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# American and British speech differences in low socioeconomic status homes

Jennifer Markfeld

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American and British Speech Differences in Low Socioeconomic Status Homes

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An Honors College Project Presented to  
the Faculty of the Undergraduate  
College of Health and Behavioral Studies  
James Madison University

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by Jennifer Elise Markfeld

April 2019

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Accepted by the faculty of the Department of Communication Sciences and Disorders, James Madison University,  
in partial fulfillment of the requirements for the Honors College.

FACULTY COMMITTEE:

HONORS COLLEGE APPROVAL:

---

Project Advisor: Rory A. DePaolis, Ph.D.  
Professor, Communication Sciences and Disorders

---

Bradley R. Newcomer, Ph.D.  
Dean, Honors College

---

Reader: Michelle McGillion, Ph.D.  
Assistant Professor, Department of Psychology,  
University of Warwick

---

Reader: GERALYN R. TIMLER, Ph.D.  
Associate Professor, Communication Sciences and  
Disorders

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**PUBLIC PRESENTATION**

This work is accepted for presentation, in part or in full, at the Society for Research in Child Development (SRCD)  
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### Abstract

**Background:** Infants living in low socioeconomic status (SES) homes display lower developmental functioning by 12 months than mid- and high-SES infants, and speak fewer words on average as they grow older. Maternal speech is especially important for language development and has been found to be the largest predictor of SES-related differences in children's vocabulary. Although there are documented differences between British and American infant language development, for example American infant lexicons are typically larger than age matched British infants, there is little research looking at caregiver speech across these countries in low SES groups.

**Method:** This retrospective study compared 10 British and 10 American caregiver-infant dyads in order to explore language differences that may exist between the two populations. Each family used a LENA (Language ENvironment Analysis) recording device to record the amount of speech heard in the infant's environment over two subsequent days. Analysis was completed using two methods: 1) the automated LENA counts from recordings, and 2) one hour of orthographically transcribed infant directed speech extracted from the LENA audio files.

**Results:** No significant differences were found in any of the automated LENA counts across groups. After completing a language sample analysis for each transcribed hour, only the mean length of utterance (MLU) showed a significant difference. The American caregivers had a significantly higher average MLU than British caregivers.

**Conclusions:** These results further document differences between lower SES British and American caregivers and add to the ongoing discussion of language differences in British and American infants.

### **Introduction**

Infants' language development is impacted by the care they receive and the environments in which they are immersed (Hurt & Betancourt, 2017). Living in poverty often leads to negative outcomes for developing infants. For example, as early as 12 months of age, low socioeconomic status (SES) infants display lower developmental functioning than 12-month-old high SES infants when tested on motor, language, and cognitive skills (Tomalski et al., 2017, Hurt & Betancourt, 2017). At age three, American children from families on public assistance speak an average of 300 fewer words per hour when compared to children from professional families (Hart & Risley, 1995). Overall, lower household income levels are correlated with fewer words heard and spoken by children growing up in the USA, which is associated with slower vocabulary growth during the developing years (Cates et al., 2012; Fernald, Marchman, & Weisleder, 2013; Hart & Risley, 1995; Hoff, 2003).

Since American infants' developmental trajectories as a function of SES have been well established in the literature, researchers have now begun to look at language development cross-culturally. In one study comparing American and British infant language development, American infants were found to have higher levels of expressive and receptive vocabulary levels when compared to British infants (Fernald et al., 1989; Hamilton & Plunkett, 1999). The research comparing American and British English within this broader cultural comparison of development has only recently begun, and differences between American and British mother-infant interactions have emerged as a potential contributory factor to the observed differences in infants (Floccia et al., 2016; Vest, 2013). However, more research is needed to continue to explore if significant differences exist and, if so, to determine why such differences are present.

