiment, infants were presented images with pairs of objects, which were either semantically related (e.g., apple–orange) or unrelated (e.g., apple–book).

The hypothesis was that if infants were affected by semantic relatedness, they would have much better results with the unrelated pairs of objects, the comprehension would be stronger. With the home-recordings, Bergelson & Aslin (2017, 12917) gathered either day-long audio or an hour-long video from infants' homes and picked only those parts when concrete nouns were presented to infants. The task was to find if this was related with the infants' results and performances in the in-lab eye-tracking experiment, and additionally, referential transparency was examined (i.e., if the caregivers talk about objects the infants can observe).

It was found that 6-month-old infants understand words more when shown pairs with unrelated objects than those with related ones, which suggests that the first words do have some semantic structure. There was also evidence found that word comprehension is connected to referential transparency at home, the input quantity being essential (Bergelson & Aslin 2017, 12919).

This, however, is not the only Elika Bergelson's research on young infants. In her study with Daniel Swingley (2012, 3253) she focuses on 6–9 months old infants' understanding of the meaning of words. For this to examine, they use the 'looking-while-listening' experiment, which is performed in a controlled environment. Infants are presented with a screen with two images (e.g., they can see words from categories 'food' and 'body parts'), one of which is always labelled in a sentence said by their caregiver who hears the pre-recorded sentence in the headphones. This is so that the infants would hear the words said by a familiar voice. Each infant was presented with either two paired pictures, each from one category (e.g., an apple and an ear) or a complex scene (e.g., a full body of a boy and a close-up of one body part). Different demands and methods were analysed with each trial, the paired pictures, or a scene. Picture 1 is given for a better understanding of the set-up.
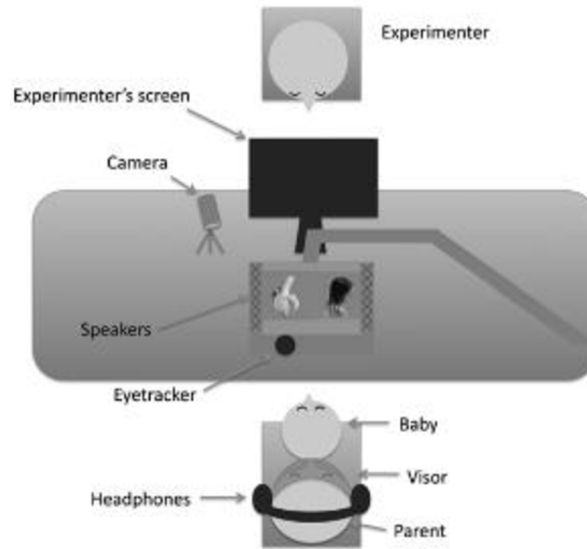
Picture 1 The set-up for the 'looking-while-listening' experiment
(Bergelson & Swingley 2012, 3254)

Bergelson & Swingley's theory (2012, 3255) was that if infant understood the word's meaning, they would fixate on the picture representing the spoken word, the word's referent. This research has proved that infants are able to understand the meaning of words, nouns, by 6–9 months of life. The two mentioned trials have revealed some of the infants' abilities. The paired picture task showed that infants can understand words even though the words' referents were given in a very narrow context, for example, when a nose was shown without eyes or the head. And the scene task showed how infants can distinguish some words from alternatives. For instance, when a child was presented a scene with a table with many different objects related to food and heard the word 'banana', he or she actually looked at the banana. Bergelson and Swingley emphasize that this experiment was not in any way practiced, meaning that it involved no training. This, therefore, means that infants learn the words and their meaning simply through their everyday experience.

According to Kuhl (2000, 11852) infants use three learning strategies to acquire language. First, they find patterns in the language. Second, they use statistical properties to identify units in running speech, and third, their perception is altered.

Infants are excellent at detecting patterns or similarities from the language input. A 6-month-old infant is capable of sorting different vowels into categories, and a 9-month-old infant can sort syllables based on phonetic features of the initial consonants, such as the difference between nasal and stop consonants. Infants also detect prosody patterns of their

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native language. At 9 months of age, they can recognize the stress or emphasis which is typical for their native language. For English it is the strong/weak stress pattern with the first syllable being emphasized. At the same age, 9 months, they can detect patterns of phoneme ordering in their native language. They can somehow "rule out" words or utterances which are not typical for their native language and can, therefore, identify the patterns for words that are typical.

For the second learning strategy, "infants detect and exploit the statistical properties of the language they hear to find word candidates in running speech before they know the meanings of words" (Kuhl 2000, 11852). A 7-month-old infant has been tested with artificial words to examine the ability to discriminate isolated syllables. Four syllables have been used, /ko/, /ga/, and two target syllables /de/, /ti/, and they have been rearranged several times, for example, /kogade/, /kogati/, /dekoga/ and more. The infants were able to discriminate the target syllables, /de/ and /ti/, which shows that infants show transitional probabilities.

All these abilities to discriminate sounds and listening preferences change with language experience and alter the child's perception. Findings from "the perceptual magnet effect" research explain this phenomenon. This effect "is observed when tokens perceived as exceptionally good representatives of a phonetic category ("prototypes") are used in tests of speech perception" (Kuhl 2000, 11853). Six-month-old American and Swedish infants were tested with the American vowel /i/ and a Swedish vowel /y/. The Americans showed the magnet effect for the /i/ vowel and treated the /y/ vowel as non-prototype. Swedish infants showed the opposite pattern with the magnet effect on the /y/ vowel. So, to conclude, at 6 months of age, language perception is warped by language experience.

3.2 Early language use

This section is focused on infants' early language use from 9 months to approximately 2 and a half years of life. The focus is on the first syllables to meaningful words produced by infants. Some phenomena describing early language production are described and exemplified.

Barrett (1996, 364) states that during the early lexical development, that is approximately from 9 months to 2 or 2 and a half years of age, children acquire different categories of words. At first, they produce direct, often unconventional expressions of what they feel at the moment. A child can, for example, say [məməmə] when he or she wants to be breastfed, or when being hungry.

Typically, after these expression of child's state, context-bound words appear. Children use these words in specific and/or limited situations, which are, however, regular to them. For adults, the same words would not be context-bound as the adults would use them in a larger range of situations (Barrett 1996, 364). As an example, the word 'papa' can be used. For the word 'papa' to be context-bound, it would have to be used only in a specific situation, for example, when a child hears the doorbell. It is context-bound because the child does not use the word in other situations. Other examples of context-bound words are shown below in Table 1.

Although, context-bound words are not the only early words children use. Many of the words used in the early development are contextually flexible. The children utter them to describe, for example, objects, animals, people, or actions. Later on, during the second year, the words can describe states of events, qualities, or properties. Unlike context-bound words, contextually flexible words are used in many different situations (Barrett 1996, 365). The word 'car' can be used. The child can use the word when he/she plays with a car toy, when he/she is sitting in a car, or when a car passes by on the street. More examples of contextually flexible words are shown in Table 2.

For an interlocutor, a parent or a stranger, it might be a little confusing why a child used a certain word in a specific situation, a context-bound word. So, even the interlocutor must find the reason why the child used that specific word. Then the interlocutor can focus on using those words more frequently and, in a way, help the child to make the context-bound words contextually flexible.

Table 1 Examples of context-bound word use (Barrett 1996, 365)

Word	Contexts of use
duck	While the child hits a toy duck off the edge of the bath.
bye	While the child puts a telephone receiver down.
sweep	While the child sweeps with a broom.
see	While the child points and turns to the listener for eye contact.
boo	While the child hides behind a curtain.
car	While the child looks out of the living room window at cars moving on the street below.

Table 2 Examples of contextually flexible word use (Barrett 1996, 366)

Word	Contexts of use
ball	While the child looks at, plays with, or requests: tennis balls, large colorful play balls, a beach ball.
teddy	While the child looks at a teddy; while the child touches the same teddy; while the child points to the same teddy; while the child plays with the same teddy.
open	As a request by the child for: a door to be opened; a jar of jelly to be opened; a box of cookies to be opened; her mother's hand to be opened.
more	While the child holds out an empty bowl; while the child brings an empty bottle to her mother; while the child reaches for a drinking cup before having another drink; while the child reaches into a toybox and takes out more bricks.

In addition to context-bound and contextually flexible words, there are social-pragmatic words. Children use them when they want something to happen, therefore, to fulfil a certain pragmatic function, when interacting with people around them. Barrett (1996, 366) mentions three words which are the most typical, and those are the words 'no', 'please', and 'look'. The word 'no' is used when a child wants to stop someone from performing a certain action. The word 'please' is a child's request for something, and the word 'look' is used to bring somebody's attention to an object. It is, however, necessary to state that these three categories of words, context-bound, contextually flexible and social-pragmatic, are not acquired at the same time.

Brice & Brice (2009, 43) propose another theory about infants acquiring and expanding lexicon in their early lexical development. They created a theoretical model and divided it into two tiers. The first one focuses on principles which start the development of the lexicon, from 12 to 18 months of life. The second one is about rapid word-learning and about how children use language knowledge and syntax, from 18 to 24 months. Only some principles from both tiers will be mentioned and described.

