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NTNU
Norwegian University of Science and Technology

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Infant-Directed Speech in Norwegian Fathers and Mothers: Relations to Gender and Gender-Role Attitudes

Master's thesis in Psychology
Supervisor: Nunne Englund
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Abstract

The current study had two central aims – to add to previous research on the properties of the IDS of Norwegian mothers and fathers, and to examine whether the gender differences of IDS can be influenced by gender role attitudes and sexism. 9 mothers and 9 fathers were recorded while playing with their 7–18-month-old infants, and implicit and explicit attitudes towards gender were assessed with the Implicit Attitude Test (Greenwald, 1998) and the Ambivalent Sexism Inventory (Glick & Fiske, 1996). Acoustic analyses for fundamental frequency (f0), vowel space area and vowel duration were performed on the vowels /a/, /a:/, /i/, /i:/, /u/ and /u:/, and voice onset time (VOT) was analyzed in the consonants /b/, /p/, /d/, /t/, /g/ and /k/. Linear mixed models showed that mothers' IDS contained a raised f0, increased vowel space area, elongated vowels and shorter VOT compared to adult-directed speech (ADS). No gender differences were found for vowel duration and VOT, but fathers' f0 was significantly less raised than that of mothers, and fathers' vowel space area was decreased in IDS relative to ADS. Significant relationships were found between some IDS exaggerations and both facets of ambivalent sexism. Implications for future research are discussed.

Sammendrag

Denne studien hadde to sentrale mål – å bidra til kunnskapen om norsk barnerettet tale (BRT), og å undersøke hvorvidt kjønnsforskjeller mellom mødre og fedre i BRT kan påvirkes av holdninger til kjønnsroller og sexisme. Det ble gjort opptak av 9 mødre og 9 fedre mens de lekte med sine 7 til 18 mnd gamle barn. Implisitte og eksplisitte holdninger til kjønnsroller og sexisme ble målt med the Implicit Attitude Test (Greenwald, 1998) og the Ambivalent Sexism Inventory (Glick & Fiske, 1996). Opptakene ble analysert akustisk for fundamentalfrekvens (f0), vokalrom og vokallengde i vokalene /a/, /a:/, /i/, /i:/, /u/ og /u:/, og for Voice Onset Time (VOT) i konsonantene /b/, /p/, /d/, /t/, /ɡ/ og /k/. En linear mixed models-analyse viste at BRT hos norske mødre besto av forhøyet f0, større vokalrom, lengre vokaler og kortere VOT sammenlignet med voksenrettet tale (VRT). Det ble ikke funnet kjønnsforskjeller i vokallengde eller VOT, men f0 var signifikant mindre forhøyet hos fedre enn hos mødre, og fedres vokalrom var mindre i BRT enn i VRT. Det ble funnet signifikante sammenhenger mellom enkelte komponenter i BRT og de to underkategoriene i ambivalent sexisme. Det blir diskutert hvilke følger dette har for videre forskning.

Forord

Denne oppgaven markerer slutten på min tid som masterstudent ved NTNU.

Til tross for at oppgaven i sin helhet ble skrevet under covid-19-pandemien, ble den ferdig på normert tid. For det vil jeg rette en stor takk til min veileder Nunne Englund, for god oppfølging og tilbakemeldinger, og for mange gode samtaler. En stor takk går også til de 9 familiene som har vært deltakere i studien, og som sa ja til å delta i et forskningsprosjekt i en krevende tid. Jeg vil også takke min samboer og min familie for støtte og oppmuntring gjennom hele perioden.

Oppgaven følger oppsett og referansestil fra sjette utgave av APAs publiseringsmanual og retningslinjer fra Psykologisk Institutt ved NTNU, samt NTNUs mal for masteroppgaver. All datainnsamling og alle analyser er gjennomført av meg.

Karen Engen Økland

Trondheim, april 2021

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1 Introduction

Language is the most important means of communication to humans, and learning to understand and use it is fundamental to mastering life for the human infant. Several studies have found that early language skills and language development predict many success factors later in life, such as academic achievement and social skills (Cochet & Byrne, 2016; Fujiki, Brinton, & Todd, 1996; Kastner, May, & Hildman, 2001). While decades of research have examined language learning in both infants and adults, and developed extensive theories and hypotheses about how language is acquired, there are still missing pieces to the puzzle.

One important focus of language development research has been infant-directed speech (IDS). IDS is the speech from a parent or other caregiver to an infant, and it has been shown to include some unique phonetic qualities (Cristia, 2013). IDS appears to have similar properties across languages and cultures, which suggest the existence of a semi-universal parental approach to language development. The nature-nurture debate of language learning has also focused on IDS, with nativists arguing that the seeming universality of IDS proves the existence of an innate language learning function, while constructivists uphold IDS as an example of how language is learned from the child's parents and surroundings (Akhtar, 2004).

Parents seem to play a vital role in early language learning (Soderstrom, 2007). The parents usually provide the majority of language stimuli from birth, and both mothers and fathers interact verbally with their infants before the infants themselves talk back. Mothers and fathers seem to approach language development and parenting styles in slightly different ways, and this varies across cultures (Burnham, Kitamura, & Vollmer-Conna, 2002; Fernald et al., 1989; Schoppe-Sullivan et al., 2006). There are also large gender differences in division of labor in the home, where women do most of the domestic housework (Dribe & Stanfors, 2009; Kamo, 1988; Perrone-McGovern, Wright, Howell, & Barnum, 2014).

Although there are some cross-cultural differences in parental involvement and division of labor, traditional gender roles still affect child-rearing in most cultures (Brinton & Oh, 2019; Dribe & Stanfors, 2009; Kamo, 1988; Perrone-McGovern et al., 2014). As some countries, like the Nordics, have a high degree of gender equality both in the workforce and at home, it can be hypothesized that both societal and individual attitudes towards gender roles could be a mediator of parental involvement and gender differences in the home (Hakovirta, Cook, & Sinclair, 2020; Holm, Ekström, Hach, & Lund, 2015; Haataja, 2009). Like all others, parents are multi-faceted human beings, and thus subject to influence from their experiences and culture. The environment that a child grows up in is ever-changing and complex, and language learning does not happen in a contextual vacuum.

2 Theory

2.1 Early language experiences

Humans have a unique ability to learn language, but this ability is dependent on early language experiences (Mayberry, Lock, & Kazmi, 2002). During their two years of life, human children develop from an almost non-lingual being to being able to communicate verbally about abstract and complicated ideas, both with other children and with adults. By early language experience, one often means the language stimuli, typically speech, that the child experiences during its most crucial years of language development, from birth until the child's first words (Hart & Risley, 1995).

The most important period of language acquisition is often referred to as the sensitive or critical period for language learning (Knudsen, 2004). Sensitive periods are limited intervals of development during which the effects of a particular type of experience on the brain are considerably stronger (Knudsen, 2004). Broadly, the first year or two of life are often referred to as the sensitive or critical period for language learning, but this time can be divided into several segments such as a specific period for phonetic discrimination (Ruben, 1997). Critical periods are a type of sensitive period during which the individual's experiences result in permanent structural or functional changes in the brain. Some believe that if the individual does not learn a particular skill during its critical period, the individual will never learn that skill (Knudsen, 2004). However, Kuhl et al. (2005) argue that the periods of first language acquisition are sensitive but not critical, in part due to the stories of how children who were deprived of language during their sensitive period still managed to learn some language, although not at the level of their non-deprived peers (Fromkin, Krashen, Curtiss, Rigler, & Rigler, 1974; Moeller, 2000; Yoshinaga-Itano, Sedey, Coulter, & Mehl, 1998).

In a longitudinal study from 2005, Kuhl and her colleagues tested one native and one non-native phonetic contrast on a group of infants at 7, 14, 18, 24 and 30 months. The researchers found a negative correlation between the infants' native and non-native perception skills - infants who were skilled at perceiving native phonemic contrasts were less skilled at perceiving non-native contrasts, and vice versa. The infants' perception of native and non-native phonetic contrasts at 7 months also predicted both the speed of language acquisition and their language skills at 30 months. Infants who were better at perceiving native contrasts at 7 months showed faster language development and higher language skills at 30 months than those who were better at perceiving non-native contrasts. According to the authors, this could mean that the infants who were more skilled in perceiving non-native contrasts were at a more neurally plastic or "open" stage in their language development (Kuhl et al., 2005).

This also supports the theory of a sensitive period for language development, as this period would be a very "open" stage.

Another important element in the support of a sensitive rather than critical period for language learning is the case of deaf or hearing-impaired infants born to hearing (non-signing) parents. Only a small number of hearing-impaired infants are born to sign language proficient parents, while the vast majority get little to no language experience before they are diagnosed as deaf, and often less than other children even after their diagnosis and treatment (Mayberry et al., 2002). The time at which the diagnosis is made is also a contributing factor to the extent of the child's language delay (Yoshinaga-Itano et al., 1998). In a study measuring the language skills of 112 hearing-impaired children, Moeller (2000) found a correlation between the age the children enrolled in the program, and their vocabulary and verbal reasoning skills at 5 years of age. While children enrolled before the age of 2 had scores that were similar to their hearing peers, children who enrolled at 2 years of age or later had substantially lower scores (Moeller, 2000).

The abovementioned studies indicate that language learning does not happen spontaneously, and point to the undoubted need for external stimuli in the infant's language learning process. All external language stimuli the infant receives is referred to as the infant's language environment.

2.1.1 The infant's language environment

In a large-scale longitudinal observational study, Gilkerson and her colleagues (2017) recorded the language environment of 329 English-learning infants once a month for several years. The researchers found that on average, a child aged 5-48 months hears 12.300 adult words during the course of a 12-hour day (Gilkerson et al., 2017). However, speech directed at the infant is only a small part of the infant's language environment – speech between adults, speech directed at other siblings, and background noises such as the radio or television constitute a large portion of the infant's language input (Soderstrom, 2007). More and more videos and digital games aimed at teaching language to toddlers are available online, but several recent studies have found that while toddlers are able to learn new words from digital material, they are dependent on their parents' presence and interaction to do so (Barr, 2019). In addition, in households where a lot of television is watched, parents' speech to their children have a lower overall quality (Lavigne, Hanson, & Anderson, 2015).

Speech directed at infants holds some unique linguistic qualities and is often referred to as *motherese* or Infant-Directed Speech (IDS) (Cristia, 2013). The linguistic qualities of

IDS are believed to be extremely beneficial for language learning (Soderstrom, 2007). As IDS constitutes a relatively small share of the infant's language environment, it is logical to assume that it is the quality, not the quantity, of speech heard by the infant that is important for language learning.

The home language environment has been shown to be an important predictor for language development. A study examining changes in the home learning environment of children approaching school age, found that a consistent increase in language stimuli from the parents was the most beneficial to children's language learning (Son & Morrison, 2010). Home environment measures such as academic stimulation and language stimulation have also been found to positively predict cognitive development (Molfese, 1996). These findings indicate that the home environment is important for language acquisition, and that language stimuli from the parents a very important factor.

2.1.2 Social differences in language environment

Language development does not happen in a vacuum, and there are several kinds of social and cultural aspects that could mediate the relationship between language stimuli from the parents and language learning. One of these is socio-economic status (SES), which is often operationalized as a function of parent's occupations, income, and education level (Bradley & Corwyn, 2002). Studies on the link between SES and language often focus on the quantity of words the infant hears during its first years of life, and the effect of SES on language and academic skills in schoolchildren.

In a renowned study from 1995, Hart and Risley found a large discrepancy in the words heard by children from low and high SES backgrounds. The study, which was conducted on families from different social backgrounds in the United States, found that a 4-year-old in a family on social welfare heard less than one third of the words heard by a 4-year-old in a professional family. From this, the authors extrapolated a 30-million-word gap dividing high-SES and low-SES children during their first three years of life (Hart & Risley, 1995, 2003). In a study by Gilkerson et al. (2017), a 3000 word deficit per day was found in the language environment of children from low-SES families, which corresponds to a four-million-word gap when the child reaches the age of 4 years. The authors also found support for the 30-million-word gap between the lowest and highest 2 % of the groups, which supports claims that Hart and Risley's (1995, 2003) findings of a 30-million-word gap are correct only in extremes (Gilkerson et al., 2017). Low-SES children with early hearing loss also have substantially poorer language comprehension than their peers, a finding which

supports claims that there is a direct link between the amount of speech a child hears and their language competence, and that this amount is mediated by SES (Nittrouer & Burton, 2005). In a Swedish assessment of the language skills of 1019 18-month-old children, Berglund, Eriksson and Westerlund (2005) found no effect of SES on language skills. This suggests that in countries with small social differences such as Sweden and the rest of the Nordic countries, the effects of SES on language learning are negligible.

In a recent meta-analysis, Sperry, Sperry and Miller (2019) disputed Hart and Risley's (1995, 2003) findings, arguing that Hart and Risley's (1995, 2003) study used SES as a proxy variable for ethnicity, and that the 30-million-word gap could be explained by cultural differences in communication towards children. Based on this, Sperry et al. (2019) argued that the 30-million-word gap alone should not be used to explain SES differences in language proficiency or academic achievement. Sperry et al. (2019) used data from five studies in different American communities, with participants from different ethnic groups and SES brackets. The study found that the relationship between SES and number of words addressed to infants was weak, and that the word gap disappeared when the researchers employed a wider definition of language environment than that used by Hart and Risley (1995, 2003), which included all words, both directed at the child and ambient speech within the child's hearing. This led the researchers to conclude that word quantity is not as vital for language learning as previously thought, and that the quality of speech is much more important.

This argument was supported in a recent study by Brookman et al (2020), in which the home language environment of 42 infants was recorded. Half of the infants had mothers who had been diagnosed with either depression or anxiety, while the other half had mothers who reported no mental health issues. Infants in the two groups heard the same number of adult words, but the mothers in the diagnosed group provided fewer conversational turns, and their infants had fewer vocalizations during conversation with their mothers. The authors also found a correlation between the number of infant vocalizations at the time of the trial, and vocabulary at 18 months (Brookman et al., 2020). This supports Sperry et al.'s (2019) claims of the importance of quantity over quality in language input, while also suggesting that anxiety and depression can act as a mediating factor on the relationship between conversational turns and vocabulary size (Brookman et al., 2020).