### **SES and Language Development**

Studies in the field of child development correlate low SES with a more chaotic and stressful home environment, and this stress frequently manifests in parent-infant interactions (Schwab & Williams, 2016; Tomalski et al., 2017). Tomalski et al. (2017) demonstrated that infants in a higher-stress home are more likely to have regular sequences of parental interaction interrupted and that such interruptions adversely impact developing attention skills. Moreover, living in an environment that is characterized by stress typically results in a less stable routine, which allows for fewer opportunities for the parent and infant to interact in ways that help scaffold language learning through meaningful exchanges (Hirsh-Pasek et al., 2015; Hurt & Betancourt, 2017; Tomalski et al., 2017). Additionally, McGillion et al. (2013) found that levels of spoken, or expressive vocabulary in infants can be delayed as a result of decreased caregiver responsiveness and that this delay is evident as early as 18 months. These findings show that interaction with a caregiver is vital to the healthy language development of infants.

An infant's mother or primary caregiver is a main teacher of language, especially in the earliest months of life (Gutman & Feinstein, 2010; Hoff, 2003; McGillion et al., 2013). Maternal speech is especially important for language development and was found to be the largest predictor of SES-related differences in children's vocabulary (Hoff, 2003). Additionally, mothers who have higher income and education levels have been shown to engage in a greater number of activities and interactions with their children (Cates et al., 2012). This is correlated with higher levels of expressive vocabulary as children develop (Gutman & Feinstein, 2010; McGillion, Herbert, Pine, et al., 2017), whereas less stimulation and quality interaction between low SES parents and their infants negatively impacts later language outcomes (Fernald, Marchman, & Weisleder, 2013; Gutman & Feinstein, 2010; Hart & Risley, 1995). In Gilkerson et al. (2017), parents who had a college degree spoke an average of 24% more words to their

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children per day when compared to less educated parents. Therefore, this suggests that less educated, lower SES parents might speak less to their children, and this decline in word counts could negatively affect the language experience of children as they develop (Hart & Risley, 1995; Hurt & Betancourt, 2017). These findings highlight the importance of the effect that the quantity of words spoken to infants has on present and future development (Gilkerson et al., 2017; Hart & Risley, 1995; McGillion, Pine, Herbert, & Matthews, 2017; Schwab & Williams, 2016).

Emerging research has begun to explore the effects that quality of speech can have on development, and conversations are beginning that suggest quality of speech may be more important for infants than the quantity of caregiver speech. This debate is ongoing (Hirsh-Pasek et al., 2015; Schwab & Williams, 2016; Vihman, 2014). In Hirsh-Pasek et al. (2015), the quantity of words spoken by mothers was not linked to later language outcomes at 36 months. The study also argued that focusing only on quantity of words spoken to infants ignores the characteristics of *how* those words are integrated into the child's everyday life. This is important to note because quality speech towards an infant helps to scaffold language learning and predicts higher levels of vocabulary in the developing years (Hirsh-Pasek et al., 2013; McGillion et al., 2013; Vihman, 2014).

Arguably, the most important element in an infant's language development is the type of communication that takes place (Cates et al., 2012; McGillion et al., 2013; Vihman, 2014). Infant-directed speech (IDS), or motherese, is distinguished by features such as simplified sentence structure and exaggerated prosody (Fernald et al., 1989). IDS is highly salient for infants and speeds up processes such as segmentation (recognizing and distinguishing known words within sentences) and word learning (Flocchia et al., 2016; Vihman, 2014). With the proven importance of IDS in an infant's language environment, it is clear that a lack of IDS—both in

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quantity and in quality—leads to lower language outcomes (Floccia et al., 2016; Hart & Risley, 1995; Hirsh-Pasek et al., 2015).

Recently, research has emerged which reexamines the original study done by Hart and Risley in 1995 that investigated SES and child word exposure (Sperry, Sperry, & Miller, 2018). Sperry et al. (2018) examined elements of Hart and Risley's study such as participant race, sample size, and data collection methods, and present new findings that do not fully support the findings of Hart and Risley. Additionally, discussions are beginning in more mainstream culture which suggest that the '30 million word gap' as coined by Hart and Risley could be an overestimation of the true differences in parental speech input across social classes (Gutierrez & Donnella, 2018; Kamenetz, 2018). Hart and Risley did lay the groundwork for bringing social, racial, and class differences to the forefront of research and clinical considerations, and allowed this conversation to continue to grow and branch into new findings such as these most recent ones. Even though the study was conducted decades ago, it is important that subsequent studies replicate this finding and it would be negligent to fail to consider them (Fernald, Marchman, & Weisleder, 2013; Hirsh-Pasek et al., 2015; Hoff, 2003; Romeo et al., 2018).