There are two principles in the first tier I will discuss. First, the principle of reference suggests that when children hear a new word, they think its referent, an object, an event, or an action, must be in their close surroundings. So, when they hear 'let's drink', they will name the action 'drink' when the caregiver gives them something to drink (Brice & Brice 2009, 43).

The second principle is the principle of extendibility, meaning that children learn a new word and add it to another word they already know (Brice & Brice 2009, 44). For example, a child knows the word 'car' and later discovers some cars can be big. He/she adds the knowledge of the word 'big' to the word 'car' and the phrase 'big car' is the extension.

The second tier talks about the principle of categorial scope and the principle of conventionality. The principle of categorial scope is about a change in word learning, when children stop naming objects based on their appearance and name them based on similarities of their category (Brice & Brice 2009, 44). For example, when children see a round candle, they call it a ball because it is round. But, when they use the principle of categorial scope, they put it in the 'candles' category.

When children learn the words and use them, they are not the words adults use in their speech. The principle of conventionality changes that. The words which are untypical, nonstandard, are replaced by words, and names, which are conventional, for actions, objects and more (Brice & Brice 2009, 44). For example, children use the word 'choo-choo' to describe a train, and with the principle of conventionality the word 'choo-choo', for describing the object, not the sound the object makes, ceases, and is replaced by the word 'train'.

According to Barrett (1996, 371), lexical development in young children, especially the use of words, is characterized by processes such as decontextualization, overextension, underextension, overlaps and mismatches. Decontextualization is a change of context-bound word into a contextually flexible word. For example, a child who earlier used the word 'duck' only when referring to a specific toy starts using the word in a wider range, for example, when s/he sees a real duck on the river. Overextension is when a child uses the same name for not only the suitable objects, but also to refer to inappropriate objects (inappropriate in the sense that adults use different words), such as when a child uses the word 'tick-tock' not only to describe a clock, but also a kitchen timer, because of the sound it makes when it is set. Underextension is the opposite of overextension. Underextension occurs when a child does not use a specific word for the full range of objects the word describes. Such as when a child uses the word 'bottle' to refer only to his/her baby bottle and not any other. Overlaps happen when a word is not used to refer to all the appropriate referents in adult language, for instance, when a child uses the word 'glasses' to refer only to dioptric glasses (with transparent lenses) and not to sunglasses. And the last phenomenon is a mismatch, a phenomenon which happens when a child's word referential scope has no overlap with the referential scope of adult

language. Barrett (2009, 372) uses the word, or a phrase, 'TV guide'. A child uses the word to refer to TV sets but not the television program guide.

4 Differences between monolingual and bilingual children

In this chapter I will discuss differences between monolingual and bilingual children. The differences can be observed in language acquisition, in perception and comprehension, and in production of language. In this chapter I will focus on perception and comprehension.

Werker & Byers-Heinlein (2008, 144) and Conboy & Montanari (2016, 97) mention in their research language discrimination, one of the differences between bilinguals and monolinguals. Language discrimination is very important for bilinguals as they need to separate speech input into two languages from the very beginning, whereas monolinguals treat all their input as one language. Even when bilinguals are in the one-person-one-language situation, they need to determine what differences between speakers are features of individual speaking and which are characteristic of the language they speak.

For infants, language rhythm is the key feature for discriminating languages since each language is categorized into either stress-timed (e.g., English), syllable-timed (e.g., French), or mora-timed (e.g., Japanese) rhythmical category. Newborns are able to discriminate languages from a different but not from the same rhythmical category. This ability improves between 4–5 months of age. Monolinguals can discriminate their maternal language from an unfamiliar one within the same category (they use the knowledge of one familiar language and are able to notice something 'different' about the second language) but cannot discriminate two unfamiliar languages within one category. For bilinguals, both of their languages are familiar to them, so they use other processes than telling apart the 'familiar' and the 'different' (Werker & Byers-Heinlein 2008, 145).

Monolingual and bilingual infants were tested in an orientation latency procedure to prove the hypothesis that bilinguals have dissimilar strategies when discriminating languages. During the procedure, an infant is seated in a small room with hidden speakers on the right and the left. They hear sentences both in their familiar language and unfamiliar language, presented randomly either from the right or left speakers. The time it takes infants to orient towards a speaker, or the sound they hear, is measured, and compared. Monolinguals showed language discrimination by orienting to their native language, unlike bilinguals who oriented to the unfamiliar language (e.g. a Czech-English bilingual orienting on French). Bilinguals' latency response was increased, and there is a speculation about why this is happening. Bilinguals first try to identify which of those two heard languages is their native, or familiar one, before orienting to the unfamiliar one. These results show difference in language

discrimination strategies between mono- and bilinguals (Werker & Byers-Heinlein 2008, 146).

This is supported by Bosch & Sebastián-Gallés (2001, 34) and their research on language discrimination in bilingual infants. It is stated that bilinguals showed later orientation to their maternal language unlike monolinguals who showed faster orientation to the maternal language. This, again, supports how the processes of language discrimination differ between mono- and bilingual infants.

Language discrimination is also possible with the use of visual clues on our faces, e.g., mouth gestures. Werker & Byers-Heinlein (2008, 146) discovered that 4-month-old infants are able to discriminate different languages, not from the same rhythmical class, by watching silent talking faces, mute videos of three women reciting sentences from a children's story. Werker & Byers-Heinlein (2008, 146) and Conboy & Montanari (2016, 97) mention in their research another difference between mono- and bilingual infants. Bilinguals are able to discriminate languages from these silent videos at 4, 6, and also 8 months of age, but monolinguals fail at the age of 8 months. Therefore, bilinguals have the ability to discriminate languages longer than monolinguals, which can help them with keeping their language input separate.

MacArthur Communicative Development Inventories which are used for measuring child's vocabulary size (more about CDIs in chapter 6.2) is where we can find another difference. Pearson *et al.* (1993, 93) used CDIs to determine whether bilingual children show some delay in developing early vocabulary in comparison to monolinguals by studying the infants' receptive and productive vocabulary. As was mentioned and discussed in chapter 2.2, when counting the vocabulary size of monolinguals and bilinguals we have to proceed in different ways. For monolinguals, the number of words is equal to number of named objects (e.g., they know 50 words which have 50 referents), but for bilinguals, because their language input is varied from monolinguals', there is a difference between Total Vocabulary (e.g., all the known words no matter the referents) and Total Conceptual Vocabulary (e.g., the number of referents, named objects, not known words).

In the study, they used 25 bilinguals between the ages of 8–30 months and 35 monolinguals between the ages of 9–30 months. Parents of these children were asked to fill either English, or Spanish adapted CDIs every 2-3 months, with the emphasis to mark only spontaneously produced words, not repetition, no matter the pronunciation. To measure the monolinguals' vocabulary size, all the words that parents checked off were counted. With

bilinguals, there were four measures: English and Spanish Vocabulary, and Total Vocabulary and Total Conceptual Vocabulary were made of the comparison of the single-language CDI forms. Then, the doublets (e.g., cross-language synonyms: 'dog' and 'perro') were found and the results were that about 85% on average of all the words were doublets (Pearson *et al.* 1993, 101–103).

Pearson *et al.* (1993, 112) found almost no differences in vocabulary size between the monolinguals and bilinguals. In fact, Pearson *et al.* say that "bilingual children's ability to understand two languages may be comparable *in each language* to monolingual children's" (Pearson *et al.,* 113). Therefore, the only difference is not in the vocabulary size, but at how to correctly measure the size of the vocabulary.

5 Effects of short-term exposure to L2 and the importance of social interaction during infancy

This study's subject's native language is Czech, so he has been mostly and primarily exposed to Czech. He has been exposed to one speaker of English, a Czech-English sequential bilingual, who is his aunt, who always interacts with him in English. The interactions in English take place regularly but are restricted to short time intervals. He has never overheard an English conversation, except for one with a native American, because nobody else in his family speaks English (see more in Research questions

In the previous section I introduced the MacArthur Short Form Vocabulary Checklist. It is used in this study for answering the first research question that this case study asks. In addition to this standardized tool, I also created a personalized vocabulary checklist, which consist of lexical words taken from transcriptions of the input audio recordings (see Methodology). The first research question addresses the lexical development of second language in the first 18 months of life:

(1) Is an infant in growing up in a monolingual Czech environment, who in the first 18 months of life experiences regular, albeit limited exposure to L2 English, able to learn to comprehend English words?

   a. How many words is the infant able to learn?

This case study also asks a question about the child's lexical development in his L1. For answering that question the Czech vocabulary checklist Dovyko is used. The Dovyko instrument is based on the CDIs, and here it is used to test whether the exposure to L2 English might have had a detrimental effect on the child's development of Czech vocabulary. The second research question of this study is formulated as follows:

(2) Is an infant growing up in a monolingual Czech environment, who in the first 18 months of life experiences regular, albeit limited exposure to L2 English, able to learn to comprehend Czech words like a monolingual Czech child?

   a. Is there evidence of word comprehension delay?

Methodology).