Post-natal depression and anxiety are issues that can affect up to half of women during the first six weeks after birth, and many continue to struggle for long after this (Lee et al., 2007). Exposure to maternal depression increases the risk of later language difficulties in infants (Sohr-Preston & Scaramella, 2006). A proposed explanation for this is that depressed

mothers talk less to their children in general, in addition to being less responsive to their children's language cues (Stein et al., 2008). An important predictor of postnatal depression is low SES, suggesting that in addition to poorer quantity and quality of language input, infants from low-SES families have an increased risk of growing up with a depressed mother or father, which could further damage their language learning (Rich-Edwards et al., 2006; Seguin, Potvin, St-Denis, & Loiselle, 1999; Sethna, Murray, & Ramchandani, 2012).

Gender is another social aspect of language development. There are significant gender differences in language skills both in early childhood and school age, with boys scoring lower than girls (Sadowski, 2010). Young boys in school have significantly lower reading skills than young girls, and a higher risk of being diagnosed with a learning disability (Wheldall & Limbrick, 2010). A similar difference is observed in much younger children – a large international meta-analysis found that boys were behind girls in emerging language skills as early as before the age of 1, and that this difference only increased with age (Eriksson et al., 2012). As many researchers have argued that socialization is at least equally important to genetics in the development of gender differences, it is natural to assume that early language stimuli does in some way contribute to this difference (Eagly & Wood, 2013).

In a longitudinal study by Kitamura and Burnham (2003), the mothers of girls talked more to their children throughout the first year of life, while mothers of boys used more non-verbal vocalizations instead. According to the authors, this could be a result of girl infants providing more cues, prompting their mothers to speak more to them. This difference in cue providing could further be explained by differing developmental trajectories in girls and boys during the first year of life (Kitamura & Burnham, 2003). As Kitamura and Burnham study only included mothers, the parent's gender could also be a reason for the difference in sensitivity. A study by Johnson, Caskey, Rand, Tucker and Vohr (2014) found that although mothers seem to be more responsive overall and speak more to their children than fathers do, mothers show a slight preference for talking to their daughters while fathers show a slight preference for talking to their sons. In a society where mothers do the majority of childcare tasks, this could lead to young boys having an increased risk of receiving poorer language input than girls.

Early language stimuli, especially in the form of speech directed at children, seems to be a key factor in early language learning (Cristia, 2013; Fromkin et al., 1974; Kuhl et al., 2005). While the importance of speech quantity is disputed, it seems that the quality of speech could be a deciding factor in the child's early language acquisition, potentially affecting language skills and academic achievement also later in life (Hart & Risley, 1995, 2003;

Nittrouer & Burton, 2005; Sohr-Preston & Scaramella, 2006; Sperry et al., 2019). Because of this, parental IDS has become an important part of language acquisition research.

2.2 Acoustic-phonetic qualities of Infant-Directed Speech

IDS differs from adult-directed speech (ADS) on all levels of language, and is characterized by increased repetition, a large number of questions and more focus on attention-getting words (Soderstrom, 2007). On the acoustic-phonetic level, IDS has a number of unique acoustic qualities that are not found in other types of speech, that are thought to maintain interest in the infant at the same time as providing high-quality language stimulation. ADS does not share the same acoustic qualities (Soderstrom, 2007). The acoustic qualities of IDS have been found in many different languages, including Norwegian, Swedish, English, German, French, Mandarin Chinese, Thai, Japanese, and even Japanese Sign Language (Englund & Behne, 2006; Fernald & Simon, 1984; Floccia et al., 2016; Grieser & Kuhl, 1988; Kitamura, Thanavishuth, Burnham, & Luksaneeyanawin, 2001; Masataka, 1992; Sundberg, 1998; Werker et al., 2007). IDS differs across the age span, and parents enhance different phonetic aspects of speech at different times in the infants' development (Kitamura & Burnham, 2003). The qualitative changes in IDS as the infant ages suggests that IDS is a natural response in adults who address infants, and that it is an important part of human language acquisition. While studies show that fathers also use these phonetic enhancements when speaking to their children, most studies have focused on mothers, and in the past IDS has been referred to as *motherese* (Weirich & Simpson, 2019).

The most obvious difference between IDS and ADS is the raised fundamental frequency (f0) of IDS, combined with increased pitch variations (Cristia, 2013; Fernald & Simon, 1984). The fundamental frequency of speech is the frequency at which the vocal cords vibrate, while the pitch is the way that this is perceived by human ears. Thus, vocal cords that vibrate at a high frequency will produce a higher pitch, while vocal cords that vibrate at a lower frequency will produce a lower pitch (Theil & Toverud, 1991). The raised f0 of infant-directed speech, along with the increased pitch variations, is hypothesized to aid in maintaining infants' concentration in interaction with their parents (Soderstrom, 2007). An alternative hypothesis is that these qualities are simply a side-effect of the parent smiling when talking to their infant (Cristia & Seidl, 2014). A similar raised f0 and increased pitch variations can be found in pet-directed speech and foreigner-directed speech, but these do not contain the mentioned phonetic enhancements in the same way as IDS (Gergely, Faragó, Galambos, & Topál, 2017; Uther, Knoll, & Burnham, 2007). This supports the notion of pitch

variations and raised f0 being a tool to maintain attention in infants and other beings with little or no language comprehension.

Another difference between IDS and ADS is vowel duration. In IDS, vowels are longer – in some cases almost twice as long as vowels in ADS (Andruski & Kuhl, 1996; Cristia & Seidl, 2014; Hartman, Ratner, & Newman, 2017; Sundberg, 1998). Vowels are elongated in both target words and semantically less important words, indicating that this phenomenon has another function than only highlighting the meaning of a sentence (Sundberg, 1998). Longer vowels can make the vowels appear clearer to infants, facilitating discrimination between different vowel contrasts (Cristia & Seidl, 2014; Sundberg, 1998). Some researchers have proposed that a lengthening of vowels can be combined with a shortening of consonants to highlight contrasts, but findings regarding the shortening of consonants has been less clear (Cristià, 2010; Sundberg, 1998).

The length or duration of a stop consonant is measured by voice onset time (VOT). VOT in a syllable is the time from when a stop consonant is released to when voicing sets in in the following vowel (Theil & Toverud, 1991). A Swedish study from 1999 found significantly shorter VOTs for IDS than for ADS, suggesting a shortening of consonants to enhance clarity in IDS (Sundberg & Lacerda, 1999). However, in a later study on Norwegian mothers, Englund (2005b) found longer VOTs for IDS than ADS, suggesting instead an overspecification of stop consonants. One explanation for these conflicting findings could be that VOTs in IDS change as the child ages. Thus, speech to a younger infant would under-specify consonants and over-specify vowels, while the opposite would be true for older infants, to enhance (Cristià, 2010; Sundberg, 1998). Another reason could simply be the small sample sizes of the studies mentioned, as acoustic analyses of speech can be very time consuming (Cristià, 2010).

Increased vowel space area is another characteristic of IDS (Cristia, 2013). The vowel space area is the area between the specific vowels measured in a plot with f1 frequencies along one axis and f2 frequencies along the other. An increased vowel space area is synonymous to hyperarticulation (Cristia & Seidl, 2014). Due to this, IDS has been referred to as “hyperspeech”, highlighting the increased vowel space’s role in making speech more adapted to infants (Fernald, 2000). This is unique for IDS – as mentioned above, studies comparing infant-directed and pet-directed speech have found support for an increased f0 in pet-directed speech similar to IDS, but only IDS contains increased vowel space (Gergely et al., 2017). In a study by Cristià and Seidl (2014), the IDS of 46 mothers was analyzed with respect to the point vowels /i/, /ɑ/, and /u/. In addition, the authors examined phonemic and

allophonic contrasts to ensure that they were indeed measuring hyperarticulation. To younger infants, all vowels were hyperarticulated, while to older infants, some vowels were hyperarticulated, while others were hypoarticulated (Cristia & Seidl, 2014). A recent study examining a large number of vowels in a Norwegian population found a smaller, not larger, vowel space in IDS. It is therefore argued that IDS is hypoarticulated, not hyperarticulated, in comparison to ADS (Englund, 2018). Nevertheless, it seems that there are indeed significant differences in articulation between IDS and ADS.

2.2.1 The Mother Infant Phonetic Interaction model

The Mother Infant Phonetic Interaction (MIPhI) model explains how parents respond to their infants' phonetic cues at the same time as infants respond to their parents' IDS, making IDS an interactional collaborative effort (Englund, 2005a; Sundberg, 1998). The model describes IDS as a constant adjustment of speech to the infants' language learning needs (Englund, 2005a). According to the MIPhI model, both the parent and the infant have a "phonetic filter" that all verbal interactions pass through (Englund, 2005a; Sundberg, 1998). The infant's phonetic filter acts as a calibration device for the infant's language learning, in that the filter adjusts the infant's language learning to the parent's speech, making that particular speech easier to process. This affects the infant's vocalizations and phonetic cues towards the parent. The parent's phonetic filter also acts as a calibration device, processing the infant's cues and vocalizations and calibrating the parent's IDS to their infant's needs (Englund, 2005a; Sundberg, 1998).

The MIPhI model is supported by findings of significant changes in IDS during the first year of life, with parents adjusting both the semantic content and phonetic difficulty of their speech to the infants' age and language skills (Englund & Behne, 2006; Kitamura & Burnham, 2003; Kokkinaki, Vasdekis, & Devouche, 2020). This is very closely tied with parental sensitivity and responsiveness, which have been shown to affect development in a myriad of different ways (Braungart-Rieker, Garwood, Powers, & Wang, 2001; Davidov & Grusec, 2006; Parpal & Maccoby, 1985; Tamis-LeMonda, Kuchirko, & Song, 2014; Tamis-LeMonda, Bornstein, Baumwell, & Melstein Damast, 1996). In two studies of in total 90 mother-child dyads, Tamis-LeMonda et al. (1996) found that maternal responsiveness within the language domain, such as appropriate responses to child vocalizations, predicted child language skills over time. Parental responsiveness is the parent's propensity to prompt the infant and aid development in age-appropriate ways. By asking questions, labelling objects, and engaging in conversations, a responsive parent helps their infant to learn language faster (Tamis-LeMonda et al., 2014).

2.2.2 The Native Language Magnet theory

On a cellular level, learning can be defined as the genesis and strengthening of pathways in response to external stimuli, and this effect is especially strong in young children (Edelman, 1992). In the language learning domain, this means that language stimuli must be repeated over and over to ensure language development in infants. According to the Native Language Magnet (NLM) theory, this is made possible through the use of phonetic prototypes (Kuhl, 1993, 1994). A phonetic prototype is an example of a phoneme that is as clear and regular as possibly, creating a reference category for future language processing in the infant's brain. It is thought that the hyperarticulation of IDS facilitates the creation of phonetic prototypes, and that this is a large part of the link between IDS and language learning (Kuhl et al., 1997).

The NLM theory might explain how young children are able to discriminate foreign language sounds much better than adults. In a landmark study from 1992, Kuhl and her colleagues tested 32 Swedish and 32 American 6-month-old infants. Half of the children in each group were trained with a native prototype, while the other half were tested with a foreign prototype. Both Swedish and American infants showed a much stronger magnet effect for their native prototype, suggesting that speech perception is significantly altered by the individual's native language as early as 6 months of age (Kuhl, Williams, Lacerda, Stevens, & Lindblom, 1992)). Another example of support for the NLM theory is found in another article by Kuhl et al. (2005). Infants who were more skilled at perceiving native than non-native phonemic contrasts at 7 months showed faster language acquisition through their first 30 months of life, suggesting that developing a preference for one's native language early makes language acquisition more efficient.

The NLM theory is similar to the MIPhI model in that it emphasizes how the parent's language affects the infant's language learning (Kuhl, 1993, 1994). In an in-depth, updated version of the NLM, called the NLM-e, Kuhl et al. (2008) describe the four stages of the theory. In the initial stage, when the infant is very young, there is little to no difference in the discrimination of phonemes from different languages. The second stage occurs when the infant is a little older, and a neural commitment to the native language emerges as a result of IDS. The infant has developed some perceptual representations of language, and these representations guide further language acquisition. Kuhl et al. (2008) emphasize the importance of social interaction at this stage, as the experience gained through meaningful verbal interactions are vital for the development of neural commitment. In the third stage the infant's language-learning system is more specialized to its native language, and the infant

develops an understanding of more complex linguistic features, such as the recognition of phonotactic patterns and word segmentation. In the fourth and final stage, the neural commitment has stabilized, and further language learning can take place within the constraints of the infant's main language (Kuhl et al., 2008).

2.3 Language learning in a social context

Research on language learning is often focused on how cognitive processes lead to language-learning outcomes, but this approach has been criticized for neglecting the importance of the child's social environment (Hoff, 2006). The MIPhI model and the NLM theory both illustrate the importance of social interactions on language learning. Studies have shown that parent-infant interaction is a key factor in language development (Topping, Dekhinet, & Zeedyk, 2013). This supports the notion that language development in itself is a social process.

2.3.1 Infant-Directed Speech is social and context-dependent

As shown in the MIPhI model and the NLM theory, IDS is contingent on social interaction. This could lead to the assumption that IDS also would be vulnerable to changes in the parent's social environment. One example of this is the importance of the quality of the couple relationship between the infant's parents on the parent-infant interaction (Korja et al., 2016). According to a recent study, the quality of the couple relationship between a mother and a father can negatively influence both the quality and quantity of IDS (Fink, Browne, Kirk, & Hughes, 2020).

Another aspect is the way that IDS appears to shift between the parents. In a study examining families with a depressed mother and a non-depressed father, Kaplan, Dungan and Zinser (2004) found that when the mother is depressed, the father's speech to their infants increases in both quality and quantity.

IDS also changes depending on the gender of the infant. In a study of 6 mother-boy dyads and 6 mother-girl dyads, Kitamura and Burnham (2003) found that mothers of girls generally speak more to their children than mothers of boys, who make more non-verbal vocalizations instead. These differences were attributed to the mothers sensitivity to the different developmental trajectories of boy and girl infants (Kitamura & Burnham, 2003).