### **American and British Differences**

Much of the existing research on language development has occurred in North America, and cross-cultural linguistic comparisons have largely focused on acoustic properties of IDS and how those properties affect language development (Vihman, 2014; White, 2012). The exploration of IDS and its differences in American and British English mothers began when researchers found that American English infants are consistently exposed to more exaggerated prosody and higher mean pitch when compared to British English infants (Fernald et al., 1989). This difference in IDS could explain the observed lower levels of receptive and expressive vocabulary in British English infants longitudinally across all levels of SES (Fernald et al., 1989;

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Shute & Wheldall, 1988). Prior to this finding, very few researchers had explored American and British differences in language learning because most assumed that the two populations were very similar. This discovery prompted further research regarding factors that may be causing differences in language acquisition between American and British infants.

Studies exploring additional differences in vocabulary learning in American and British infants began when Hamilton and Plunkett (1999) assessed the expressive and receptive vocabulary levels in 669 middle class British English infants (ranging in age from 12 months to 25 months) using Communicative Development Inventories (CDIs). CDIs are parent reported measures of words that their child can say and/or understand. Hamilton and Plunkett then compared the British CDIs to the American CDIs obtained by Fenson et al. (1994) across all SES groups. For each vocabulary score, there were large and significant differences between the two groups – each difference supporting higher levels of vocabulary in American English infants. Hamilton and Plunkett admit their confusion about these findings, and suggest that “subtle cultural differences” between groups may have influenced the results. To date, there are no studies that have determined the causes of the differences between American and British English IDS and infant language outcomes between different groupings of SES.

A recent study (Floccia et al., 2016) failed to replicate the results of the classic word segmentation paradigm conducted by Jusczyk, Houston, and Newsome (1999) in British English infants. These new findings showed that British infants segmented words starting at 10.5 months only with exaggerated IDS – much later than their American English counterparts. This study has revived questions about the causes of these differences in word-learning and language environments between American and British infants—topics that have received little attention in the literature (Floccia et al., 2016). Additionally, the role of SES in differences between

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American and British language learning remains unexplored (Floccia et al., 2016; Hamilton & Plunkett, 1999).

Another unexplored factor in developmental research between American and British English is the impact of social structures. There are variations between British and American social systems that are important to note, as they may be complicating the potential causes of observed language differences. When looking at studies of infant and toddler language development, the data favor American children above British children (Fernald et al., 1989; Floccia et al., 2016; Hamilton & Plunkett, 1999; Shute & Wheldall, 1988). However, social structures seem to point in favor of the British in the following ways. First, every UK citizen is universally covered by publicly financed healthcare. In addition to universal healthcare, a safety net is in place that exempts certain populations such as low-income individuals/families from prescription drug copayments (Mossialos, Wenzl, Osborn, & Sarnak; 2016). In contrast, healthcare in America is largely privatized with the exception of government-funded healthcare for certain populations such as low-income individuals who receive care through Medicaid. As of 2014, 33 million Americans were uninsured (Mossialos, Wenzl, Osborn, & Sarnak; 2016).

A second difference exists between the US and the UK in maternity leave. In the UK, all parents receive Statutory Maternity Pay for up to 39 weeks postpartum (Government Digital Service, 2018). In the US, all mothers can take a maximum of 12 weeks of unpaid maternity leave—one of only five countries internationally that does not provide any form of paid maternity leave (US Department of Health and Human Services, 2013). Healthcare provisions and maternity leave have implications for the quality of care families receive and mandate how much time mothers can spend with their infants, which could point to potential advantages for British infants during development. However, the British advantages in social systems do not line up with research showing clear language advantages in American infants (Floccia et al., 2016;

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Hamilton & Plunkett, 1999). The effects of these social differences on language development and parent-infant interactions in low SES homes are currently unclear, which leads to more of a reason to explore these differences. It could be that language differences counterbalance social differences between families with similar SES, but further research is needed to determine the cause of differing language trajectories in typically developing American and British children.