Social interaction is essential for language and lexical development. Before infants begin to learn to recognize words, they first learn how to differentiate sounds. As has been mentioned in chapter 4, infants are very much capable of telling the difference between sounds of any language, native or foreign. However, Kuhl *et al.* say that "[b]etween 6 and 12 mo of age, the ability to discriminate foreign-language phonetic units sharply declines" (Kuhl *et al.* 2003, 9096). Therefore, an experiment has been initiated in order to find out how and if this decline could be prevented.

There were two experiments conducted, one for finding out whether the decline can be prevented, and the second to determine whether social interaction contributes to phonetic learning or if it is possible without social interactions. In the first experiment, thirty-two 9-month-old American infants were exposed to native speakers of Mandarin Chinese in twelve 25-minute-long sessions who read to the infants from children's book and played with toys. After these sessions, infants were tested in Mandarin Chinese test stimuli. Their task was to discriminate an alveolo-palatal fricative and alveolo-palatal affricate syllables common for Mandarin Chinese. After this, their speech perception was tested in a head-turn procedure (more about the HT procedure in section 6.1). The infants should turn their heads when they hear a change in the repeating sound played from speakers. This experiment has proven that even a short-term exposure to a second language can reverse the decline in speech perception of a foreign language (Kuhl *et al.* 2003, 9097).

In the second experiment, there were also thirty-two 9-month-old American infants who were in twelve 25-minute-long sessions exposed to the same speakers of Mandarin Chinese as in experiment 1, but only through professionally produced audio-visual or audio-only recordings, with a close-up on the speakers, so that their facial expressions and mouth movements were visible. The infants were subjected to the same two tests, the Mandarin Chinese test stimuli, and the HT procedure. It was found that infants exposed only the audiovisual or audio-only recordings had much lower visual attention than in the first experiment (Kuhl *et al.* 2003, 9099).

The first experiment revealed that the decline in language perception can be reversed without long-term exposure to a language, that even a short-term exposure is sufficient enough to affect phonetic perception. The second experiment determined that infants' speech perception, or phonetic perception, is not in any way affected by only listening to and

watching audio or audiovisual recordings without interaction with the speakers (Kuhl *et al.* 2003, 9100).

How is it that a video with the same native speakers and the same reading cannot change the perception? Kuhl *et al.* (2003, 9100) believe that certain interpersonal social cues, which an audio cannot give, attract infants' attention, and motivate them to learn the language. In addition to that, interaction with a person gives the infants more information, for example, when parents show infants a picture with their gaze focused on the picture, infants follow the gaze to find out something new, it again attracts their attention. Simply put, children love to play and interacting with adults is more fun and motivating then when watching a video.

Jerome Bruner (1983, 19) also depicts the importance of social interaction with infants and states that without interaction the infants would not be able to enter the linguistic community. He is a major contributor to the Social Interactionist theory proposed by Lev Vygotsky. According to the theory, "children are social beings who acquire language in service of their needs to communicate" (Fahim & Amerian 2015, 2). Bruner claims that children spend most of their first year of life communicating and socializing and that the interaction between the infant and an adult builds the language structure long before verbally communicating (Brumer 1983, 27).

To conclude, social interaction is very important for infants during their early development. The interaction with adults, either caregivers or not, helps to prepare them for the society, for social interaction in the future. For the subject of this study, the social interaction was very important because even though it was regular, it was limited.

6 Testing language development in infants

My thinking about doing research with a young child was inspired by a manual of research methods created by a team of researchers and students from the Cornell University and the Cornell Language Acquisition Lab (CLAL). The goal of the manual is "to support and sustain research in the area of language acquisition" (Blume & Lust 2017, preface). In this chapter I focus on testing language, and specifically on the main types of methods that can be used for testing lexical development.

In language studies, theoretical and empirical methods are needed, and every theory needs to be supported by evidence, i.e. the data, which are truly valid. To get this type of data, any research we conduct should be built on two types of empirical methods – observational and experimental. These methods are based on observation, either in a laboratory or in the child's natural environment, and they test hypotheses (Blume & Lust 2017, 13–14).

The experimental method is a method where the subject is presented with a controlled and pre-designed stimuli in a controlled environment to evoke a reaction using, for example, a task or other techniques. The experimental method can be, for example, the Head-Turn Procedure which examines language comprehension (see more in 6.1). The observational method is the opposite of experimental method. Here the subjects are not presented to pre-designed stimuli and are not studied in a controlled environment. Rather, children are examined in their natural and well-known environment, mostly at their homes, and the researchers are simply observing their behaviour, their use of language (Blume & Lust 2017, 14).

Working with a child is much more difficult than with an adult. Children may not be as cooperative as adults. They do what they want to do when they choose to do it. We cannot force a child into collaborating with us, the child will work with us only when he or she wants to. Also, especially when working with infants and using the observational method, they can get bored and start doing something completely different then what we have come for. However, our priority is to keep the children happy and natural and not be forceful, even if it means the "session" is over.

Knowing how to test language development in infants is essential for this qualitative study. This research studies a boy infant from birth to his 18 months of age. He is studied and analysed only with observational methods and from naturalistic data, since the interlocutor is his aunt and is observing him in his home and in natural environments – while eating, being

with his grandparents, playing on a playground and more. Many times, especially when Jan, the infant boy, was not older than 5 months, he was not very cooperative and the sessions planned (e.g., reading books to him, playing with him etc.) usually did not go as planned. Still, I could not have interfered and made him cooperate, not when he was younger, neither when he was older, around 10 to 18 months of age.

6.1   Methods of testing infants' language comprehension and perception

In this section, the focus is on testing infants' language perception and comprehension. There are several experimental methods of doing that, I have chosen to discuss two that were most interesting to me, and which have been widely used (e.g. by Dr. Peter Jusczyk, 1999).

The first method is called High Amplitude Sucking procedure (HAS) which tests speech discrimination in 2- to 3-months old infants. Dr. Peter Jusczyk used this procedure to determine if infants are able to distinguish the differences between the speech sounds and what kind of information the infants remember (1999, video).

A baby is given a pacifier which is connected to a pressure transducer. Once the sucking rate of the baby (how much and how often) is set, the speech sounds are being played every time the infant gives a hard suck. Once the baby realizes what is going on, which is quite quickly, the sucking gets faster, and the sounds are therefore played more often (1999, video).

When the baby gets bored listening to the same sounds the sucking rate gets slower. To test if babies can truly tell the difference between speech sounds, new sounds are played and if the baby's sucking rate increases again, it is a proof that babies can tell the difference between speech sounds, and those can be speech sounds of any language (1999, video).

Dr. Peter Jusczyk also used this procedure to examine if the babies remember the information they hear. For this to find out, there is a second phase when no sounds are being played but only pictures are shown to the babies (only for about 2 minutes). Later, the sounds are played again and if the baby remembers, the sucking gets faster. If the baby is presented with new sounds the sucking gets even faster (1999, video). This procedure shows that babies as young as 2–3 months old can both tell the difference between speech sounds, and they remember well what they hear.
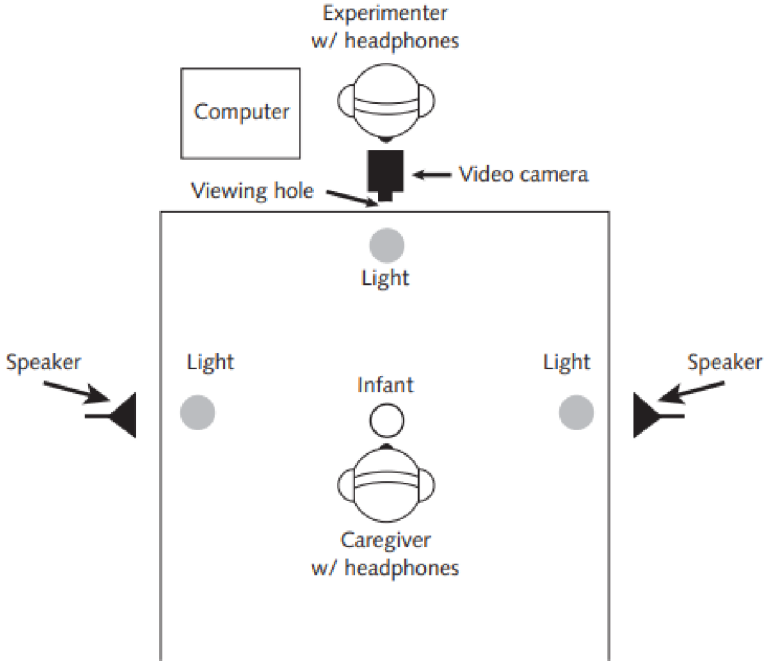
The second method is the Head Turn Preference procedure (HPP) which tests speech segmentation in older infants and can also test how long a baby remembers a word. It is,

however, not performed on babies younger than 4 months, because it requires them to turn the head without any problems.

The baby comes with a caregiver and is seated on his or her lap in a boot with three lights (as shown in Picture 2). First, the baby's attention needs to be focused on the centre with a light, after that the centre light is turned off, one of the side lights is turned on and speech begins to play (video).