In a study of Australian versus Thai IDS, Kitamura et al. (2001) found surprising differences between the two languages. While other studies have often focused on the similarities in IDS across languages, the authors highlighted several differences between Australian and Thai IDS, particularly in the differences between addressing boy and girl

infants. The main finding was that Australian mothers used a higher f0 to their daughters than to their sons, while the effect was reversed in Thai mothers, who spoke with a higher f0 to their sons. According to the authors, this could be a result of the cultural differences in gender roles between Australia and Thailand, which could lead the Thai mothers prioritizing their sons (Kitamura et al., 2001).

2.3.2 Gender differences in Infant-Directed Speech

While most IDS research has focused on mothers, there is a growing interest in father's speech to their infants. Transferring previous findings about the mother-infant relation to the father-infant relation is a threat to validity and reliability, as fathers and mothers have several distinct differences in their parenting styles, such as parental sensitivity and responsivity (Schoppe-Sullivan et al., 2006). Infants show a strong preference for both male and female IDS, and some research indicates that this preference is present as early as a few days after birth (Cooper & Aslin, 1990). Although results have been variable, several studies have shown that fathers apply the same prosodic changes to their speech when speaking to infants compared to speaking with adults, such as a higher f0 and increased pitch variations, but that the differences between IDS and ADS are generally smaller for fathers than for mothers (Fernald et al., 1989; Shute & Wheldall, 1999; VanDam, De Palma, & Strong, 2015). Other studies have found no difference between the IDS of fathers and that of mothers (Jacobson, Boersma, Fields, & Olson, 1983; Papoušek, Papoušek, & Haekel, 1987). In a recent study, Weirich and Simpson (2019) assessed the IDS of 16 German mothers and 19 German fathers. Although the study showed that fathers were less involved than mothers with their children both in regard to time spent and the performance of specific child-care tasks, there were no significant differences in the IDS of mothers and fathers (Weirich & Simpson, 2019).

According to another recent study, infants show less preference to fathers' IDS compared to that of mothers. Sulpizio et al. (2018) used functional near-infrared spectroscopy to assess the brain activation of 4-month-old infants in response to male and female IDS. The study found that female IDS elicited significantly more activation in the infants' brains than male IDS, which suggests that infants prefer female IDS over male. The infants also showed a slight preference for female IDS compared to male ADS, but this effect was smaller (Sulpizio et al., 2018). A review by Soderstrom (2007) argues that infants may not develop a preference for their father's voice until after the age of 4 months, which could mean that the infants in the study by Sulpizio et al. (2018) were simply too young to have developed this preference.

Fathers show no difference in the quantity of words compared to mothers, but there are certain qualitative differences (Hummel, 1982; Kokkinaki et al., 2020). Fathers tend to differentiate less between boy and girl infants than mothers, which could mean that fathers are less sensitive to their infant's developmental trajectory (Kitamura & Burnham, 2003; Kokkinaki et al., 2020). Fathers' speech is also more cognitively challenging for infants, with more units of speech and thematic changes in a shorter amount of time (Kokkinaki et al., 2020). This could suggest that the father's role in language development is not only to supplement the speech input from the mother, but something else entirely.

2.4 Gender roles in child-rearing

Fathers and mothers seem to have different roles in their child's life, and gender differences in the division of labor in the home are found in most cultures (Brinton & Oh, 2019; Dribe & Stanfors, 2009; Kamo, 1988; Perrone-McGovern et al., 2014). Parents' gender stereotypes might influence their children in the long term, affecting their performance and activity choices (Eccles, Jacobs, & Harold, 1990). Although many parents attempt to install more progressive and egalitarian gender roles in their children, parents' actual gender-role behavior is a stronger predictor for their children's attitudes towards gender roles (Halpern & Perry-Jenkins, 2016).

Generally, women perform more housework tasks than men (Brinton & Oh, 2019; Dribe & Stanfors, 2009; Kamo, 1988; Perrone-McGovern et al., 2014). The skewed division of labor is sometimes referred to as *the second shift*, meaning that women who work full-time effectively have two jobs as they also pick up the majority of the housework (Croft, Schmader, Block, & Baron, 2014). While most cultures appear to be moving towards a more egalitarian division of labor in child-care, mothers still do more work than fathers in most cultures, including the US, Europe, East Asia and Africa (Brinton & Oh, 2019; Cheng & Hsu, 2020; Chesley & Flood, 2017; Ejuu, 2016; Giménez & Molina, 2020).

According to a large-scale Russian survey, the relative amount of housework done by the mother could affect gender roles in their sons' later romantic relationships, but the same effect was not found in daughters (Giménez-Nadal, Mangiavacchi, & Piccoli, 2019). However, daughters were more sensitive to the type of housework their mothers did, preferring the same type of housework when they grew older. According to the researchers, the daughters adapted their mothers' housework preferences into their own identity (Giménez-Nadal et al., 2019). In many cultures, housework, along with other traditionally female tasks such as childcare, seems to have become a vital part of women's identity (Procher, Ritter, &

Vance, 2018; Yamamura & Tsutsui, 2019). Thus, it is important to note that a skewed division of labor in the home is not necessarily a result of the lack of contribution by the father – it could also be that mothers are reluctant to give up tasks that are connected to traditionally female identity.

Maternal gatekeeping (Allen & Hawkins, 1999) can be defined as a set of behaviors and beliefs exhibited by mothers that limit fathers' roles in caring for their children, ultimately inhibiting cooperation between the father and the mother in family-related tasks. Maternal gatekeeping consists of three dimensions; mothers are reluctant to let go of the responsibility for family tasks, they want to be seen by others and by themselves as responsible for work that is done in the home, and they see family-related work as part of their domain as women. As a result of maternal gatekeeping, some couples might adopt what Allen and Hawkins (1999) refer to as a "manager-helper relationship" (p. 203), where the mother takes on the role of organizing and delegating both housework and childcare. Maternal gatekeeping can also impair fathers' relationships with their children, as mothers might keep fathers "at an arm's length from meaningful parent-child interactions" (Allen & Hawkins, 1999, p. 204). Egalitarian division of labor in regard to child-care brings positive outcomes for both men and women, such as improved relationship quality (Carlson, Hanson, & Fitzroy, 2016).

To summarize, labor division in the home seems to be skewed in the direction of women and mothers doing more of the work, across many cultures (Brinton & Oh, 2019; Kamo, 1988; Perrone-McGovern et al., 2014). While this might seem like an obvious result of sexism directed at women, women also seem take part in upholding this division through maternal gatekeeping (Allen & Hawkins, 1999). Although parents try to install egalitarian attitudes in their children, children learn gender roles from their parents' behavior, thus upholding traditional gender role attitudes in future generations (Eccles et al., 1990; Halpern & Perry-Jenkins, 2016).

2.4.1 Sexism and gender roles

Gender roles are specifical individual, group and societal expectations towards individuals based on their gender, which are determined by the society's beliefs about gender (Blackstone, 2003). Sexism can be seen as stereotypical beliefs about women and men, and an endorsement of traditional gender roles (Swim & Cohen, 1997). In 1996, Glick and Fiske coined the term *ambivalent sexism,* with the two facets *hostile sexism* and *benevolent sexism* to describe how sexism can consist of both positive and negative attitudes. Hostile sexism is based on prejudice and negative attitudes towards women, while benevolent sexism is

connected to more positive yet stereotypical attitudes towards women, such as viewing women as fragile and in need of protection (Glick & Fiske, 1996). Less educated individuals and individuals with lower SES tend to uphold more sexist views, although sexist views are present among highly educated individuals as well (Erkal, Copur, Dogan, & Safak, 2007; Garaigordobil & Aliri, 2012; Glick, Lameiras, & Castro, 2002).

Parents' sexist attitudes can in some cases affect their children. In a recent study, Muntoni and Retelsdorf (2019) found a negative relation between parents' gender-stereotype beliefs and their sons' reading abilities. The effect was mediated by the children's competence beliefs and intrinsic task values. No significant effects were found for girls (Muntoni & Retelsdorf, 2019). In a longitudinal study from 1999, Williams and Radin found that the magnitude of the father's role in child rearing did neither impact children's gender role attitudes or expectations, nor their academic self-perception, in a 20-year follow up (Williams & Radin, 1999).

Defying societal gender norms can lead to ostracism and negative evaluations by others. People generally have more positive attitudes towards women than men, and women who conform to traditional gender roles are rated more positively than non-traditional women (Haddock & Zanna, 1994). Parents who do not conform to traditional family gender roles, e.g. stay-at-home fathers and working mothers, are evaluated more negatively (Brescoll & Uhlmann, 2005). In a recent study, Szastok, Kossowska and Pyrkosz-Pacyna (2019) assessed the attitudes of a Polish population towards a fictive working mother and a fictive stay-at-home mother, solely divided by their choice in taking either 3 months or 3 years of maternal leave. The authors found that participants evaluated the working mother less positively than the stay-at-home mother, and that this in part was a result of benevolent sexism (Szastok et al., 2019). Such evaluations of others are often rooted in attitudes, either explicitly, through conscious attitudes towards individuals who defy gender norms, or implicitly.

2.4.2 Explicit and implicit attitudes

Attitude theory discriminates between explicit and implicit attitudes. Explicit attitudes are the views that individuals overtly express, which are subject to thoughtful deliberation, while implicit attitudes are automatic associations or assumptions towards an attitude object (Rudman, 2004). Thus, explicit attitudes are more vulnerable to societal norms and social desirability (Greenwald, McGhee, & Schwartz, 1998). As implicit attitudes by definition are unavailable to deliberation and introspection, they are often measured by various association-based tests (Greenwald et al., 1998). Some scholars have questioned the assumptions that

implicit attitudes are unconscious and not readily available for deliberation. Instead, it has been argued that while the individual is unable to ascertain the origin of their implicit attitudes, they are still aware of them to a degree, in spite of not reporting them on questionnaires (Gawronski, Hofmann, & Wilbur, 2006). Men and women differ in their implicit stereotypes towards gender - according to a Dutch study, mothers have more implicit stereotypes towards gender, while fathers' stereotypes about gender are more explicit. Mothers' implicit stereotypes also predict their daughters' implicit stereotypes (Endendijk et al., 2013). As attitudes towards gender, both explicit and implicit, are so inescapable in modern society, it is natural to assume that gender role attitudes can affect childcare practice in the home. In current times, sexism has become a political subject, which makes it very vulnerable to social desirability (Greenwald et al., 1998). Thus, when measuring gender role attitudes, it could be beneficial to adopt a dual approach of measuring both explicit and implicit attitudes.

2.4.3 Gender differences and the father's role

During the last decade, the norms of fatherhood have changed radically (McGill, 2014). As the ideal of the stay-at-home mother is dwindling in many western countries, expectations have risen for fathers to become more involved in their home life. In a study using data from a large-scale national survey from the United States, McGill (2014) found a significant negative relationship between work hours and involvement in physical childcare among fathers. This relation was mediated by attitudes towards parenting, with fathers who adopted less traditional attitudes would spend more time caring for their children despite working long hours. The study did however not find a relationship between work hours and total time fathers spent with their children, suggesting that presence and parenting attitudes are more important for the quality than the quantity of time spent with children (McGill, 2014).

In a study examining fathers' involvement in their children's health care, Zvara, Schoppe-Sullivan and Dush (2013) found that mothers' beliefs about gender roles, along with maternal gatekeeping, predicted fathers' involvement in their children's healthcare. Fathers' beliefs were not associated with involvement, but it did predict fathers' perception of their own influence on decisions relating to the health of their child (Zvara et al., 2013). Another recent study found that people's attitudes towards men's parenting are predicted by both subcategories of ambivalent sexism, while hostile sexism predicts father's attitudes toward parenting (Aikawa & Stewart, 2020). According to the authors, these attitudes could dissuade fathers from taking a more active role in parenting their children (Aikawa & Stewart, 2020).

While the most commonly used definitions of sexism focus on negative attitudes on women, these findings indicate that sexism also affects men's role in the family, challenging fathers' trust in their ability to provide care for their own children. This could potentially be transferred to the language domain, with fathers being less conscious of their role in their children's language development.

According to the *father bridge hypothesis* (Gleason, 1975), the father's more challenging speech and general interaction style provides motivation for the child to learn more complex language and movement. This is supported by findings of fathers' speech being more cognitively challenging (Kokkinaki et al., 2020), and fathers' play being rougher, and physically and motorically challenging (Cairney, Hay, Faught, Mandigo, & Flouris, 2005; Simons & Conger, 2007). The father bridge hypothesis describes the father's role in child-rearing as a bridge between the safe and nurturing home sphere that exists between the infant and the mother, and the outside world. Mothers tend to understand the early communications of their infants and toddlers better than their surroundings, and as the mother is the most important figure in the infant's life, researchers have been puzzled as to why the child learns the complex language of adults when it is perfectly capable of communicating with its mother (Gleason, 1975).

2.5 Gender roles in Nordic countries

The Nordic countries (Norway, Sweden, Denmark, Finland, and Iceland) are generally seen as progressive when it comes to gender equality, with almost as many women as men contributing to the workforce (SSB, 2021b). During the past two decades, Nordic men have substantially increased their contribution to labor in the home (Holm et al., 2015). Men in the Nordics also have the opportunity to take out a fairly long parental leave (Haataja, 2009). Generally, family policies in Nordic countries aim to strengthen equality between the genders; in the workplace, at home and economically (Hakovirta et al., 2020).

2.5.1 Parental leave

The option of paternal parental leave was introduced in the Nordics during the 1970's and 1980's, with specified father's quotas emerging throughout the 1990's and 2000's. Denmark later abolished their father's quota (Eydal et al., 2015). The long parental leaves and father's quotas in the Nordics are meant to encourage fathers to take an active part in their child's development, while enabling both parents to return to the workforce when the child reaches

daycare age (Haataja, 2009). Historically, parental leave has been an important political cause in the Nordics, on both sides of the political spectrum (Eydal et al., 2015).

A statistical review by Haataja (2009) found that the amount of parental leave taken by Nordic fathers is slowly increasing in Sweden and Norway, and diminishing slightly in Denmark (Haataja, 2009). A peer effect has been found in the choice to take paternity leave in Norway, meaning that fathers are more likely to take a longer paternity leave if their friends and acquaintances do (Dahl, Løken, & Mogstad, 2014). The increasing amount of parental leave taken in Sweden and Norway has a substantial social significance. Overall, families in Iceland are the most successful at sharing parental leave equally (Haataja, 2009).