The present study compared IDS in low SES American and British English families. This comparison has been done with mid-SES British and American IDS, but there has yet to be exploration of the differences between the quantity and quality of low SES British and American caregivers' IDS (Hamilton & Plunkett, 1999; Shute & Wheldall, 1988; Vest, 2013). Mothers were matched based on education levels in order to compare the differences in American and British IDS in a low SES context, and data was collected from families' naturalistic language environments using LENA recording devices. Given the complex nature of communication and all of the concomitant factors involved, a variety of outcomes could be imagined. Since parent talk has been associated with child vocabulary levels, one could hypothesize that British infants are hearing fewer adult words in their environment, and that this reduced input could negatively impact the number of vocalizations that British infants are producing (Hamilton & Plunkett, 1999). On the other hand, the social supports available in the UK may mean that low SES British families are experiencing less stress on a day-to-day basis when compared to low SES American families, which could impact British caregiver speech and/or infant vocalizations in the other direction (Government Digital Service, 2018; Mossialos, Wenzl, Osborn, & Sarnak, 2016). A third hypothesis could be extrapolated from these first two potential outcomes. It was hypothesized that there would be no significant differences between American and British IDS once maternal education was controlled for due to these two large factors mitigating each other.

### **Methods**

The present study used LENA (Language ENvironment Analysis) recordings from two previously completed studies – one from Sheffield, England, and the other from the Shenandoah Valley, Virginia, USA. Recordings were made in the UK with permission from the Department of Psychology Ethics Sub-Committee at the University of Sheffield and in the US with permission from the James Madison University Institutional Review Board. All participants in the UK study had agreed for their data to be used in further research.

### **Background**

In the UK study (McGillion, Pine, Herbert, & Matthews, 2017), 142 families were recruited for a longitudinal study that investigated the impact of caregiver contingent talk on later language acquisition. The families were gathered from diverse socioeconomic backgrounds. The 2015 English Indices of Deprivation (IMD), a measure provided by the government, was used to categorize the participating families into 10 deciles. The IMD determines a family's decile through considering factors such as income, employment, and housing. Out of the 142 families, 30% were in the bottom third of the IMD deciles, with another 30% in the middle three, and the final 37% in the top four deciles. All families were monolingual English speakers, and all children were typically developing, full-term, firstborn singletons. Primary caregivers included in this study could not work more than 24 hours per week.

The US study compared IDS between 10 low SES and 10 mid SES families. The mid SES data were collected for a study investigating cultural differences between American and British mid SES families and evolved into a study that examined language differences between low and mid SES families in the Shenandoah Valley. Low SES families were recruited through a community hospital program and a University-based program for low-income families. Mid SES families were recruited through university emails, daycares, local pediatrician offices, and flyers

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in grocery stores. Each family had only one eight-month-old child at the time of data collection. Currently, this data set includes 10 low SES and 10 mid SES mother-infant dyads.

Each study obtained audio data using LENA recorders. LENA allows for interactions to be recorded in a naturalistic environment without the presence of an observer and has proven reliability in quantifying adult and child vocalizations (Richards, Gilkerson, Paul, & Xu, 2008; Xu, Yapanel, & Gray, 2009). Caregivers had the ability to turn the LENA recording device on and off throughout a two-day period (Range in hours 8-32). Each caregiver kept a log of their weekend to denote when LENA was turned on and off throughout each day. After recording, each LENA device had its audio data imported onto a computer. Then, the LENA statistical analysis was exported to Excel. The audio files were exported to ELAN for additional transcription.

### **Sample Selection**

Because there were more potential participants in the British sample compared to the American sample, the researchers took the following steps to match the 10 low SES American samples with 10 of the low SES British samples. First, maternal education level was considered as a proxy for SES. The researchers broke the American educational system down into three categories, and then established equivalent categories for the British educational system. The three American educational system categories were: (1) high school not completed, (2) high school completed, and (3) some college completed. The three British educational system categories were: (1) GCSE grade D-G, (2) GCSE grade A-C, and (3) A-Levels. GCSEs are tests completed by students in the UK after 12 years of schooling and are graded on a scale with the letters A, B, C, D, E, F, G, with A being the highest score and G being the lowest passing score. A-Levels are subject-based tests completed in the UK after 14 years of schooling that are taken before applying for admission to university.