In the video, provided by Derek Houston, a Professor of Speech, Language, and Hearing Sciences at the University of Connecticut, a baby is first familiarized with the word 'doctor' and listens to it as long as it is "interesting" for the baby. In the test phase, the same word is put in connected speech, i.e. a sentence or a phrase, and when a baby recognized the word 'doctor', he or she turned towards the light/speaker.

It has been discovered that infants that are 7,5 months old pay more attention to the blinking light when they hear words they had been familiarized with. This suggests that infants by 8 months are able to "segment words from fluent speech" (Houston, 425). During both HPP and HAS procedures the caregivers and/or experimenters are wearing headphones with loud music not to affect the infants in any way.

Picture 2 The Head Turn Preference Procedure (Houston 2008, 424)

6.2 Methods of testing the infants' vocabulary

Infants' language development can be studied for many reasons and in many ways. The second part of this thesis deals with testing the lexical development of an infant boy. An instrument that has been used in a large number of studies of children's vocabulary development is the MacArthur-Bates Communicative Development Inventories (CDIs).

The CDIs are parent report instruments which help assess their infants' communicative skills. There are two forms of CDIs – a long CDI and a short one, developed for parents who do not have much time and need a quick assessment of their children (Fenson *et al.* 2000, 95).

There are two levels of CDIs based on the age of the children tested, Level I called The Words and Gestures, and Level II called The Words and Sentences (Marchman & Dale 2023, 01). We are interested in Level I designed for infants who are 8–18 months old. The short form Vocabulary Checklist for Level I is shown in Figure 1. It consists of 89 words. The long form of Level I consists of 395 words which are divided into 22 semantic categories (Pearson *et al.* 1993, 99).

Marchman and Dale have stated that parents bring valuable insights. They are, as the primary caregivers, much more aware of their children's behaviour and impressions since they spend hours and hours observing and interacting with them. This rich experience cannot be matched by the short time spent children spend in laboratories. Moreover, they argue that "[parents'] reports are less likely to be influenced by factors that may mask a child's 'true' abilities in the laboratory or clinic (e.g., child non-compliance)" (Marchman & Dale 2023, 01).

Elizabeth Bates, from whose early efforts to collect parental reports the CDIs evolved, wanted the parents to focus more on newly developing and emerging behaviours, to focus on the present and not recall. So, the key for CDIs is that parents are only asked to choose from a list of words rather than to remember and recall (Marchman & Dale 2023, 01).

The MacArthur-Bates Communicative Development Inventory is a favourite way of researching not only early language development and the size of child's vocabulary, but also to uncover language delays as shown in chapter 4. Thanks to the great interest of researchers all over the world, the Advisory Board has authorized versions of the Inventory in more than 100 languages, which were all not translated, but adapted to each specific language, its sociocultural and linguistic features. Not only the CDIs have now more than a hundred

versions, but the Web-CDI is also available for those parents who prefer their laptops or phones to paper-pencil forms (Marchman & Dale 2023, 02).

MacArthur Short Form
Vocabulary Checklist: Level I

Make no stray marks.   Improper Marks   Proper Mark
Erase any changes cleanly.   ⊘⊗⊖⊙   ●   USE NO. 2 PENCIL ONLY

Child's Name _____ Sex _____

Birthdate _____ Today's Date _____

VOCABULARY CHECKLIST

For words your child understands but does not yet say, mark the first column (understands). For words that your child not only understands but also says, mark the second column (understands and says). If your child uses a different pronunciation of a word, mark it anyway.

	UNDERSTANDS	UNDERSTANDS AND SAYS		UNDERSTANDS	UNDERSTANDS AND SAYS		UNDERSTANDS	UNDERSTANDS AND SAYS
choo choo	○	○	chair	○	○	wait	○	○
meow	○	○	couch	○	○	break	○	○
ouch	○	○	kitchen	○	○	feed	○	○
uh oh	○	○	table	○	○	finish	○	○
bird	○	○	television	○	○	help	○	○
dog	○	○	blanket	○	○	jump	○	○
duck	○	○	bottle	○	○	kick	○	○
kitty	○	○	cup	○	○	kiss	○	○
lion	○	○	dish	○	○	push	○	○
mouse	○	○	lamp	○	○	sing	○	○
car	○	○	radio	○	○	smile	○	○
stroller	○	○	spoon	○	○	night	○	○
ball	○	○	flower	○	○	today	○	○
book	○	○	home	○	○	all gone	○	○
doll	○	○	moon	○	○	big	○	○
bread	○	○	outside	○	○	broken	○	○
candy	○	○	plant	○	○	dark	○	○
cereal	○	○	rain	○	○	fast	○	○
cookie	○	○	rock	○	○	hurt	○	○
juice	○	○	water	○	○	pretty	○	○
toast	○	○	babysitter	○	○	soft	○	○
hat	○	○	girl	○	○	I	○	○
pants	○	○	grandma	○	○	me	○	○
shoe	○	○	mommy	○	○	how	○	○
sock	○	○	bath	○	○	who	○	○
eye	○	○	don't	○	○	away	○	○
head	○	○	hi	○	○	out	○	○
leg	○	○	night night	○	○	other	○	○
nose	○	○	patty cake	○	○	some	○	○
tooth	○	○	please	○	○			

Figure 1 The MacArthur Short Form Vocabulary Checklist for Level 1
(Fenson *et al*. 2000, 108)

6.3   Research questions

In the previous section I introduced the MacArthur Short Form Vocabulary Checklist. It is used in this study for answering the first research question that this case study asks. In addition to this standardized tool, I also created a personalized vocabulary checklist, which consist of lexical words taken from transcriptions of the input audio recordings (see Methodology). The first research question addresses the lexical development of second language in the first 18 months of life:

(3) Is an infant in growing up in a monolingual Czech environment, who in the first 18 months of life experiences regular, albeit limited exposure to L2 English, able to learn to comprehend English words?

    a.   How many words is the infant able to learn?

This case study also asks a question about the child's lexical development in his L1. For answering that question the Czech vocabulary checklist Dovyko is used. The Dovyko instrument is based on the CDIs, and here it is used to test whether the exposure to L2 English might have had a detrimental effect on the child's development of Czech vocabulary. The second research question of this study is formulated as follows:

(4) Is an infant growing up in a monolingual Czech environment, who in the first 18 months of life experiences regular, albeit limited exposure to L2 English, able to learn to comprehend Czech words like a monolingual Czech child?

    a.   Is there evidence of word comprehension delay?

7   Methodology

In this section I will be describing this research's subject in detail. However, my primary focus will be on language exposure. Also, I will characterize the methods I used while collecting data and what data these are. There will also be a focus on testing the subject using one of the tests mentioned in the previous section.

The child studied in this research is called Jan. He was born on 10th September 2022 in Valašské Meziříčí, a town in Eastern Moravia, more specifically its part Wallachia, in the local hospital to his parents, the primary caregivers, Žaneta and Jiří. He was born at 4.41 a.m., weighting 3120 grams and he was 49 cm tall. According to the birth report provided by the hospital and information given by the mother, Jan was born prematurely in the 38th week.

During birth, Jan had an umbilical cord wrapped around his neck. According to Jan's paediatrician, there are no permanent health problems or conditions related to this so-called nuchal cord. When born, Jan's temperature was low, and he had to be put under the heat lamp. This has not caused any health problems either.

A cephalohematoma has formed on his head after birth. It is a condition associated with a difficult birth when blood pools under the newborn's scalp. Since the cephalohematoma has not absorbed itself, the blood had to be drained surgically in the University Hospital in Olomouc. After it has been removed, there have been no other injuries or problems with Jan's head.

Right after birth there have been some tests conducted which were focused on Jan's sight and hearing. His mother reported that there have been no complications, and his sight and hearing were not impaired.

Within three days after birth, Jan's weight has dropped to 2800 grams since the mother could not yet breastfeed. The fourth day, when the breastfeeding started, his weight has gone up to 2930 grams. Ever since then his weight keeps growing and has not dropped. The mother has been breastfeeding him for 5 months and after that he started to eat complementary foods and solid food without difficulties, still being breastfed until he was 20 months old.

The primary caregivers, as has been mentioned, are Jan's parents Žaneta, who was 26 when giving birth, and Jiří, who was 30 at that time. They are both native speakers of Czech language. Neither of them speaks English with Jan except for a few words said by his mother, but that will be further discussed.

Jan spends a lot of time with his grandparents, from his mother's side, Bronislava and Jaroslav, but mostly with his grandmother. Since Jan was 4 months old, she has been babysitting him once a week for a whole day. However, according to the mother, his grandmother sees him much more often, sometimes three to four times a week, sometimes every day in a week. Jan also sees his other grandmother Lenka often, from his father's side. She is, however, not as close to him as Bronislava.

Since Jan was 2 months old, his mother and him had started taking so-called "tubbing" lessons, which help with psycho-motor development, relieve stomach aches, improve posture, help the child get used to the water and much more. Jan has been seeing the same instructor from the beginning and all of them, Jan, his mother, and the instructor, have been interacting using nursery rhymes, children's songs, and sensory toys. Now they go to swimming and exercising lessons. Jan's mother said he is truly comfortable around his instructor and remembers her very well. All people mentioned are native speakers of Czech.