Data from the large-scale Pairfam survey in Germany indicate that the addition of a fathers' quota has changed gender-role attitudes across generations (Unterhofer & Wrohlich, 2017). The researchers found that in the "grandparent generation", that is, the parent generation of the fathers taking paternal leave, attitudes towards gender changed towards a more egalitarian view. This indicates that parental leave can affect sexism and attitudes towards gender roles on a societal level, in addition to making practical gender-equalizing changes.

2.5.2 Working mothers and "soft men"

The Nordic countries do to a large extent follow the dual breadwinner model of society, which is based on both parents contributing more or less equally to the workforce (Ellingsæter, 1998). While women in many other countries tend to make a choice between motherhood or employment, Scandinavian mothers have a long tradition of choosing both options at the same time (Ellingsæter & Rønsen, 1996).

Although working mothers are seen as something of an ideal in Scandinavian culture, a study found that single working mothers experience significantly more stress and less satisfaction and happiness than non-single mothers (Bull & Mittelmark, 2009). Both single and coupled mothers in Scandinavia have higher educations and more life satisfaction than their Southern European counterparts, but coupled mothers score higher than single mothers on life satisfaction. However, Scandinavian single mothers have higher life satisfaction than coupled Southern European mothers, suggesting that the protective welfare policies of Scandinavian mothers are a stronger predictor for happiness than being in a relationship (Bull, 2009).

In a large international study, Hill, Hawkins, Märtinson and Ferris (2003) found that although both fathers and mothers experience work-family conflict, Scandinavian fathers and

mothers report much lower levels of conflict. According to the authors, this could be because Scandinavian fathers are much more involved in child-care (Hill et al., 2003).

Western men are increasingly adhering to traditionally feminine ideals, such as a freer emotion display (de Boise & Hearn, 2017). This has led many researchers to argue that the ideals of modern masculinity are changing (Itulua-Abumere, 2013). Originally from the 1970s, the Norwegian term "soft man" (*"myk mann"*) has in recent discourse been used to describe the modern, feminine, egalitarian man. Some see this term as derogatory, arguing that "soft men" and "real men" have become opposites (Tordsson, 2013). Regardless, fathers in Norway are becoming increasingly involved in both childcare and other tasks traditionally performed by women, such as cooking (Holm et al., 2015; Kvaal, 2019).

In summation, the attitudes towards gender within a society seem to affect parental practice within that society, and especially for fathers. Thus, as IDS is a very intimate and reciprocal process between parent and child, gender role attitudes might affect fathers' communication style with their children. Norwegian and Scandinavian fathers share some characteristics that distinguish them from fathers from other cultures, such as an increasing involvement in childcare – this could potentially be reflected in the language domain as well. Parental practice seems to be linked to gender norms both on a personal and a society-wide level, but how this impacts child development remains unclear.

2.6 The current research

Several studies have examined the properties of IDS in a Norwegian population, but these have focused mostly on mothers. Internationally, several studies have examined fathers' IDS, sometimes in relation to that of mothers, but these studies have mainly focused on either fathers alone, or mothers and fathers of different children. Previous studies on Norwegian IDS lack a focus on Norwegian fathers, which is necessary to establish an understanding of all facets of Norwegian IDS and language learning in Norwegian infants. The current study seeks to examine IDS in a Norwegian population of both mothers and fathers of the same children, to attempt a replication of previous findings about mothers' and fathers' speech both in Norway and internationally. The study will measure the parents f0 in speech to their child, along with vowel durations and VOTs. The aim of this part of the study is to add to the current knowledge about Norwegian mothers' and fathers' IDS, in a sample consisting of mothers and fathers to the same children.

As outlined above, previous studies have found that the quality of IDS can be altered based on a number of different social factors (Brookman et al., 2020; Burnham et al., 2002;

Kitamura & Burnham, 2003; Kokkinaki et al., 2020). Based on this, one would assume that fathers who believe childcare to be a women's task, and who thus would be less involved emotionally and practically in their child's development, would provide a poorer language input than fathers who uphold more egalitarian views. On the other hand, according to the father bridge hypothesis (Gleason, 1975), the father's role should be different from that of the mother, and one would expect that attitudes towards gender would have no impact on the quality of IDS. Here, the father bridge hypothesis provides something of a paradox; if a father's role is to provide more challenging language stimulus to his child, not doing so would mean that he provides less challenging stimulus in the form of more exaggerated IDS. Thus, the current research aims to examine whether a relationship between attitudes towards gender and IDS can be found, specifically the degree to which IDS differs from ADS. No studies that have come to my attention have examined this hypothesized relationship.

The current research has two central aims – to add to the current research on the properties of IDS in both men and women in a Norwegian population, and to examine whether fathers' speech to their children can be influenced by their and their partners' attitudes towards gender and gender roles. For the former, hypotheses have been formulated based on previous research. As the latter aim of this study falls on uncharted territory, some of the relationships examined will be based on exploratory research questions rather than more strict hypotheses. Both hypotheses and research questions are outlined below.

2.6.2 Research questions

Analyses directed at the second aim of the current research will be based on a more exploratory approach. The following research questions are asked:

Q1. Can parents' explicit or implicit attitudes towards gender roles predict the magnitude of their exaggerations in IDS relative to ADS?

Q2. Can the parents' gender affect this relationship? If so, how?

2.6.1 Hypotheses

Based on the research outlined above, the following hypotheses have been formulated.

H1a. Mothers' IDS will contain a higher f0, significantly shorter or longer VOT, increased vowel space area and longer vowel durations than their ADS. This is based on former studies such as Englund and Behne (2006) and Englund (2005b), that have found these features of IDS in a Norwegian population. These findings also reflect research on IDS in other languages (Cristia, 2013; Soderstrom, 2007).

H1b. Fathers' IDS will contain a higher f0, significantly shorter or longer VOT, increased vowel space area and longer vowel durations than their ADS. This is based on previous findings about fathers' IDS, such as Weirich and Simpson (2019).

H2. Fathers' IDS will be less exaggerated than that of mothers. Specifically, this will mean smaller changes in f0, VOT, vowel space area and vowel duration in IDS compared to ADS. This hypothesis is based on the father bridge hypothesis (Gleason, 1975), which suggests that the father's role in the child's language development is to provide challenging stimuli, motivating the child to develop their language further, in addition to previous research (Fernald et al., 1989; Shute & Wheldall, 1999; VanDam et al., 2015).

3 Methods

3.1 Recruitment and participants

Previous findings have indicated that infants show a slightly weaker preference for fathers' IDS than for that of mothers, and that the preference from fathers' IDS develops later in the infants' life (Cristia, 2013; Soderstrom, 2007; Werker & McLeod, 1989). As IDS is a reciprocal form of communication, this could have an impact on the quality of the fathers' IDS. Therefore, this study aimed to recruit participants with children above 7 months of age, despite IDS studies typically focusing more on younger infants (Soderstrom, 2007). Based on previous research, the recruitment goal was set to 10-20 families (N = 20 – 40).

Participants for the current study were recruited through social media, through an open shared post and posts in various local child-related Facebook groups. A total of 9 mother-father-child triads (N = 18) were recruited, all belonging to the Trondheim region of Norway. 6 of the parents spoke the regional Trøndersk dialect, while 12 parents spoke other dialects (Table 1). The children varied in age from almost 7 to 18 months.

As this study was conducted during the covid-19 pandemic, recruiting participants proved difficult. Several attempts were made at recruiting through local daycare centers and children's clinics (Helsestasjon), to increase the chances of a more varied selection in terms of parents' socioeconomic status and age, while ensuring that the children were of a similar age. However, these attempts were unsuccessful, as many of these institutions were lacking in capacity due to the pandemic.

The Norwegian Centre for Research Data (NSD) were notified about this study. See Appendix VI for approval from NSD.

Table 1. Distribution of participant dialects.

Dialect	*Number of speakers*
Trøndersk (central Norway)	6
Northern Norwegian dialects	4
Western Norwegian dialects	4
Eastern/Southern Norwegian dialects	2
Undisclosed	2

3.2 Procedure

Initially, the goal was to visit all participant families in their homes and aid them in recording the speech material needed. This was done for the first participant family. However, due to

changing restrictions during the covid-19 pandemic, subsequent participants recorded themselves without the researcher present. In the home visit case, the researcher brought toys and recording equipment to the participants' home. The same equipment and toys were delivered outside the homes of the participants who recorded without the researcher present, and picked up after two or more days, depending on the parents' preference. Before recording, participants were provided with a short video clip of the researcher explaining the procedure and the recording equipment. The same researcher was available via email and telephone throughout the recording sessions.

The participants were recorded in three short sessions – two sessions recording IDS from each of the parents, and one session recording ADS from both parents. The sessions lasted from 11.63 to 53.2 minutes (M = 33.21, SD = 12.46). During the first two sessions, the parents were recorded while playing with the toys together with the child. The parents decided the order of the first two sessions themselves, based on practicality and preference. The last session was a conversation between the parents, or between the parents and the researcher, where the play was discussed, and the parents mentioned and talked about all the toys.

After the recording session, the participants received invitations to the IAT experiment and the ASI survey via email. There was no time limit for the surveys, but participants were encouraged to answer as soon as possible.

3.3 Measures

3.3.1 Infant-directed speech

A high f0 is perhaps the most easily recognizable characteristic of IDS (Cristia, 2013). However, several studies have shown that humans increase the f0 of their speech to other groups as well as infants, such as non-native speakers or pets, so f0 should not be treated as an effective IDS characteristic on its own (Gergely et al., 2017; Soderstrom, 2007; Uther et al., 2007). Other important characteristics of IDS are an increased vowel space and vowel duration (Cristia, 2013; Cristia & Seidl, 2014; Sundberg, 1998). In addition, some studies have examined VOT, but results have been conflicting as to whether IDS has a longer or shorter VOT compared to ADS (Englund, 2005b; Sundberg & Lacerda, 1999).

In order to provide a comprehensive overview of IDS in Norwegian mothers and fathers, several IDS variables were measured in this study. Specifically, the study included f0, vowel duration, vowel space area and VOT. All target words spoken during the recording sessions were analyzed for their target phonemes (see Table 2).

3.3.2 Explicit attitudes

Ambivalent sexism consists of the two factors benevolent sexism and hostile sexism, which are based on different underlying factors. Therefore, they are not always correlated (Glick & Fiske, 1996). In order to provide a comprehensive and in-depth overview over participants' attitudes towards gender roles, both hostile and benevolent attitudes were measured in this study. Explicit attitudes about gender roles were examined using a Norwegian version of the Amibalent Sexism Inventory (ASI) (Bendixen, Helle, Langbach, & Rasmussen, 2014; Bendixen & Kennair, 2017; Glick & Fiske, 1996). This survey measures both hostile and benevolent sexism, and it provides a score for each of the two variables, along with a total ambivalent sexism score (Glick & Fiske, 1996). The ASI was administered digitally through Nettskjema.

3.3.3 Implicit attitudes

Due to social desirability issues, explicit attitude measures are not always entirely reliable (Greenwald et al., 1998). Because of this, implicit attitudes towards gender roles were also examined in this study, using the Implicit Association Test (IAT) (Greenwald et al., 1998). In the IAT, the participant is presented with different words or names, and asked to sort them into categories. The IAT is built on the premise that differences in response time will reveal automatic assumptions, so that a person with sexist implicit attitudes will have a longer response time when sorting a female name with the category “woman” when it is grouped with the category “career” than when it is grouped with the category “family”. The response times and error rates are measured, and an IAT score of between -2,0 and 2,0 is computed. Values outside the interval of -0,65 – 0,65 indicate that the subject has a strong implicit association between two of the categories, such as “woman-family” or “woman-career” (Greenwald, Nosek, & Banaji, 2003). The version of the test used in the current research used words from Nosek, Banaji and Greenwald (2002), translated into Norwegian by the researcher. The names used in the test were based on the most popular names in Norway (SSB, 2021a). The IAT was administered online through PsyToolKit (Stoet, 2010, 2017).

3.4 Stimuli and equipment

3.4.1 Toys

Acoustic-phonetic analysis requires that the same words are repeated many times, to provide a high number of comparable data points from the same participants. Therefore, participants in the current study were asked to play with and talk about 8 provided toys. The toys were

chosen based on their names or labels, with focus on including short and long versions of the three cardinal vowels, along with the six Norwegian stop consonants. The toys and their corresponding names and target phonemes are described in Table 2.

Table 2. Toys used in the study with names and target phonemes.

Name of toy	*English translation*	*Target vowel*	*Target consonant*
Bille	Beetle	/i/	/b/
Bok	Book	/u:/	/b/
Bukk	Buck	/u/	/b/
Dukke*	Doll	/u/	/d/
Gutt	Boy		/g/
Kake	Cake	/a:/	/k/
Katt	Cat	/a/	/k/
Pippi	Pippi (Longstocking)	/i/	/p/
Tiger	Tiger	/i:/	/p/

**Dukke was not an individual toy but served as a secondary label for both Pippi and Gutt.*

3.4.2 Recording equipment

All sessions were recorded on a LENA Pro DLP device (Figure 1). All participants wore a shirt with a chest pocket for the recording device, to ensure minimal background noise and to keep the distance between the participant's mouth and the recording device constant (Figure 2).

Figure 1. LENA Pro Digital Language Processor.

Figure 2. LENA t-shirt with chest pocket.

3.5 Acoustic analysis

Recordings were transferred from the LENA Pro Digital Language Processor device to a computer in a .wav format. Before conducting acoustic analyses, the longer recordings were shortened so that each file contained only a single target word, with each recording ranging from .65 to 2.73 seconds. The smaller files were labeled and organized into folders for each participant. Each recording contained all three sessions from one of the mother-father dyads, and analysis for each recording did not commence until after the entire file was segmented, as to not miss any of the target words.

As parents were asked specifically to use the target words during their sessions, most sentences were constructed with the target word in a focal position. IDS was characterized with repetition and questions. Table 3 contains example sentences from the IDS recordings.