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After filtering the low SES British sample for matches in maternal education, the remaining samples (n=45) were then matched with the 10 US samples based on child age. The researchers chose the children with the youngest age (average = 334 days) whose mothers first fit the educational requirements that matched the American mothers as closely as possible (UK mean child age = 334 days, range: 327-344 days; US mean child age = 281 days, range: 251-326 days). After determining which British mothers had the youngest children, the researchers finalized the sample. The American mother in the sample who had only completed some high school (n = 1) was matched with a British mother who had a GCSE grades D-G (n = 2); the American mothers who completed high school (n = 7) were matched with British mothers who had GCSEs with grades A-C (n = 6); and the American mothers who completed some college (n = 2) were matched with British mothers who passed A-Levels (n = 2). The final sample selections based on both education and child age are displayed in Table 1. In the final sample, seven of the American infants were male and four of the British infants were male.

<b>American</b>	<b>British</b>
Some High School (n=1)	GCSE grade D-G (n=2)
High School Diploma (n=7)	GCSE grade A-C (n=6)
Some College (n=2)	A-Levels (n=2)

**Table 1.** Final matching of American and British mothers by education and child age

### **Analysis**

Through the use of the previously collected LENA recordings, the researchers generated two separate data sets to analyze. The first data set consisted of automated counts from the LENA software, and the second data set consisted of orthographic transcriptions of the LENA audio files.

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Using automated LENA counts, the 20 matched samples were compared on the following measures: adult word counts (AWC) as a measure of quantity of parental input, infant vocalizations (CVC) as a measure of how vocal the infants were, and conversational turns (CTC) as a measure of interaction quality between caregiver and infant. Previous studies have compared LENA data based on these measures (see Gilkerson et al., 2017; Vest, 2013). To control for variance in LENA recording time, averages for each measure were calculated for all participants for use in analysis (Table 2).

Total Amount of LENA Recording Time (in hours) by matched participant	
British	American
32	24
32	16
32	8.09
32	9.95
32	11.59
32	8.39
32	16
32	16
27.95	12.53
28.74	10.89

**Table 2.** The number of hours each family recorded on the LENA recording device.

### Transcription

For each caregiver-infant dyad, one hour from each LENA recording was orthographically transcribed in ELAN. The hour chosen was after the infant woke up from a nap as indicated by parental logs. The hour began when the primary caregiver spoke their first

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utterance that was directed towards the infant. Transcribers transcribed only maternal infant-directed speech (IDS), except for the case in two of the ten British English samples, where the primary caregiver within the hour after the infant's nap was the father.

For the American English samples, the audio files were transcribed by undergraduate student volunteers at James Madison University. For the British English samples, the audio files were transcribed by two undergraduate student volunteers at the University of Warwick in Coventry, England. All transcribers used 'xxxx' to indicate unclear words and followed the same set of instructions (Vest 2013; see Appendix A for complete coding scheme).

After transcribing the hours, each transcript was analyzed using a procedure from Pavelko and Owens' (2017) SUGAR method (Appendix B), which was adapted for lab use by Vest (2013). The method produced counts for the following measures of quantity of speech: total number of words directed toward the infant, total number of utterances directed toward the infant, total number of word repetitions, total number of utterance repetitions, total number of different word repetitions, MLU (calculated with words as a measure of average utterance length), and total number of isolated words. These numbers were then compared between the US and UK samples.