For the purposes of this report, I observed Jan since his birth until his 18th month of life, that is until March 2024. During that time there have been no problems or abnormalities in his development. His mother claims he is a "chart baby". Everything concerning his development goes exactly according to given norms, as confirmed by Jan's paediatrician.

7.1 The character of baby Jan's interactions with caregivers

From Jan's birth I, as Jan's aunt as well as his only English-speaking interlocutor and data collector in this study, has been seeing him once a week on weekends. As Jan got older and was less dependent on his mother, around the age of 4 months, I started seeing him more often, twice to three times a week, as my studies allowed. However, there were three intervals when I didn't see him for up to three weeks, due to illnesses or simply busyness.

As his aunt I have been able to observe him in the course of everyday life in his family environment. He has gotten used to me and was willing to interact with me all the more because of it.

The language input I provided to Jan was mostly interactional input. In addition to speaking and playing, I also read to him extensively from children's books till he was 6 months old. When playing, I engaged parts of his body (hands, fingers, feet, etc.) and used phrases which either rhymed, used a lot of repetition, or I sang them, e.g., a riding song: "We are riding a bike, riding a bike, we are, we are riding a bike, riding a bike, riding a bike, we are, we are riding a bike." I used this song when Jan had stomach pain which was very often.

Later our play involved color-learning (usually from a children's book but later from objects around us), a lot of object naming (these objects involved mostly his toys and things he himself liked) and also singing. I performed different kinds of everyday activities, such as bathing the baby, feeding him, changing diapers, or getting him dressed. I regularly sang to Jan when putting him to sleep or trying to calm his crying.

During the period described in this study, Jan received little non-interactional input in English. From the age of 6 months onwards, I was almost never alone with him but participated in interactions between him and his mother, and/or most of the time his grandmother. They would play him Czech nursery rhymes and songs, or children's TV shows, because they wanted to listen to and watch the content with him. They also used the media to get him calmed down during mealtimes. While we were watching Czech TV shows together, I would talk to Jan in English, commenting on what was happening in the shows, naming objects, describing actions or sounds. There was one English children song called "Baby Shark" that Jan's mother played to him regularly.

There were a few times when I watched a programme on TV and Jan joined me, but it did not keep his attention. When I played "Alvin and the Chipmunks" in English, when he was 16 months, he watched it for a moment, probably interested in the high-pitch voices, but then he left and started playing with his toys. According to Jan's mother, it was not unusual. Even in Czech he would watch a children's video for 5–10 minutes and then lose interest in it.

So far, English interactions with people other than me have been very limited. Jan has heard a native speaker of American English when he was 9 months old, but it was only a few words (see Transcription 1 in the Appendix). Jan's mother and grandfather tried talking to him in English on a very few occasions, too, but only a few words to try to see if he would understand a speaker other than me. The outcome was that he understood both of them when they used phrases I have used frequently, e.g., "Can I get a kiss?" or "high five". However, Jan's mother participated in the conversation with the native speaker of American English, as can be seen in Transcription 1. The last person interacting with Jan is his grandmother, but due to her lack of knowledge of English, she either repeated words I said, isolated, or named an object whose name was written, e.g., a penguin. Given all this, however, it is crucial to state I am the only one who speaks English fluently in Jan's presence and who has been interacting with him regularly since birth.

To summarize, I am a Czech native speaker and so are people in Jan's surroundings. None of the people he spends time with speaks English in any situation, with the few

exceptions mentioned above. This affects what language I speak around Jan. When directly talking to him, I speak only English. When it comes to language of overhearing, he hears only Czech, because as was mentioned, I have to speak in Czech to the other family members. Jan has never heard me talking with anyone in English, except for that one occasion when the American English speaker was present. Interestingly, Jan's mother, his grandmother and I have independently noticed that my using Czech produces a novelty effect and attracts Jan's attention. Whenever I start speaking in Czech close to Jan, and it is not that often as I try to avoid it, he stops doing whatever he is doing (e. g. playing, watching, eating) and stares at me, motionless. As if it was strange for him to hear me speak a different language than English.

7.2 Aunt Tereza – The interlocutor's English proficiency and experience

I am a Czech native speaker, and both of my parents are Czech. I have been learning English at school for the past 16 years since the age of six. Currently, I am studying English as an academic student at Palacký University in Olomouc. I am mostly a typical classroom instructed learner. I have been enhancing my English input by reading books, listening to natives speaking in videos, movies, and other available media resources. My language competence is at least at C1 level of CEFR (Common European Framework of Reference for Languages). I have never obtained any official certificate confirming this level of competence, but as a student of English philology at the Department of English and American studies I have passed a compulsory exam which tests the knowledge and competence of listening, reading, vocabulary and grammar at C1 level.

My immersion experience is not particularly extensive. In 2016, I travelled to England, London with my primary school classmates and teachers. We stayed for one week and we attended English courses with native speakers every day during our stay. I have used English in an international context when in May 2023, I visited Tromsø in Norway for three days with Palacký University's choir ATENEO. In October 2023, we hosted the Norwegian Arctic Student Choir in the Czech Republic, all as part of the 'Together in Chorus' project. This experience was quite special as there were many people from different countries (Germany, Brazil and Australia) in the Norwegian choir and it was an opportunity to be exposed to a variety of accents.

I have visited more European countries, such as Greece, Italy, Switzerland, Croatia, France and Austria where I used English interactively, but none of those countries have English as an official language.

7.3   The linguistic features of the English input

Now, I would like to describe linguistic features of my language input to Jan. Since Jan's birth to 10 months of age I recorded myself whenever I interacted with him. From those recordings, it is clear my language addressed to Jan has features of Infant Directed Speech, IDS, or so-called baby-talk. Some of those features are phonetic, including the use of a slower rate, greater variations in pitch, the sing-song tone, and a high pitch voice or lengthening of vowels. Some are lexico-grammatical, such as the use of short non-complex phrases, and many diminutives, e.g., mommy, daddy, doggie, kitty, tummy, auntie, blankie, froggy. The older Jan got, the more complex the phrases became, e.g., "Munchkin, could you put this on the table?" instead of a simple phrase "on the table". My speech showed fewer variations of pitch and the speaking rate got faster. My voice pitch still got high sometimes, and I still used a lot of diminutives until the end of the observation period.

Since I have learned English as a foreign language, there are non-native features in my speech. Some characteristics of my English influenced by Czech include, for example, the absence of the contrast between vowels /æ/ and /ɛ/. This contrast is absent in my normal speech, which is faster and more connected. When I speak slowly (including when I use IDS), I believe that this contrast can be perceived well. Another non-native feature in my English is word-final devoicing, especially of the voiced alveolar stop /d/. Whenever I use a regular verb in past tense, with –ed suffix as /d/ or /ɪd/, instead of pronouncing the stop as voiced I pronounce it as voiceless [t] sound. I may pronounce /aɪ dɪskʌvəd/ as [aɪ dɪskʌvət]. These are the most frequently occurring non-native features in my speech. There are other ways in which Czech affects English pronunciation, e.g., replacing /ð/ and /θ/ with /s/, /f/ and /t/; using /w/ instead of /v/ and vice versa; word final /ŋ/ pronounced as /ŋk/ (Šimáčková & Podlipský 2011, 141), but since I have been studying and learning English since I was 6 years old and I have devoted myself to English quite significantly, these features are usually not present in my speech.

On the prosodic level Czech pronunciation of English is quite monotonous, especially adult speech. Since my speech in this study was directed at an infant, my pitch range was quite large and the melody quite varied.

As a non-native speaker, I have been making mistakes in my grammar and in vocabulary. What was the most occurring problem in grammar was forming questions in past tense, e.g., *Did you see it?* My problem was that I was also putting the verb in the past tense,

creating an ungrammatical sentence, e.g., *Did you saw it?* However, I have always corrected my mistake by repeating the grammatically correct sentence.

The problem with vocabulary was with the use of opposites, for example, *lend* and *borrow*. This is a mistake that keeps occurring even now, but as with the grammar, I have always corrected myself.

In addition to non-nativeness, my English is a mixture of American and British features. I have been told by a native speaker that British accent is predominant in my pronunciation which may be because British English is taught at schools. However, I have also experienced a strong influence from American media, especially movies and TV series. This has had an influence not only on my accent but also on my vocabulary (e.g., *biscuits VS cookies, pavement VS sidewalk, candy floss VS cotton candy,* etc.).

7.4   Lexical limitations of the input

Most significantly, what started to be a problem as Jan got older, was not knowing English words. Several times, when trying to name objects, I had to turn to using dictionaries. Many times, when I could not find a word, I tried to avoid naming the object. When I could not avoid referring to an object, I simply referred to it as "it". Objects which I could not name were at first baby things (e.g., baby stroller, thermometer etc.), then animals (e.g., anteater, walrus, etc.) or flowers (e.g., daisy, marsh marigold). Sometimes I used a wrong name for an object, for example, calling a windmill "a fan".

I find it a great disadvantage that I do not have the vocabulary of a native English speaker and I am aware that this partially effects even Jan's results. In section 6.2 I introduced the MacArthur Short Form Vocabulary Checklist, which consists of 89 words. There are words on the list which Jan has not ever heard me say. In addition, we must also consider the fact that these are parental reports, and I, as Jan's aunt, could not ever possibly use the same amount and range of vocabulary as a parent would.