During analysis, vowel lengths and VOT were calculated in milliseconds. F0, f1 and f2 frequencies were measured in Hz. F1 and f2 frequencies were used to calculate vowel space area, using the following equation from Liu, Kuhl and Tsao (2003):

$$Vowel\ space\ area = ABS\ \frac{F1i(F2a - F2u) + F1a(F2u - F2i) + F1u(F2i - F2a)}{2}$$

in which ABS indicates that this is an absolute value, F1i stands for the f1 frequency in Hz of the vowel /i/, F2a stands for the f2 frequency in Hz of the vowel /a/, etc. The average frequency of all instances of the vowels were used to calculate two vowel space areas, one for short and one for long vowels, for each participant. Only viable words were analyzed,

meaning that words that were whispered or interrupted by background noise were discarded. All acoustic-phonetic analyses were performed in Praat (Boersma & Weenink, 2018).

Table 3. Examples of sentences from recordings of IDS speech.

Example sentence	*English translation*
For en fin dukke! Ja, så fin dukke!	What a nice doll! Yes, such a nice doll!
Kan du si katt? Kan du si katt?	Can you say cat? Can you say cat?
Kan du gi meg billa? Kan jeg få billa? Takk!	Can you give me the beetle? Can I have the beetle? Thank you!

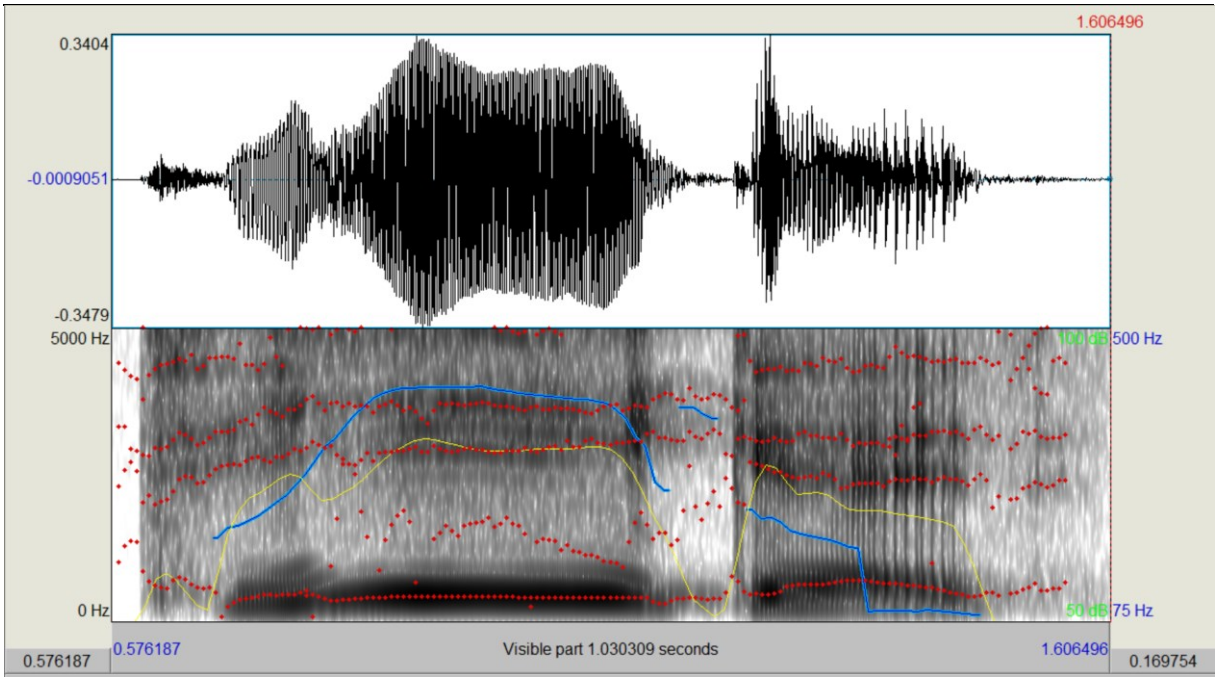

Figure 3. Spectrogram and waveform in Praat of the word "tiger", as said by a woman in the IDS condition.

3.6 Statistical analysis

A power analysis indicated that a minimum of 22 participants were needed to provide a power of .80, given a significance level of .05, an effect size of $F = .25$, two groups, five repeated measures and a correlation of .5. Based on the same conditions, a group of 18 participants was expected to provide a power of .70. Power analyses were performed in G*power, v. 3.1.9.7 (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007).

As it is impossible to accurately predict how many times a word will be repeated in natural speech, the number of observations per participants often varies greatly within the domain of IDS research. In addition, several observations for each word, and several words

for each target phoneme, provides multilevel or nested data. Because of this, many studies within psycholinguistics have traditionally used a repeated measures ANOVA to analyze results. However, since the advance of powerful statistic software several decades ago, repeated measures ANOVA has received much criticism (McCulloch, 2005). While ANOVAs are less complex or computationally intensive and easier to understand, statisticians have argued that this method of analysis is inefficient at best, and that it could provide spurious results (Jaeger, 2008; McCulloch, 2005). Due to these reservations, the current study will employ a mixed models approach with fixed effects. This is also sometimes called a fixed model. Due to being a one-step analysis, linear mixed models are less prone to error. The mixed models approach is also generally deemed more trustworthy and better suited to account for random subject and item effects (Jaeger, 2008).

Linear mixed models were compiled with each of the IDS characteristics as dependent variables. All statistical analyses were performed with SPSS version 27 (IBM, 2020).

4 Results

4.1 Descriptive statistics

The 9 target words of the study were said a total of 1270 times. Participants spoke between 4 and 109 words each in the IDS condition (M = 54.00, SD = 33.97), and between 3 and 43 words each in the ADS condition (M = 16.56, SD = 10.79). Across the two conditions, the word *Pippi* was used the most at 250 times, while the least-used word *Dukke* was said 53 times (M = 141.11, SD = 52.85).

Out of 18 participants, 16 answered the ASI questionnaire, and 10 answered the IAT. On the 5-point scale of the IAT, participants scored between .64 and 2.91 on hostile sexism (M = 1.89, SD = .67), and between .10 and 1.91 on benevolent sexism (M = 1.10, SD = .51). Independent samples t-tests found no significant differences between the genders in neither hostile (p = .419) nor benevolent ASI scores (p = .691).

Out of the 10 participants who completed the IAT, no one scored outside the middle value of -0.65 – 0.65, meaning that all participants showed weak associations between gender and family/career. Because of this, IAT scores were deemed too scarce and too similar to be used in further analyses.

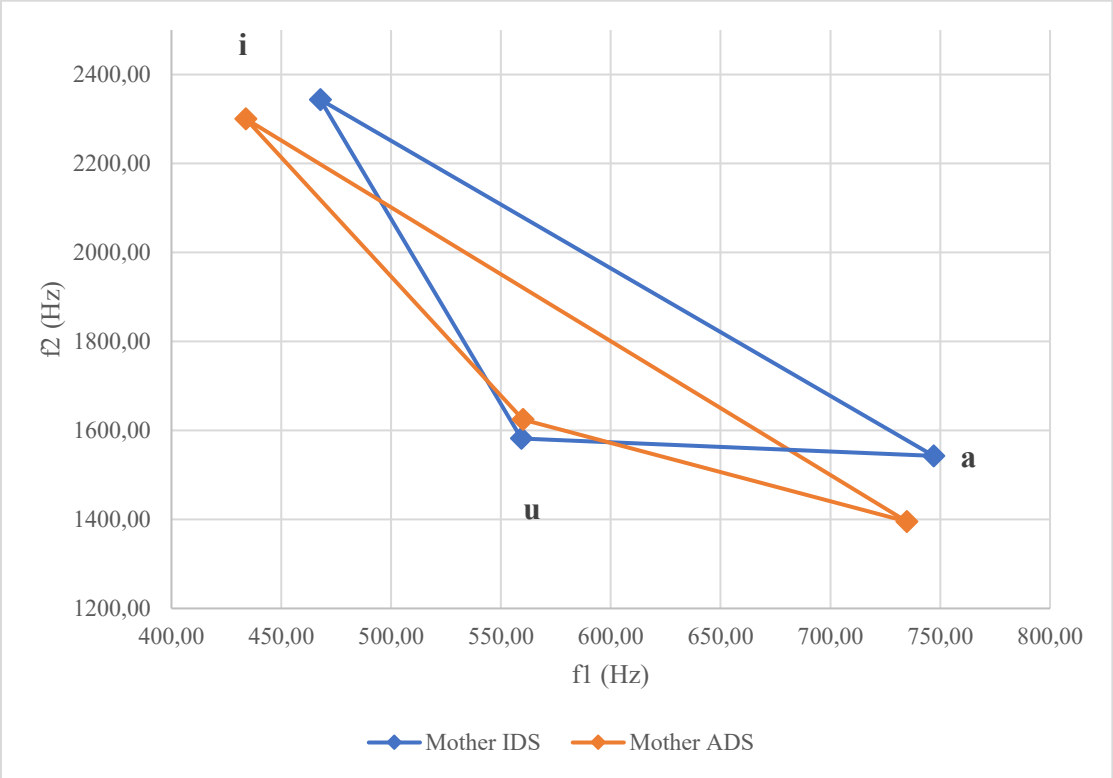

Figure 4. Vowel space area for female participants.

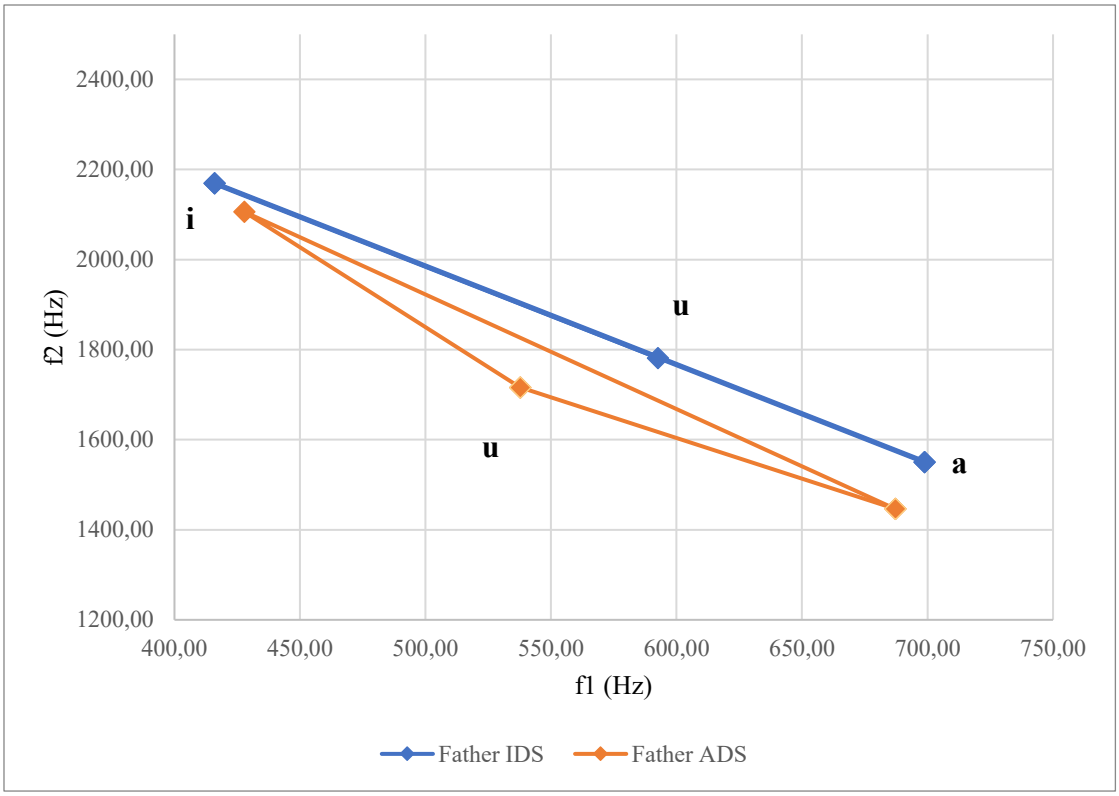

Figure 5. Vowel space area for male participants.

4.2 IDS characteristics in Norwegian fathers and mothers

Four linear mixed models were compiled with each of the IDS markers f0, vowel duration, VOT and vowel space area as dependent variables, and gender and type of speech as fixed effects with two levels each. An interaction between gender and speech type was also included as a fixed effect. The complete models can be seen in tables 4 through 7.

F0 was significantly raised in IDS compared to ADS for both groups (β = 38.36, p < .001. There was no significant difference between men and women in f0 increase.

Vowels were significantly longer in IDS compared to ADS (β = .021, p = .007) There was no significant gender difference in this effect (p = .062).

VOT was significantly shorter in IDS than in ADS (β = -.008, p < .001). Men had a longer VOT in IDS relative to ADS than women (β = .008, p = .047).

The vowel space area was significantly larger in IDS than ADS for women (β = 17067, p < .001). For men, the vowel space area was significantly smaller (β = -54091, p < .001). As the negative difference in vowel space area for men and women exceeded the positive difference in vowel space area for women in IDS compared to ADS, men had a smaller vowel space area in IDS compared to ADS.