## Results

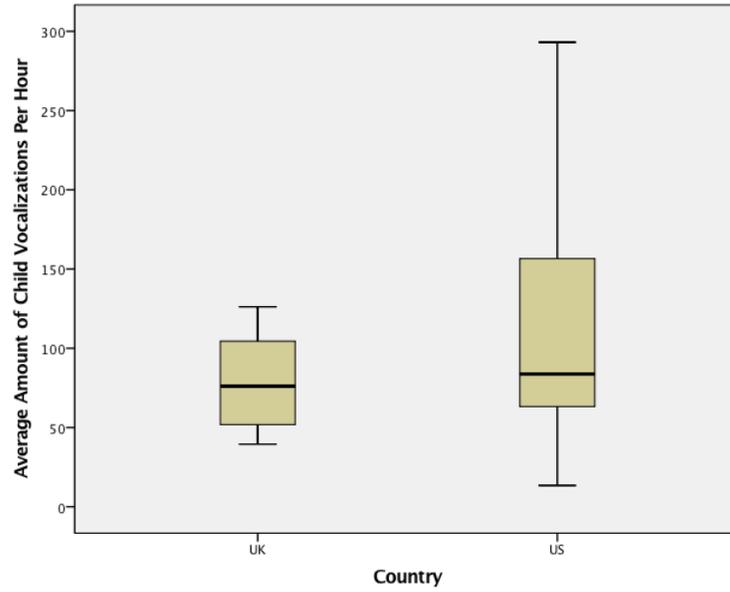
### LENA Analysis

Analysis of the LENA automatic counts using independent t-tests showed no significant differences between British and American caregivers and infants. When looking at the number of words that British (M=894, SD=346) and American caregivers (M=858, SD=468) spoke on average in any given hour, there was no significant difference ( $t(18)=.198, p=.846$ ).

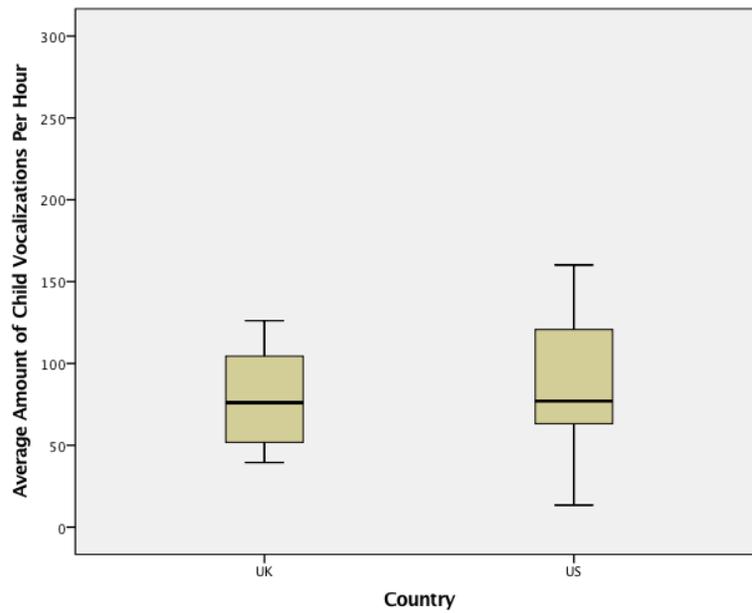
Additionally, there was no significant difference between the number of conversational turns that occurred between British (M=21, SD=10) and American (M=25, SD=18) adults and their infants on average in any given hour ( $t(18)=-.573, p=.090$ ).

Initial analysis showed that the eight-month-old American infants vocalized significantly more per hour on average (109 vocalizations) when compared to the 10-month-old British infants (77 vocalizations;  $t(18)=-1.184, p=.041$ ), as shown in Figure 1. Additional analysis revealed that one of the American infants (293 average vocalizations per hour) was determined to have been an outlier in the American data set (M=109, SD=79). An outlier was defined as any value +/- 2 standard deviations away from the mean. When British and American infants were compared again with the outlier removed, there was no longer a significant difference in child vocalizations between British (M=78, SD=28) and American (M=89, SD=49) vocalizations ( $t(17)=-.614, p=.127$ ) (Figure 2).

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**Fig. 1.** Comparison of British and American child vocalizations per hour (average)



**Fig 2.** Comparison of British and American child vocalizations per hour (average) with American outlier infant removed

### Language Sample Analysis

All language sample data were analyzed with independent t-tests.