7.5   Audio recordings and transcriptions

As I have mentioned above, I recorded myself for some time, mostly the first five months and then Jan's tenth and twelfth month of life. The purpose of the recordings was to monitor my linguistic input to Jan, i.e., to see which words I use around him. As he got older, however, it got more and more difficult to keep recording my speech, because the boy kept moving a lot,

kept taking the recorder from me and there was more noise than speech. Also, many times we found ourselves unexpectedly at places which were not fit for recordings (e.g., children's playrooms, cafes, or supermarkets). When I stopped recording, I tried to write the words down. However, it was impossible to write down all the words since my role as an observer conflicted with my role as the boy's aunt. I could not keep writing things on my phone if I wanted to keep his attention.

I have approximately 16 hours of audio recordings. I transcribed 11 out of the 45 recordings and made a list of words appearing in those recordings. To this I added the words I successfully wrote down on my phone and I made two tables of all the words from the 11 transcribed recordings and my phone (these tables are enclosed with the thesis as an Excel document). Further, I submitted three selected transcriptions (when Jan was 1 month, 4 months, and 9 months old) to the Altmann Quantitative Linguistics Analyzer (Altmann & Popescu) to illustrate the lexical range and frequency of my English input to the boy. The figures and the attached table include only English words. All the words in other languages, mostly Czech, even if said by me, are only in the recordings (attached with the thesis).
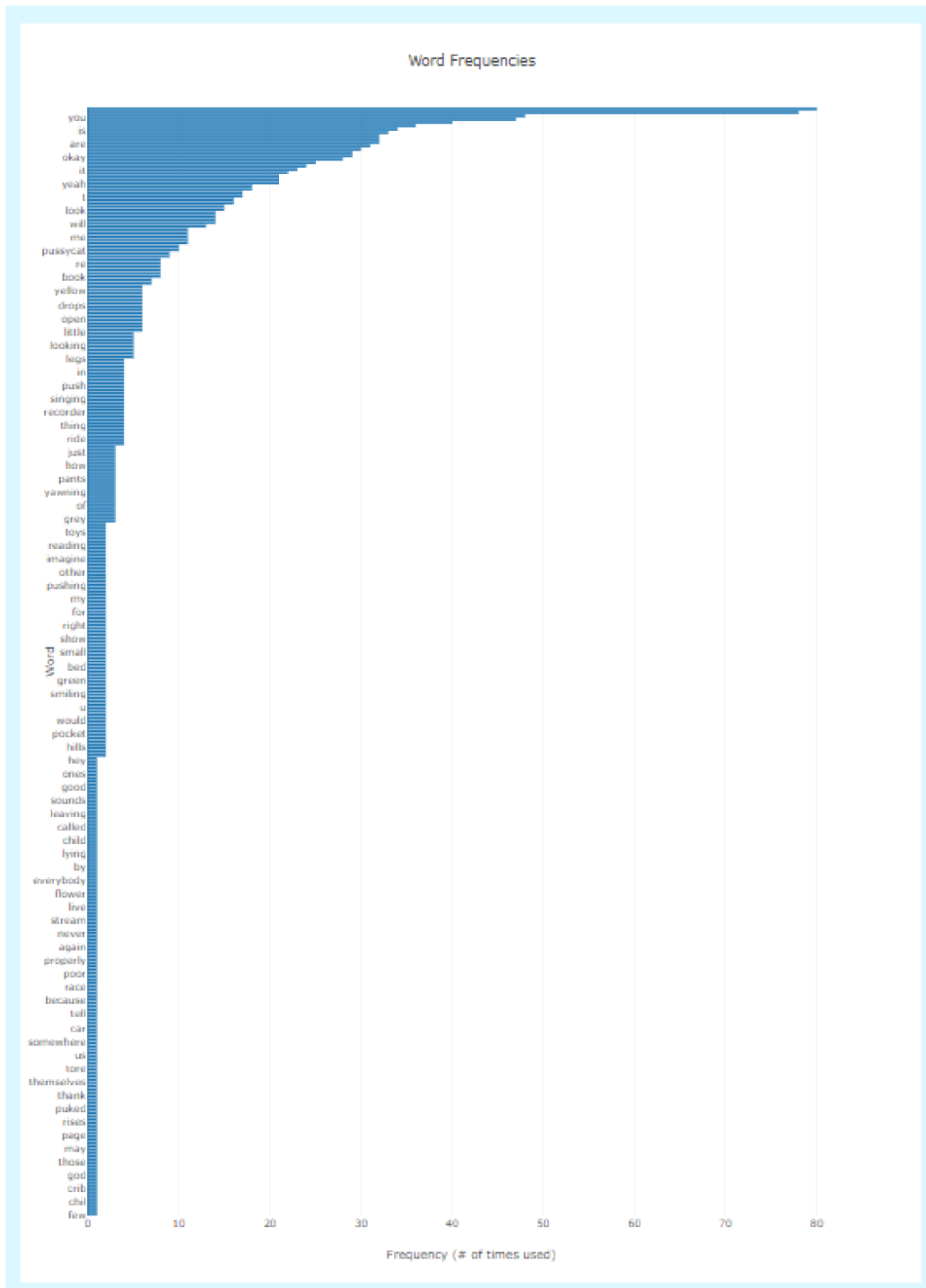
Figure 2 Word frequencies from a transcription of a recording made on 9th October 2022
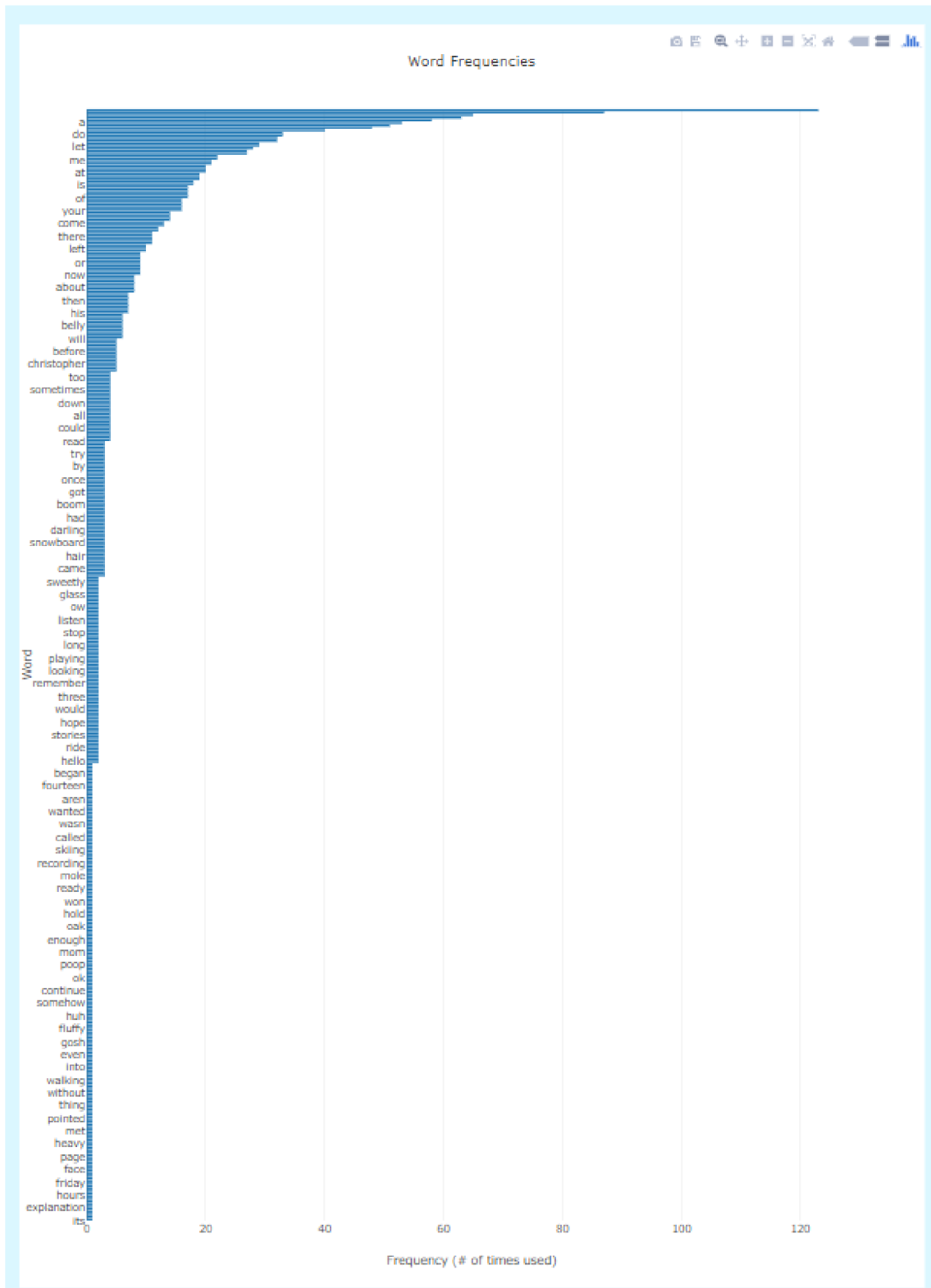
Number of words: 1726; Vocabulary size: 331