Table 4. Linear mixed model with f0 as the dependent variabel and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	217.28	20.00 (22.29)	< .001	194.77, 239.79
Gender	-94.17	-6.02 (23.83)	< .001	-126.48, -61.86
Speech type	38.36	6.46 (1256.10)	< .001	26.72, 50.01
Gender*speech type	-14.75	-1.63 (1263.81)	.103	-32.48, 2.98

Table 5. Linear mixed models with vowel duration as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	.157	16.50 (35.91)	< .001	.138, .177
Gender	-.020	-1.42 (39.48)	.163	-.048, .008
Speech type	.021	2.71 (1263.15)	.007	.006, .036
Gender*speech type	-.022	-1.86 (1260.35)	.062	-.045, .001

Table 6. Linear mixed models with VOT as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	.049	14.693 (31.78)	< .001	.042, .056
Gender	$-1.789*10^{-5}$	-.004 (34.59)	.997	-.010, .010
Speech type	-.008	-3.25 (1184.34)	.001	-.013, -.003
Gender*speech type	.008	1.99 (1189.44)	.047	$9.854*10^{-5}$, .015

Table 7. Linear mixed models with vowel space area as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	62648	5.42 (16.19)	< .001	38166, 87130
Gender	-4517	-.28 (16.25)	.786	-39161, 30127
Speech type	17068	11.19 (1234.39)	< .001	14076, 20059
Gender*speech type	-54091	-23.19 (1236.56)	< .001	-58668, 49514

4.3 Research questions

Four linear mixed models were compiled with each of the IDS markers f0, vowel duration, VOT and vowel space area as dependent variables, gender and speech type as fixed effects with two levels each, and hostile ASI and benevolent ASI as fixed effects with one level each. Interaction terms were also added as fixed effects, between speech type and hostile ASI, speech type and benevolent ASI, speech type, hostile ASI and gender, and speech type, benevolent ASI and gender, respectively. The complete models can be seen in tables 8 through 9.

For participants who scored higher on hostile sexism, the f0 difference between ADS and IDS was smaller (β = -20.63, p = .009). For participants who scored higher on benevolent sexism, f0 was additionally increased in IDS (β = 21.87, p = .032). There were no gender differences on either of these effects

Participants who scored higher on hostile sexism had a smaller increase in their vowel space area in IDS relative to ADS (β = -13453, p < .001). Participants who scored higher on benevolent sexism had a larger increase in their vowel space area in IDS relative to ADS (β = 20077, p < .001). There were no significant gender differences on either of these effects.

The two ASI scores had a significant effect on neither vowel duration nor voice onset time.

Table 8. Linear mixed models with f0 as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	150.15	3.27 (11.26)	.007	49.39, 250.90
Gender	-29.25	-.54 (9.54)	.602	-150.96, 92.44
Speech type	55.64	3.22 (1151.33)	.001	21.74, 89.54
Hostile ASI	28.63	1.56 (11.81)	.145	-11.46, 68.72
Ben. ASI	14.50	.64 (11.17)	.536	-35.46, 64.47
Speech type*hostile ASI	-20.63	-2.64 (1149.78)	.009	-35.99, -5.27
Speech type*ben. ASI	21.87	2.15 (1145.61)	.032	1.93, 41.81
Gender*speech type*hostile ASI	-12.24	-.51 (9.82)	.619	-81.98, 26.98
Gender*speech type*ben. ASI	-52.34	-1.73 (9.90)	.293	-119.82, 15.15

Table 9. Linear mixed models with vowel space area as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	130499	2.42 (10.10)	.036	10502, 250496
Gender	-81006	-1.22 (9.98)	.001	228616, 66605
Speech type	14831	3.27 (1131.79)	.249	5719, 23745
Hostile ASI	-21593	-1.01 (10.14)	.335	-69050, 25863
Ben. ASI	-20437	-.76 (10.03)	.462	-80007, 39133
Speech type*hostile ASI	-13454	-6.45 (1130.64)	< .001	-17546, -9361
Speech type*ben. ASI	20077	7.77 (1130.19)	< .001	15007, 25147
Gender*speech type*hostile ASI	15421	.54 (10.01)	.604	-48821, 79662
Gender*speech type*ben. ASI	-7326	.42 (10.10)	.845	-88753, 74102

5 Discussion

The current study had two central aims – to assess the properties of Norwegian IDS, particularly in Norwegian fathers, and to explore the potential relationship between IDS and explicit and implicit attitudes towards gender roles. For the former, support was found for hypotheses H1a, meaning that mothers' IDS contained a higher f0, significantly shorter VOT, increased vowel space area and longer vowel durations than their ADS. Hypothesis H1b was only partially supported, in that fathers' IDS contained a higher f0, shorter VOT and longer vowel durations as suggested in the hypothesis, while their vowel space area was decreased in IDS compared to ADS. Fathers increased their f0 slightly less than mothers as suggested by hypothesis H2, but there were no gender differences in neither VOT nor vowel durations. This, combined with the surprisingly decreased vowel space area, suggests that the IDS of the fathers in the current study was not less exaggerated than that of mothers in the traditional sense, but rather exaggerated in a different way. Thus, the current findings replicate previous studies only to an extent. The traditional IDS exaggerations were found on all counts in mothers, but in fathers the results paint a slightly different picture than the one that was expected. While fathers in the current study did indeed make exaggerations in IDS relative to ADS, the results defied expectations of fathers IDS being "less exaggerated" than that of mothers; indeed, fathers' IDS seems to have properties that in parts differ from mothers' IDS altogether.

As for the second aim, a relationship was found between both forms of ASI scores and IDS changes, but gender had no effect on this relationship. However, the relationship between sexist attitudes and IDS was only examined for explicit attitudes, as the data were not sufficient for the IAT. Potential explanations and implications for these findings are discussed below.

5.1 IDS in a Norwegian sample

As hypothesized, mean f0 values increased considerably in IDS compared to ADS in both genders. Although it has been argued that f0 alone is not a good measure of IDS, it is still considered one of the main IDS characteristics (Cristia, 2013; Gergely et al., 2017; Soderstrom, 2007; Uther et al., 2007). Thus, this finding is mirrored in many impactful studies (Cristia, 2013; Fernald & Kuhl, 1987; Grieser & Kuhl, 1988). Many have argued that the raised f0 of IDS is a result of the emotional content of speech, or of the parent smiling more when speaking to their child than to a fellow adult (Benders, 2013; Kalashnikova,

Carignan, & Burnham, 2017). No matter the reason, the increased f0 has been found to maintain infant attention better than ADS (Cristia, 2013).

The vowel durations measured in the current study also met the hypothesized expectations; vowel durations were significantly longer in IDS and ADS for both genders, lending support to previous findings (Andruski & Kuhl, 1996; Cristia & Seidl, 2014; Hartman et al., 2017; Sundberg, 1998). As the hypothesized function of IDS is language learning, one explanation for this is that longer vowels might be easier for the infant to process (Cristia & Seidl, 2014).

For the mothers of the current study, vowel space was larger in IDS than ADS. This supports the hypothesis of hyperarticulation of vowels in IDS in mothers, and mirrors previous findings in the field (Cristia & Seidl, 2014). This means that mothers in the study exaggerated the clarity of their vowels, lending support to the NLM-e (Kuhl et al., 2008). As per the NLM-e, mothers enhance the clarity of their vowels to provide phonetic prototypes in the infant's native language, which the infant uses to specialize their language learning system to support future language learning (Kuhl et al., 1997; Kuhl et al., 2008).

Also mirroring previous findings, the current study found significantly shorter VOT in IDS than in ADS (Sundberg & Lacerda, 1999). VOT is vital for discerning consonants and rhythm in language, and different consonants have different VOTs. Relatively longer VOT for each consonant puts more emphasis on the consonants, thus highlighting the rhythmic structure of the language (Peelle & Davis, 2012). Studies show that infants are sensitive to rhythm in language when they are very young, and that this sensitivity to rhythm guides language discrimination before intonation and recognition of native language (Nazzi & Ramus, 2003). This could be part of the explanation for the shorter VOTs found in IDS, in accordance with the MIPhI model – if infants are already adept at discerning rhythm in language, a sensitive parent might shorten consonants to give more space for vowels (Englund, 2005b; Sundberg, 1998). Another explanation might be that the more abrupt amplitude change in shorter VOTs could make IDS easier to follow and more interesting for the infant (Sundberg & Lacerda, 1999).

5.2 Gender differences in IDS

Fathers exhibited an f0 increase that mirrored that of mothers, although the difference between ADS and IDS was smaller in fathers. This supported both the current hypothesis and previous findings (Fernald et al., 1989; Shute & Wheldall, 1999). Additionally, there were no gender differences in neither VOT nor vowel durations. This defies the second hypothesis, but

it is not an altogether surprising finding, as several studies have been unable to find a significant difference in men's and women's IDS (Jacobson et al., 1983; Papoušek et al., 1987; Weirich & Simpson, 2019).

Despite previous findings and the current hypothesis, the vowel space area was significantly smaller in IDS than ADS for fathers. A larger vowel space area signifies more distance between the cardinal vowels and thus more clarity of the vowels, which has been referred to as hyperarticulation (Cristia & Seidl, 2014). Thus, the IDS of the fathers of the current study was hypoarticulated. In a recent study that explored a large number of vowels in the Norwegian language, Englund (2018) found evidence for a smaller, not larger, vowel space area in IDS compared to ADS. The author argued that this could mean that hypoarticulated IDS could present as a perceptual challenge for the infant (Englund, 2018).

5.3 The Father Bridge Hypothesis and the NLM-e

To summarize, fathers in the current study had shorter VOT, longer vowel duration, and a slightly raised f0 in IDS relative to ADS, while vowels were hypoarticulated. This is particularly interesting, as many have linked hyperarticulation to vowel duration (Sundberg & Lacerda, 1999). For mothers, vowels were hyperarticulated, and f0 was raised, vowel durations were longer and VOT was shorter. Previous research has argued that many of the features of IDS are present to maintain infant attention (Cristia, 2013). According to the NLM-e, parents provide phonetic prototypes for their children through IDS (Kuhl et al., 2008). Based on this, a potential explanation for the current findings is that both parents employ phonetic alterations that makes speech both more interesting (f0) and easier to process (VOT and vowel durations) for the infant, and that while mothers provide clear phonetic prototypes for their infants to include in their internal language learning systems, fathers test these phonetic prototypes with ambiguous and confounding input to challenge their infants perceptually or phonetically. This reflects findings within the domain of motor development, where it has long been established that fathers play rougher and more motorically challenging with their infant, in order to motivate them to develop (Cairney et al., 2005).

However, not all families fit into the stereotypical heterosexual two-parent family. The current findings cannot be generalized outside of the study's population, but there are other studies that indicate a certain plasticity in parental roles in language learning – an interesting example is that children of mothers who suffer from chronic depression tend to shift their responsivity towards their fathers' IDS, learning more from male IDS than female IDS (Kaplan et al., 2004). This suggests that although the social and interactive prerequisites for

early language learning are complex, they are also plastic and robust to change. There is little doubt that more research is needed on LGBTQ+ families and single-parent households, both within the domain of language learning and generally within the field of psychology.

5.4 The effect of sexist attitudes on IDS

Both hostile sexism and benevolent sexism had significant effects on the differences between ADS and IDS in both f0 and vowel space area. Participants who scored higher on benevolent sexism had a higher f0 and an increased vowel space area in IDS than in ADS, while participants who scored higher on hostile sexism had a smaller f0 and vowel space area increase in IDS. There were no gender differences in these effects, meaning that both kinds of sexist attitudes affected men and women the same. This means that hostile sexist fathers would have an even larger vowel space area decrease in IDS than fathers with lower hostile sexism scores, while the difference in vowel space area from ADS to IDS would decrease for mothers with higher hostile sexism scores. For benevolent sexism scores, the outcome is reversed – benevolently sexist fathers have a smaller difference in vowel space area, whereas the difference is larger for mothers with higher benevolent sexism scores. As f0 change from ADS to IDS had the same direction for both genders, hostile sexist fathers and mothers would have a smaller difference in f0 from ADS to IDS, while the opposite would happen to benevolently sexist mothers and fathers.

These findings are somewhat confusing and need to be addressed in future research. One potential explanation could be that sexism affects men and women differently based on different underlying factors, even though the effects of sexist attitudes seem similar on the surface. As hostile sexism is connected with negative attitudes towards women (Glick & Fiske, 1996), one assumption might be that a woman with a higher score on hostile sexism might have negative attitudes towards her own self-worth, or lower competence beliefs about her role as a mother. A man with a higher hostile sexism score might have negative associations towards traditionally female tasks, such as childcare, which might make him less inclined to engage in his child's language development. On the other hand, benevolent sexism is based on positive yet stereotypical attitudes towards women, which could mean that a woman with high benevolent sexism score would have a positive or even romanticized attitude towards her own role as a mother, while a benevolently sexist father would seek to protect and help the mother of his child with her traditionally female tasks, such as childcare. Although the current data only supports the existence of a relationship between IDS and sexism, the explanation can still be seen as likely. Further investigation is needed into this

topic to ascertain the nature of the relationship between sexism and IDS in both women and men.

Another explanation might be that sexist attitudes are only a symptom of another underlying factor. Attitudes based on prejudice, such as sexism, are often correlated (Henley & Pincus, 1978). Thus, there might be another explanation for these results, such as another trend in attitudes, or something else altogether.

It is also important to note that all participants scored fairly low on both ASI scales, with the highest scores being 2.91 out of five for hostile sexism, and 1.91 out of five for benevolent sexism. As Norway is known to be a country that is characterized by a high degree of gender equality, it might be hard to find a group of participants who exhibit true sexist attitudes (Hakovirta et al., 2020). While the current data do not support further assumptions about possible links between sexism and gender roles in IDS, future research should attempt to address this both within the IDS domain and for other components of child-rearing.

6 Limitations of the current study

6.1 Participants and recruitment

The number of participants was lower than the theoretical goal of 20-40 participants, and the statistical goal of 22 participants found through power analysis. Recruitment for a study that required close contact between participant and researcher proved difficult during a pandemic. Several of the participants noted that while closed daycare centers and schools and stay-at-home orders gave them extra time with their children, they did not have the energy and flexibility needed to participate in research. The initial attempt to recruit from public institutions failed for the same reason, as daycares and clinics were already burdened by restrictions and did not have the time and resources to participate in recruiting.

As a result of this, all recruitment was done through social media. This poses several issues, as the social media reach of the researcher does not necessarily constitute a representative selection. It is therefore likely that the participants of the current study were a more homogenous group than the general population. This is especially troubling as SES and other sociodemographic factors tend to influence attitudes about gender (Anderson, Cooper, & Okamura, 1997; Yamawaki, Darby, & Queiroz, 2007). As previously established, SES could also impact both the quantity and quality of IDS (Hart & Risley, 1995, 2003; Sperry et al., 2019). In addition, a highly educated group of participants could be an explanation for the generally low ASI scores, as people with higher education tend to have less prejudice-based attitudes (Carvacho et al., 2013). The current study did not control for SES factors, but as Trondheim is a university town, it is likely that the sample consist of highly educated individuals. However, differences in sexist attitudes do occur in high-SES and highly educated environments as well, as demonstrated in the current study (Erkal et al., 2007; Garaigordobil & Aliri, 2012; Glick et al., 2002). A similar inquiry with participants with larger variation in SES and education level could potentially provide larger effects on IDS.