Figure 3 Word frequencies from a transcription of a recording made on 14th January 2023
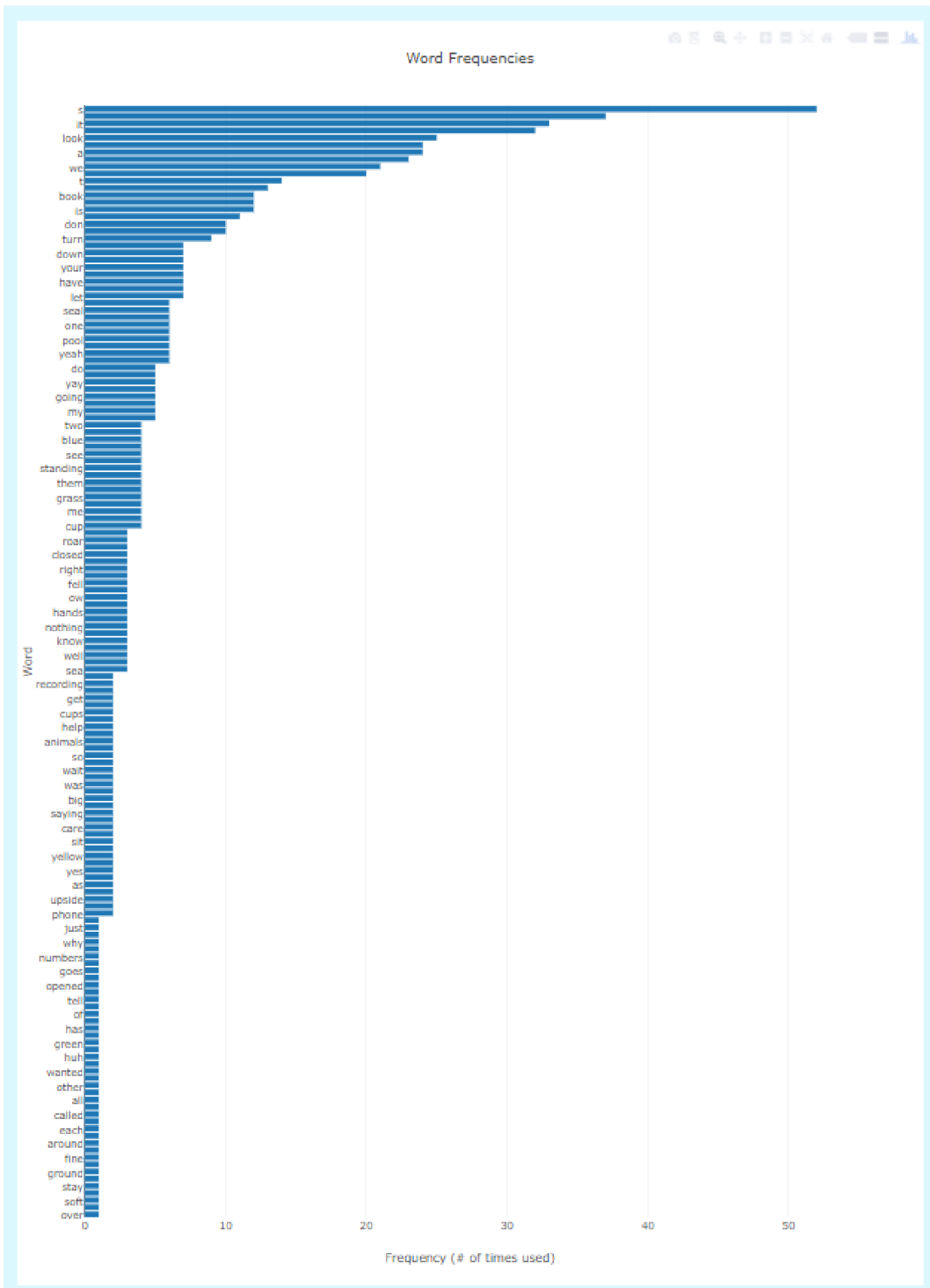Number of words: 2363; Vocabulary size: 435

Figure 4 Word frequencies from a transcription of a recording made on 18th June 2023
Number of words: 774; Vocabulary size: 155

7.6   Testing baby Jan's English vocabulary

I have used two methods to find out if Jan truly understands the words shown in the MacArthur Short Form Checklist. What I did the most was to make him do something, very often to get someone or me something, or go to someone. For example, the word *me* was tested in a sentence *Give me a kiss.* To be sure he understands, first I told him this: *Give grandma a kiss.* If Jan did what he was asked to do, to kiss his grandmother, then I told him *Give me a kiss.* If he did, I knew he understands, as I only switched *grandma* for *me.*

Another method I used was looking while listening. This was used either with pictures in books or with Jan's toys. For example, I would put several toys on the floor next to each other and usually asked Jan: *Where is …?* The toys were, for example, his cars, balls, or books (with balls and cars we were also practicing colours). At first, he only looked at the items I asked him about. When he was older (around 14 months), he started giving me the toys. With books, he usually simply either looked at an animal/object (e.g. *kitty, dog, duck, goose,* and others) or pointed to it (Jan started pointing around 15 months of age).

7.7   Testing baby Jan's Czech vocabulary

For testing the English vocabulary, the MacArthur Short Form Checklist was used. However, in order to find out whether English has in any way affected Jan's Czech language, specifically his lexical development, a Czech adaptation of the CDIs, Dovyko, was used. This checklist has two parts: Dovyko I is for children from 8 to 18 months, and Dovyko II is for children from 16 to 30 months (Paillereau *et al.,* 2023). For this study, Dovyko I was used, because this checklist examines both language perception and production. Dovyko II examines only language production, and since Jan produced 6 words when he was 18 months old, this checklist was not appropriate.

Since Dovyko is an adaptation of the CDIs, the checklist is very similar, using two columns 'understands' and 'understands and says' and same methods for testing Jan's Czech vocabulary were used. One difference between the Czech and the English forms, in this study, is the number of words. As was mentioned, the English Short Form consists of 89 words, and the Czech Dovyko consists of 402 words.

When Dovyko I is filled in, the results of the baby are compared with the norms in the table showing the numbers for each month of age, and percentile, just like the English Short Forms. However, the decision to test Jan's Czech vocabulary was made late and Jan was,

therefore, tested when he was 21 months old. The checklist in Dovyko I was appropriate for Jan who even at the age of 21 months had a very limited productive vocabulary. However, since the instrument is for children up to 18 months of age, Jan's results could not be directly interpreted.

8   Results and discussions: Baby Jan's lexical development

This case study asked two research questions which are formulated in section 6.3. The first question addressed the development of L2 English vocabulary. To answer the question, the MacArthur Short Form Vocabulary Checklist was used. In total, Jan could understand 52 out of 89 words at the end of his 18th month. According to the percentile scores for vocabulary comprehension, Jan's score reached the 40th percentile (Fenson *et al.* 2000, 111).

In Figure 5 I present the MacArthur Checklist filled in by me for Jan on 9th March 2024. The words he knows are marked in black.

MacArthur Short Form Vocabulary Checklist: Level I

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*For information/copies, contact the Developmental
Psychology Lab, San Diego State University, San Diego, CA 92182

Make no stray marks. Erase any changes cleanly.	Improper Marks ⊘⊗⊖⊙	Proper Mark ●	USE NO. 2 PENCIL ONLY

Child's Name _____ Sex _____

Birthdate _____ Today's Date _____

VOCABULARY CHECKLIST

For words your child understands but does not yet say, mark the first column (understands). For words that your child not only understands but also says, mark the second column (understands and says). If your child uses a different pronunciation of a word, mark it anyway.

	Understands	Understands and says		Understands	Understands and says		Understands	Understands and says
choo choo	●	○	chair	●	○	wait	●	○
meow	●	○	couch	○	○	break	○	○
ouch	○	○	kitchen	●	○	feed	○	○
uh oh	○	○	table	●	○	finish	●	○
bird	●	○	television	○	○	help	●	○
dog	●	○	blanket	○	○	jump	○	○
duck	●	○	bottle	●	○	kick	●	○
kitty	●	○	cup	●	○	kiss	●	○
lion	○	○	dish	○	○	push	●	○
mouse	○	○	lamp	○	○	sing	○	○
car	●	○	radio	●	○	smile	●	○
stroller	●	○	spoon	●	○	night	○	○
ball	●	○	flower	●	○	today	○	○
book	●	○	home	●	○	all gone	○	○
doll	○	○	moon	●	○	big	●	○
bread	●	○	outside	○	○	broken	○	○
candy	○	○	plant	●	○	dark	○	○
cereal	○	○	rain	●	○	fast	○	○
cookie	●	○	rock	●	○	hurt	○	○
juice	○	○	water	●	○	pretty	●	○
toast	○	○	babysitter	○	○	soft	○	○
hat	●	○	girl	●	○	I	●	○
pants	●	○	grandma	●	○	me	●	○
shoe	●	○	mommy	●	○	how	○	○
sock	●	○	bath	○	○	who	○	○
eye	●	○	don't	●	○	away	○	○
head	●	○	hi	●	○	out	○	○
leg	●	○	night night	○	○	other	○	○
nose	●	○	patty cake	○	○	some	○	○
tooth teeth	●	○	please	●	○			

Figure 5 MacArthur Short Form Vocabulary Checklist for Jan

As we can see, only the first column in the Short Form is filled in. Jan did not produce any word from the Short Form during or at the end of the observation period, but his three most repeated words were [ɑjɑjɑj] meaning something fell down, or he did something wrong, [məməmə] meaning 'hungry' or 'eating' (even when animals eat) and [ə-hə] meaning 'yes'.

We see 37 words which are not coloured at all. This is partially because some of those words have never been used in the input. Those are: *candy, cereal, juice, toast, television, dish, babysitter,* and *patty cake.* Sometimes, other words similar to those on the list have been used (e.g., *TV* for *television, bread* for *toast*).

Jan, however, understands more words than those on the MacArthur Checklist. The eleven transcriptions of the audio recordings and the words written down on my telephone consist of approximately 23 760 English words and the vocabulary size is approximately 2118 words. I also checked Jan's understanding of the words from this input. Those words that Jan clearly understands are included in Table 3. The 149 words in this table are content words organized according to the word class – nouns, verbs, adjectives, adverbs and other. Taken together with the 52 words in the standardized checklist, the data confirms that at the age of 18 months baby Jan understood at least 201 English words. As can be seen in the table, he understands mostly nouns and verbs.

Table 3 Content words understood by Jan

Understands					
Nouns		Adjectives	Verbs	Adverbs	Other
hedgehog	dummy	good	want	here	no
table	mommy	better	hug	there	this
froggy	book	big	look	again	me
kitchen	hands	blue	see	up	where
shoe/shoes	belly	yellow	give	more	yes
car	baby	yummy	take	behind	bye
flower	hand	careful	go	out	please
grandpa	tea	green	wait	down	hello
bedroom	mouth	red	say	under	nope
munchkin	darling	purple	come	outside	goodnight
uncle	doggie	orange	hold		goodbye
strawberry	ball		put		one
raspberries	auntie		open		two
pillow	pig		smile		
chair	leg/legs		kick		
blueberries	sheep		turn		
balloon	page		eat		
mama	cat		try		
fridge	toys		show		
step	hair		sit		
button	head		drink		
feet	nose		kiss		
bang	tree		push		
banana	bed		stop		
snowball	daddy		close		
train	food		clap		
hug	blanket		dance		
rocks	kitty		change		
pokey	Andrew		stand		
spoon	tiger		run		
foot	pants		blow		
pigeon	door		hide		
guineapig	grandma		wipe		
socks	phone		spin		
bathroom	bottle		toot		
balloon	circle/circles		throw		
TV	diaper		shake		
			pull		
Total: 149 words					

50

The second research question this case study tried to answer was concerned with the development of Czech vocabulary of the infant boy. I wondered whether learning English might have a negative effect on L1 development. For this, the Czech adaptation of MacArthur CDIs, Dovyko, was used. Just like the CDIs, the scores are presented in percentiles. As was mentioned above, we have to bear in mind that Jan was tested when he was 21 months old and his results cannot be directly compared with other baby boys since the oldest age group included in Dovyko are 18-month-olds.

However, when Jan was 21 months old, he understood 279 out of the 402 words that are in the Dovyko vocabulary checklist and, according to his mother, said 3 words presented in Dovyko: 'mňam', 'máma' and 'jé'. If Jan were tested at the age of 18 months, his results would correspond to percentile 70, when it comes to word comprehension and percentile 25, when it comes to word production (Paillereau *et al.* 2023, 2-4). When the languages are taken separately, the vocabulary size of the boy may appear limited.

We cannot say with at this point that exposure to English has caused a language delay or limited his language development. When Czech and English words are taken together, Jan understands at least 408 words (just above the 100th percentile in Dovyko I). Jan has spoken some words even before he was 18 months old, he does have passive vocabulary in both English and Czech languages, but his active vocabulary is still very limited. However, according to Paillereau *et al.* (2024), if a child scores above the fifteenth percentile, it could be stated that the results indicate no risk of any language disorders and the higher the score is the smaller the risk is.

9 Conclusion

To conclude, the main focus of this bachelor thesis was foreign language vocabulary learning in the first 18 months of life in a monolingual L1 community.

In the first part of the paper, chapters 2–6, I reviewed academic papers and other sources and focused on early language and lexical development, on bilingualism and its advantages and disadvantages, on differences between monolinguals and bilinguals, on the effect of social interaction during language learning and the research methods used to examine infants' language comprehension, perception and their vocabulary. The second part of the thesis reported on a case study I conducted over the period of 18 months. It described the child's living circumstances, his language input, the process of testing his vocabulary and reported the results of the research, answering this study's research questions.

In chapter 2, I focused on effects of bilingualism and raised the question whether bilingualism is good or bad for a child and if it causes any language disorders or difficulties. Based on my data from one child at this point in his development I cannot make any definite conclusions about bilingual exposure in early childhood. So far Jan's language behaviour in L1 appears normal, neither the parents nor members of a wider family or his paediatrician see any signs of language difficulty or delay. It is true that Jan's active vocabulary is still very limited; at the end of data collection, he spoke 6 words in total. However, this is not unusual even for monolingually brought up children. It is still too soon for saying that exposure to English has or has not affected his development in the Czech language. Even though, according to Dovyko (Paillereau *et al.* 2023), with Jan's results, the risk of any language disorder can be ruled out.

At the same time, it is clear that a child with regular though limited (approximately weekly) exposure to a foreign language from a non-native speaker in an otherwise monolingual community is able to learn at least two hundred L2 words.

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Appendix

Transcription 1

I = interlocutor; NA = Native American; JM = Jan's mother

I: [talking to Jan] Eh, I will record this, okay? We will record a native American. Yes, that's my phone, wee. That's my phone. That's a native American. [talking to native American] Can I, can I ask you for something?
Native American: Yeah!
I: I'm trying to learn him English, or teach him English, sorry, and he's never heard a native, 'cause I'm not native. So, can you please tell him something? Something very nice.
NA: What is your name?
I: What's your name?
NA: What is your name?
I: It's Jeník.
NA: Jink?
I: Jeník.
NA: Jenik.
I: Ehmm.
NA: Like Janek but Jenik.
I: Kinda.
NA: Yeah? Okay.
I: It's like Honza, basically, but more of a Czech version.
NA: My name is Jason.
I: It's Jason.
NA: Can I shake your hand?
I: Can he? Give him his hand.
NA: Is this your hand? My name is Jason.
I: Heey.
NA: You are handsome.
I: Yeah, handsome little fella.
NA: Handsome. And your mother is beautiful.
I: Oh, I'm not his mother.
NA: Oh, you're not? Oh..
I: No no, I'm his aunt.
NA: Oh, his aunt. Your aunt is beautiful.
I: Thank you.
NA: Yes, absolutely.
I: His mother is standing over there and rubbing her head, whatever.
NA: No, I wouldn't, I would not know.
I: It's okay.
NA: You are handsome.
I: He's a native American, that's good for us.
NA: Yes. Anything you need to know, but I am American, not English.
I: Americans are better. Don't tell the British.
NA: That's why we beat them.
I: It's actually for my bachelor thesis, so it's gonna be fun.
NA: How old is he?

I: Ehm, it's… how old are you?

NA: Eighteen months?

I: Oh, no, no, he's not even a year, a year old.

NA: No, not even a year old.

I: He's like ten, ten months.

NA: I'm sorry, eight months, eh, ehm… how is this thing, you answered one.

I: Ten months.

NA: Ten months?

I: E-hm, ten months. I think ten months. Wait, what month is it? June, or…

NA: Today is June.

I: Oh, sorry, nine months.

NA: Nine months?

I: Nine months.

NA: Nine months. Not eighteen months, because he was…

JM: This is my son.

I: Yeah, that's his, that's his mother.

NA: Oh. He's very handsome.

JM: Nice to meet you. I'm Žaneta.

NA: Ganeta? My name is Jay, yeah.

JM: I know.

I: Yeah, she was...

JM: [talking to me] Jo, je tombola.

NA: He is handsome. Beautiful eyes…

JM: I know!

NA: Yes!

I: Our family is…

JM: After mommy.

I: She told me that she was afraid to tell you 'Thank you', that you let her go somewhere near the toilet or something.

NA: Oh yeah!

JM: Between the door.

NA: Yeah, absolutely, no! I…

JM: Too late!

I: [talking to Jan] You wanna go to mommy?

JM: Nevím, jestli nemá pán třeba tombolu.

I: It's 'tombola'. I don't know how is that in, in… Did you buy the tickets?

NA: Yeah.

I: So then, it's happening right now.

NA: I gave them US cash, so I had to convert it to crowns, so…

I: That's good! Thank you very much!