6.2 Research design and statistics

The research design was considered to have a high degree of ecological validity, as families recorded themselves alone without a researcher present. Previous research has argued that IDS studies should be recorded in environments and situations that are familiar to both the parent and the infant, to obtain high-quality data (Englund & Behne, 2006). However, as parents were encouraged to focus on being present and speaking naturally rather than remembering to use all the words, not all parents used all the target words. Additionally, the current study used a large number of toys, which made it harder for participants to remember

all the target words. It is difficult to ascertain the optimal number of target words in IDS studies – while it is important that all target phonemes are present in the list of target words, the target words should also be common or known words for all the parents in the study. In the current study, while not all participants used all the words, many phonemes were represented in more than one word, and as such, missing words were not thought to have affected the quality of the data.

As participants were required to record themselves without the researcher present, the researcher could not account for background noise in the recordings. However, as the LENA system is designed to record the everyday language environment of children, it is robust to background noise (Wang et al., 2017). Additionally, phonemes with audible background noise were not included in the analyses.

The statistical model was composed with only fixed effects, and no random effects. Random effects in linear mixed models account for variables that change considerably within each group – in this instance, that would be changes between different observations within each participant (Mehmetoglu & Jakobsen, 2016). As linguistic variables were the only ones that required several observations per participants, and linguistic variables were only used as dependent variables within the model, the decision was made to only include fixed effects in the statistical model. However, the case could be made for speech type to be included as a random effect, as all participants had observations from both speech types.

6.3 The IAT

As stated above, the IAT could not be used, due to both few answers and neutral scores. One explanation for the lack of answers could be evaluation fatigue – participation in this study required participants to answer both a survey and a digital test, in addition to three recordings. Due to the nature of the technological solutions chosen for the study, participants received the email with the PsyToolKit link to the IAT after their invitation to the ASI survey, which supports the assumption of evaluation fatigue. Another explanation could be that some participants simply did not receive the PsyToolKit email, due to email carrier issues. The technological tools available did not allow the IAT to be included in the survey – if this were possible, it could have made a difference in the number of IAT answers. If the study were performed in a laboratory setting, it would have been easier to ensure that participants completed both the ASI and the IAT, but this would have sacrificed the ecological validity of the IDS and ADS recordings.

The homogenous IAT results could be a result of tasks being too easy, so that response times were low for all conditions. However, the homogeneity of the IAT results reflects the low ASI scores from the study, which indicates that the current sample had very few sexist attitudes altogether. The ASI scores alone provided enough data to address the research questions of the current study, but future studies should attempt to use both explicit and implicit attitude measures.

6.4 Potential confounding variables

The current study did not control for parents' education level or SES. As mentioned above, education level can affect attitudes (Carvacho et al., 2013). There are also several studies that point to a relation between SES and the quality and quantity of IDS (Hart & Risley, 1995, 2003; Sperry et al., 2019).

Parents were also not asked about how they have chosen to share parental leave. Current parental leave policy gives parents a lot of flexibility in division of parental leave, although in most cases, the mother stays at home for longer than the father (SSB, 2020). How much time parents spend with their children could potentially affect their relationship, which in turn could affect IDS.

There was a large variation in the parents' dialects. This could potentially have made acoustic analyses harder and more ambiguous, which could have created trends in e. g. vowel duration. However, several other studies have used parents from different dialects, and as Norway is a country with large phonetic variation between dialects, this would be hard to control (Gooskens, 2004). Thus, while differences in dialect might have affected the acoustic outcome of individual phonemes, it is highly unlikely that differences between ADS and IDS were affected.

The current study also did not control for neither age nor gender of the participants' children – this was due to ethical concerns, as the current study was only approved to gather data on the parents and not the children. IDS tends to change as the infant ages (Cristia & Seidl, 2014; Englund & Behne, 2006; Kitamura & Burnham, 2003; Kokkinaki et al., 2020). The infant's gender can also affect how they are spoken to by their parents (Kokkinaki et al., 2020). In addition, male and female IDS follows different trajectories as the infant ages (Kokkinaki et al., 2020). Thus, both infant age and infant gender could affect the gender differences between parents in the current study.

7 Conclusions and implications for further research

In support of previous research, the results of the current study indicate that the IDS of Norwegian mothers is characterized by a raised f0, shorter VOT, increased vowel space area, and longer vowel durations. Similarly, the IDS of Norwegian fathers seems to be characterized by a raised f0, shorter VOT, longer vowel duration, and a decreased vowel space area. The findings on mothers' IDS were expected, and while the apparent decrease in vowel space area in Norwegian fathers seems surprising, it is not entirely unwarranted. The apparent hypoarticulation in male IDS could function as a perceptual challenge to the infant, in the same way that fathers challenge their children motorically more than mothers do, in accordance with the Father Bridge hypothesis. The most important conclusion from the current research is that while traditionally, fathers have been viewed as a "lesser mother" in language development matters, the current results indicate that fathers have a different role altogether. Further investigation is needed into the application of the Father Bridge hypothesis to the language learning domain, in order to obtain a more comprehensive overview of the father's role in language learning.

The apparent connections between IDS and sexist attitudes are interesting, and future research should address these relationships and attempt to locate any underlying causes. While no gender differences were found in the effect of sexism on IDS, the gender differences in vowel space area meant that sexist attitudes affected male and female IDS differently. This, combined with the obvious assumption that sexism in itself affects men and women differently, demands further inquiry into the relation between gender, sexism and IDS.

Future research should also address how the gender differences in the current study relates to non-heterosexual- and single-parent households. Additionally, the apparent homogeneity in the current sample calls for future investigations in samples with larger variations in SES and education level. Further studies should also attempt to include measures of both explicit and implicit attitudes, which the current study was unable to do.

The father's role in child development is much less researched than the mother's role, and in a time where fathers are expected to take on more of the traditionally female tasks at home, further research on this topic is consequential for our understanding of early language development.

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Appendices

Appendix I: Tables for non-significant models

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Appendix I: Tables for non-significant models

Table I-I. Linear mixed models with vowel duration as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	.108	3.28 (15.35)	.005	.038, .179
Gender	.017	.48 (8.27)	.645	-.063, .097
Speech type	.001	.04 (1125.76)	.966	-.043, .045
Hostile ASI	.029	2.15 (17.74)	.046	.001, .058
Ben. ASI	-.005	-.28 (16.15)	.781	-.039, .030
Speech type*hostile ASI	.004	.39 (1144.65)	.697	-.016, .024
Speech type*ben. ASI	.010	.73 (1151.91)	.463	-.016, .036
Gender*speech type*hostile ASI	-.041	-2.65 (8.65)	.028	-.076, -.006
Gender*speech type*ben. ASI	.015	.18 (20.30)	.468	-.030, .060

Table I-II. Linear mixed models with VOT as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	Estimate (β)	t (df)	p	CI (lower, upper)
Intercept	.063	5.48 (14.27)	< .001	.038, .087
Gender	-.012	-1.00 (7.90)	.346	-.016, .014
Speech type	-.001	-.09 (1073.13)	.926	-.040, .016
Hostile ASI	-.003	-.69 (16.68)	.501	-.013, .007
Ben. ASI	-.007	-1.18 (14.93)	.256	-.019, .005
Speech type*hostile ASI	-.003	-.83 (1081.97)	.407	-.010, .004
Speech type*ben. ASI	-.001	-.20 (1081.30)	.841	-.010, .008
Gender*speech type*hostile ASI	.009	1.58 (8.15)	.151	-.004, .021
Gender*speech type*ben. ASI	.001	.11 (8.84)	.913	-.015, .017

Appendix II: *F* statistics

Table II-I. *F* statistics for Table 4. Linear mixed model with f0 as the dependent variabel and participants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 16.62	674.274	< .001
Gender	1, 16.62	50.409	< .001
Speech type	1, 1263.81	47.050	< .001
Gender*speech type	1, 1263.81	2.665	.103

Table II-II. *F* statistics for Table 5. Linear mixed models with vowel duration as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 16.90	732.941	< .001
Gender	1, 16.90	7.452	.014
Speech type	1, 1263.35	2.947	.086
Gender*speech type	1, 1263.35	3.476	.062

Table II-III. *F* statistics for Table 6. Linear mixed models with VOT as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 16.24	542.556	< .001
Gender	1, 16.24	.904	.356
Speech type	1, 1189.44	5.424	.020
Gender*speech type	1, 1189.44	3.950	.047

Table II-IV. *F* statistics for Table 7. Linear mixed models with vowel space are as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 15.93	46.313	< .001
Gender	1, 15.93	3.758	.070
Speech type	1, 1236.56	73.162	< .001
Gender*speech type	1, 1236.56	537.537	< .001

Table II-VIII. *F* statistics for Table 8. Linear mixed models with f0 as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 10.07	35.285	< .001
Gender	1, 9.54	.291	.602
Speech type	1, 1151.33	10.372	.001
Hostile ASI	1, 10.15	.488	.500
Ben. ASI	1, 9.97	.396	.543
Speech type*hostile ASI	1, 1151.58	3.066	.080
Speech type*ben. ASI	1, 1151.76	.021	.886
Gender*speech type*hostile ASI	2, 17.73	1.286	.301
Gender*speech type*ben. ASI	2, 17.55	4.405	.028

Table II-VI. *F* statistics for table 9. Linear mixed models with vowel space area as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 10.02	8.637	.015
Gender	1, 9.98	1.496	.249
Speech type	1, 1130.79	10.657	.001
Hostile ASI	1, 10.03	2.209	.168
Ben. ASI	1, 9.10	.029	.867
Speech type*hostile ASI	1, 1131.89	36.260	< .001
Speech type*ben. ASI	1, 1131.56	.548	.459
Gender*speech type*hostile ASI	2, 17.91	.891	.428
Gender*speech type*ben. ASI	2, 17.87	57.378	< .001

Table II-VII. *F* statistics for Table I-I. Linear mixed models with vowel duration as the dependent varaibel and aprticipants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 10.41	40.541	< .001
Gender	1, 8.27	.229	.645
Speech type	1, 1125.76	.002	.966
Hostile ASI	1, 10.32	3.524	.089
Ben. ASI	1, 9.65	.260	.621
Speech type*hostile ASI	1, 1144.51	.263	.608
Speech type*ben. ASI	1, 1127.50	1.518	.218
Gender*speech type*hostile ASI	2, 17.27	3.824	.042
Gender*speech type*ben. ASI	2, 17.49	.341	.716

Table II-VII. *F* statistics for Table I-II. Linear mixed models with VOT as the dependent variable and participants as the grouping variable. All variables are fixed effects.

Parameter	df	*F*	*p*
Intercept	1, 9.80	77.269	< .001
Gender	1, 7.90	1.005	.346
Speech type	1, 1073.13	.009	.926
Hostile ASI	1, 9.72	.619	.450
Ben. ASI	1, 9.14	2.375	.157
Speech type*hostile ASI	1, 1081.47	.043	.835
Speech type*ben. ASI	1, 1072.07	.798	.372
Gender*speech type*hostile ASI	2, 16.20	2.050	.161
Gender*speech type*ben. ASI	2, 16.32	.392	.682

Appendix III: IAT stimuli

Table III-I. IAT stimuli.

Male names	*Female names*	*Career*	*Family*
Jakob	Emma	Sjef	Hjem
Lucas	Sara	Ledelse	Foreldre
Markus	Emilie	Profesjonell	Barn
Kristian	Camilla	Bedrift	Familie
Thomas	Anne	Lønn	Søskenbarn
Jan	Heidi	Kontor	Bryllup
Per	Bente	Jobb	Ekteskap
Bjørn	Ingrid	Karriere	Slektning

Appendix IV: Toys

Bille/Beetle

Bok/Book

Bukk/Buck

Gutt/Boy
Dukke/Doll

Kake/Cake

Katt/Cat

Pippi/Pippi
Dukke/Doll

Tiger/Tiger

Appendix V: NSD approval

NSD NORSK SENTER FOR FORSKNINGSDATA

NSD sin vurdering

Prosjekttittel

Barnerettet tale og holdninger om kjønn

Referansenummer

412169

Registrert

31.08.2020 av Karen Engen Økland - karen.okland@ntnu.no

Behandlingsansvarlig institusjon

Norges teknisk-naturvitenskapelige universitet / Fakultet for samfunns- og utdanningsvitenskap (SU) / Institutt for psykologi

Prosjektansvarlig (vitenskapelig ansatt/veileder eller stipendiat)

Nunne Englund, nunne.englund@ntnu.no, tlf: 92442089

Type prosjekt

Studentprosjekt, masterstudium

Kontaktinformasjon, student

Karen Økland, karen.okland@ntnu.no, tlf: 90260715

Prosjektperiode

25.08.2020 - 01.08.2021

Status

12.10.2020 - Vurdert

Vurdering (1)

12.10.2020 - Vurdert

Det er vår vurdering at behandlingen av personopplysninger i prosjektet vil være i samsvar med personvernlovgivningen så fremt den gjennomføres i tråd med det som er dokumentert i meldeskjemaet 12.10.2020 med vedlegg, samt i meldingsdialogen mellom innmelder og NSD. Behandlingen kan starte.

MELD VESENTLIGE ENDRINGER
Dersom det skjer vesentlige endringer i behandlingen av personopplysninger, kan det være nødvendig å melde dette til NSD ved å oppdatere meldeskjemaet. Før du melder inn en endring, oppfordrer vi deg til å lese om hvilke type endringer det er nødvendig å melde: https://nsd.no/personvernombud/meld_prosjekt/meld_endringer.html

Du må vente på svar fra NSD før endringen gjennomføres.

TYPE OPPLYSNINGER OG VARIGHET
Prosjektet vil behandle alminnelige kategorier av personopplysninger frem til 01.08.2021.

LOVLIG GRUNNLAG
Prosjektet vil innhente samtykke fra de registrerte til behandlingen av personopplysninger. Vår vurdering er at prosjektet legger opp til et samtykke i samsvar med kravene i art. 4 og 7, ved at det er en frivillig, spesifikk, informert og utvetydig bekreftelse som kan dokumenteres, og som den registrerte kan trekke tilbake. Lovlig grunnlag for behandlingen vil dermed være den registrertes samtykke, jf. personvernforordningen art. 6 nr. 1 bokstav a.

PERSONVERNPRINSIPPER
NSD vurderer at den planlagte behandlingen av personopplysninger vil følge prinsippene i personvernforordningen om:

- lovlighet, rettferdighet og åpenhet (art. 5.1 a), ved at de registrerte får tilfredsstillende informasjon om ogsamtykker til behandlingen
- formålsbegrensning (art. 5.1 b), ved at personopplysninger samles inn for spesifikke, uttrykkelig angitte ogberettigede formål, og ikke viderebehandles til nye uforenlige formål
- dataminimering (art. 5.1 c), ved at det kun behandles opplysninger som er adekvate, relevante ognødvendige for formålet med prosjektet
- lagringsbegrensning (art. 5.1 e), ved at personopplysningene ikke lagres lengre enn nødvendig for åoppfylle formålet

DE REGISTRERTES RETTIGHETER
Så lenge de registrerte kan identifiseres i datamaterialet vil de ha følgende rettigheter: åpenhet (art. 12), informasjon (art. 13), innsyn (art. 15), retting (art. 16), sletting (art. 17), begrensning (art. 18), underretning (art. 19), dataportabilitet (art. 20).
NSD vurderer at informasjonen som de registrerte vil motta oppfyller lovens krav til form og innhold, jf. art.
12.1 og art. 13.

Vi minner om at hvis en registrert tar kontakt om sine rettigheter, har behandlingsansvarlig institusjon plikt til å svare innen en måned.

FØLG DIN INSTITUSJONS RETNINGSLINJER
NSD legger til grunn at behandlingen oppfyller kravene i personvernforordningen om riktighet (art. 5.1 d), integritet og konfidensialitet (art. 5.1. f) og sikkerhet (art. 32).

Nettskjema er databehandler i prosjektet. NSD legger til grunn at behandlingen oppfyller kravene til bruk av databehandler, jf. art 28 og 29.

For å forsikre dere om at kravene oppfylles, må dere følge interne retningslinjer og eventuelt rådføre dere med behandlingsansvarlig institusjon.

OPPFØLGING AV PROSJEKTET
NSD vil følge opp ved planlagt avslutning for å avklare om behandlingen av personopplysningene er avsluttet.

Lykke til med prosjektet!

Kontaktperson hos NSD: Kajsa Amundsen
Tlf. Personverntjenester: 55 58 21 17 (tast 1)

Appendix VI: Consent form

Vil du delta i et forskningsprosjekt?

Dette er et spørsmål til deg om å delta i et forskningsprosjekt hvor formålet er å undersøke kjønnsforskjeller i barnerettet tale, og om disse kjønnsforskjellene kan ha en sammenheng med holdninger. I dette skrivet gir vi deg informasjon om målene for prosjektet og hva deltakelse vil innebære for deg.

Formål

Formålet med prosjektet er å undersøke om holdninger til kjønn kan ha en sammenheng med hvordan vi snakker til barn, og om denne sammenhengen er lik eller ulik for kvinner og menn. Dette er en masteroppgave, og opplysningene du gir vil kun brukes i denne masteroppgaven.

Hvem er ansvarlig for forskningsprosjektet?
Norges teknisk-naturvitenskapelige universitet (NTNU) er ansvarlig for prosjektet.

Hvorfor får du spørsmål om å delta?
Du har fått spørsmål om å delta fordi du er mor eller far til et barn i aldersgruppen 8 til 14 måneder. Henvendelsen om å delta har gått ut til 6 barnehager i Trondheim, der foreldre med barn i riktig aldersgruppe har fått forespørsel om deltakelse.

Hva innebærer det for deg å delta?

Deltakelse innebærer at man tar opptak av tre korte samtaler - en mellom mor og barn, en mellom far og barn, og en mellom mor og far. I samtalene med barnet skal dere leke med leketøy dere får utdelt, og i samtalen mellom mor og far skal dere fortelle hverandre om de forskjellige lekene. Dere vil få utdelt opptaksutstyr. Av personvernshensyn er det viktig at dere unngår å nevne navn og karakteristikker på andre dere kjenner under samtalen. I tillegg må begge foreldre svare på en kort nettbasert undersøkelse om holdninger, og ta en liten nettbasert test der dere skal sortere ord i kategorier. Både spørreskjemaet og testen handler om dine holdninger til kjønn.

Det er frivillig å delta
Det er frivillig å delta i prosjektet. Hvis du velger å delta, kan du når som helst trekke samtykket tilbake uten å oppgi noen grunn. Alle dine personopplysninger vil da bli slettet. Det vil ikke ha noen negative konsekvenser for deg hvis du ikke vil delta eller senere velger å trekke deg.

Ditt personvern – hvordan vi oppbevarer og bruker dine opplysninger
Vi vil bare bruke opplysningene om deg til formålene vi har fortalt om i dette skrivet. Vi behandler opplysningene konfidensielt og i samsvar med personvernregelverket. Det er kun jeg som er masterstudent, samt veilederen min, som vil ha tilgang til opplysningene. Navnet og kontaktopplysningene dine vil jeg erstatte med en kode som lagres på en egen navneliste adskilt fra øvrige data. Du som deltar vil ikke kunne kjennes igjen i den ferdige masteroppgaven, eller i eventuelle publikasjoner.

Hva skjer med opplysningene dine når vi avslutter forskningsprosjektet?
Opplysningene anonymiseres når prosjektet avsluttes/oppgaven er godkjent, noe som etter planen er i august 2021. Etter prosjektets slutt og klagefristen for masteroppgaven er utløpt, vil personopplysningene og opptak slettes permanent.

Dine rettigheter
Så lenge du kan identifiseres i datamaterialet, har du rett til:

- innsyn i hvilke personopplysninger som er registrert om deg, og å få utlevert en kopi av opplysningene,
- å få rettet personopplysninger om deg,
- å få slettet personopplysninger om deg, og
- å sende klage til Datatilsynet om behandlingen av dine personopplysninger.

Hva gir oss rett til å behandle personopplysninger om deg?
Vi behandler opplysninger om deg basert på ditt samtykke.

På oppdrag fra NTNU har NSD – Norsk senter for forskningsdata AS vurdert at behandlingen av personopplysninger i dette prosjektet er i samsvar med personvernregelverket.

Hvor kan jeg finne ut mer?
Hvis du har spørsmål til studien, eller ønsker å benytte deg av dine rettigheter, ta kontakt med:

- NTNU ved masterstudent Karen Økland, karen.okland@ntnu.no, eller ved veileder Nunne Englund, nunne.englund@ntnu.no.
- Vårt personvernombud: Thomas Helgesen, thomas.helgesen@ntnu.no

Hvis du har spørsmål knyttet til NSD sin vurdering av prosjektet, kan du ta kontakt med:

- NSD – Norsk senter for forskningsdata AS på epost (personverntjenester@nsd.no) eller på telefon: 55 58 21 17.

Med vennlig hilsen

Nunne Englund
Prosjektansvarlig
(Forsker/veileder)

Karen Økland
Masterstudent

Samtykkeerklæring

Jeg har mottatt og forstått informasjon om prosjektet *IDS and gender role attitudes*, og har fått anledning til å stille spørsmål. Jeg samtykker til:

- ☐ å delta i lydopptak
- ☐ å delta i spørreskjema og elektronisk test

Jeg samtykker til at mine opplysninger behandles frem til prosjektet er avsluttet

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(Signert av prosjektdeltaker, dato)

Appendix VII: E-mail to participants

Takk for at dere vil være med i mitt masterprosjekt!

Her kommer litt mer informasjon om prosjektet, samt vedlagt informasjonsskriv og samtykkeskjema. Du trenger ikke å printe ut skjemaet, men gjerne les gjennom det på forhånd!

Praktisk informasjon
På et tidspunkt som passer for dere, kommer jeg innom og leverer en pose med leker og litt opptaksutstyr hjemme hos dere, eller et annet sted som passer. Selve opptaket tar nok under en time å gjennomføre, men dere beholder utstyret i minst ett døgn. Hvis dere trenger mer tid, ordner vi det. Dere får instruksjoner om hvordan opptaket skal gjennomføres sammen med utstyret, og dersom dere ønsker det kan jeg veilede digitalt via f. eks. Zoom.

Når dere har levert opptaket sender jeg dere en lenke til et spørreskjema og en nettbasert test. Disse tar inntil 20 minutter, og begge foreldre skal svare.

Personvern
Denne studien er godkjent av NSD, og dere må signere samtykkeskjema før jeg kan bruke dataene dere gir meg. Dere får utskrift av samtykkeskjema når jeg leverer utstyret, og disse må leveres signert når jeg henter utstyret igjen - hvis ikke kan jeg ikke bruke dataene. Hvis dere bestemmer dere for at dere ikke ønsker å delta likevel, bare gi meg beskjed, så sletter jeg dataene som er knyttet til dere. For mer informasjon, se vedlagt samtykkeskjema. Si fra hvis dere lurer på noe!

Når passer det best for dere at jeg kommer? Jeg er fleksibel og har tilgang til bil, så bare foreslå tidspunkt!

Med vennlig hilsen
Karen Engen Økland
Masterstudent i psykologi, retning læring - hjerne, atferd, omgivelser

Appendix VIII: Transcript of video for participants

Hei og takk igjen for at du ønsker å være med på min masteroppgave. Jeg heter Karen, og dette er en instruksjonsvideo som forteller hva dere skal gjøre.

Når jeg har levert tingene dere trenger for å gjøre opptakene på døra, er det første dere må gjøre å lese gjennom, og forhåpentligvis signere på dette samtykkeskjemaet. Dere må levere tilbake samtykkeskjemaet til meg når dere leverer tilbake resten av utstyret, hvis ikke kan jeg ikke bruke dataene dere gir.

Det står mye om det i skjemaet, men kort forklart handler denne oppgaven om barnerettet tale, altså den talen foreldre har til sine barn, og om det er kjønnsforskjeller i den, og om de kjønnsforskjellene kan ha en sammenheng med holdningene våre til kjønn og kjønnsroller. For å undersøke det skal jeg ta opp hvordan dere snakker til barna deres, og hvordan dere snakker til hverandre, for å ha et sammenligningsgrunnlag mellom barnerettet tale og voksenrettet tale. For å gjøre disse opptakene skal vi bruke denne her – det er en nett liten opptaker, og den er veldig enkel å bruke – du holder inn på-knappen for å starte den, da står det «paused» på skjermen, så holder du inn der det står «rec» for å starte opptaket, og holder inn «rec» igjen for å stoppe opptaket. For å skru den av holder du inn på-knappen igjen.

Det som er veldig viktig med den opptakeren, er at den kun lagrer opptak som er over 10 minutter lange. Det er fordi den egentlig er laget for å fange opp et barns språkmiljø, altså alt det språket et barn hører i løpet av en dag. Den er laget for å ta mye lengre opptak enn det vi bruker den til nå. Derfor anbefaler jeg at dere starter opptakeren når dere tar opp den første samtalen, og så bare lar den gå. Den har masse lagringsplass, så det trenger dere ikke være bekymret for. Men pass på at opptaket, eller opptakene, blir mer enn ti minutter lange, hvis ikke forsvinner filen.

Opptakeren skal dere legge inni denne t-skjorten, som dere skal ha på når dere gjør opptakene. T-skjorten har en nett liten lomme på brystet, der opptakeren passer. Grunnen til at vi gjør det sånn, er at vi ønsker at opptakeren skal være like langt unna munnen hele tiden, for å sikre god lydkvalitet. Hvis dere av en eller annen grunn ikke kan ha på t-skjorten, hvis den ikke passer eller noe annet er i veien, så bare pass på å ha opptakeren et sted der den er trygg, der den er forholdsvis nær dere, og et sted barnet ikke kan ta tak i den og kaste den rundt.

Dere skal som sagt spille inn tre samtaler – en samtale eller lekestund mellom mor og barn, en lekestund eller samtale mellom far og barn, og en samtale mellom foreldrene. For at alle deltakerne skal bruke de samme ordene er det en del leker dere skal leke med, og som dere voksne skal fortelle hverandre om. Jeg skal vise fram de lekene nå, og si navnet på dem, så gjerne følg med på hva de heter.

Det er en *tiger*, en *bok*, det er en *gutt* – jeg vet det er Albert Åberg, men gjerne bruk navnet *gutt*. Vi har en *bukk*, altså en geitebukk, vi har *Pippi* – Pippi heter Pippi, men gjerne også bruk ordet *dukke* om gutten og Pippi, så får vi alle de tre ordene. Dette er en *katt*, og til slutt har vi en *kake* og en *bille*. Billen ser veldig ut som en marihøne, men for vårt formål så er det en bille.

Dette er ganske mange ord, og det er ikke det aller viktigste at dere får med alle ordene – det viktigste er at talen er naturlig. Så dersom dere ikke husker alt, eller ikke føler at det er naturlig å bruke alle disse ordene, så er det viktigere at det er naturlig tale. Gjerne ha det litt i bakhodet at dere skal bruke så mange ord som mulig, men naturlig tale er det viktigste. Når dere voksne snakker til hverandre etterpå kan dere gjerne fortelle hverandre om hvordan dere brukte lekene da dere lekte med barnet, for da har dere noe å snakke naturlig om. For eksempel kan dere fortelle at katten gikk en tur i skogen, og i skogen møtte den Pippi, og katten og Pippi ble venner. Da er det naturlig språk – det er kanskje ikke en kjempe-naturlig samtale å ha to voksne imellom, men det er mer naturlig tale enn oppramsing.

Dere har fått kontaktinformasjonen min, både e-post og telefonnummer, og dersom dere lurer på noe, underveis eller etterpå, er det bare å ta kontakt. Jeg kan også veilede dere over telefon, eller over videosamtale på for eksempel Zoom eller Skype eller FaceTime mens dere holder på med opptaket.

Det var det jeg hadde å si – tusen takk igjen og lykke til.

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