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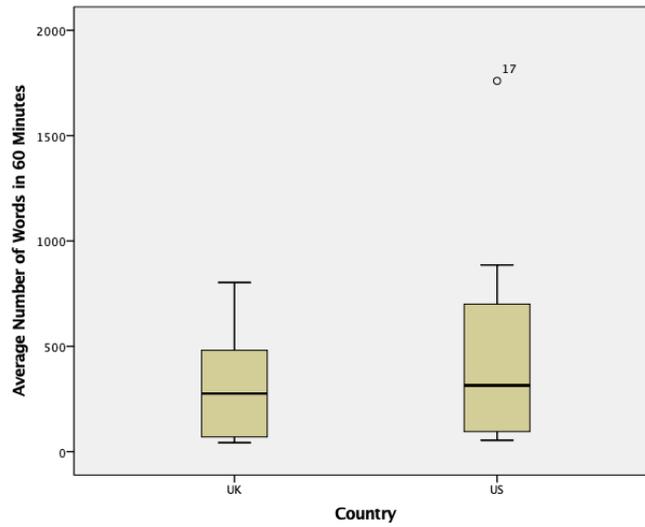
### *Total Number of Words and Utterances*

American caregivers spoke more words ( $M=495.40$ ,  $SD=520.071$ ) than British caregivers on average ( $M=331.30$ ,  $SD=271.932$ ). This difference was not significant ( $t(18)=-.884$ ,  $p=.388$ ,  $d=.42$ ). American caregivers also had a greater number of utterances ( $M=143.5$ ,  $SD=143.525$ ) than British caregivers on average ( $M=120.9$ ,  $SD=106.715$ ). This difference was also not significant ( $t(18)=-.400$ ,  $p=.694$ ,  $d=.19$ ). For both total number of words and utterances, the effect sizes were small, suggesting that with a larger sample size there would also be no significant differences between the populations. Tables 3 and 4 display the total number of words and total number of utterances used by the American and British caregivers, and Figures 3 and 4 display the average number of words and utterances used by the American and British caregivers.

Total Number of Words in 60 Minutes	
British Caregivers	American Caregivers
43	54
63	84
70	95
166	274
198	290
354	339
426	472
481	700
709	886
803	1760

**Table 3.** Total number of words directed towards the infant by 10 British and 10 American caregivers, arranged in order of least to most words spoken in 60 minutes.

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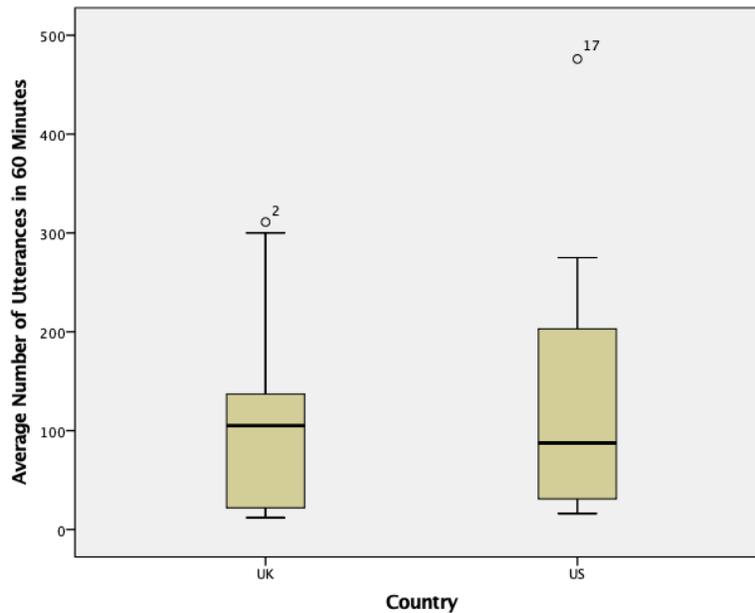


**Fig 3.** Comparison of the average amount of words that 10 British and 10 American caregivers spoke to their infants in one hour.

Total Number of Utterances in 60 Minutes	
British Caregivers	American Caregivers
12	16
19	25
22	31
83	76
102	85
108	90
115	158
137	203
300	275
311	476

**Table 4.** Total number of utterances directed towards the infant by 10 British and 10 American caregivers, arranged in order of least to most utterances spoken in 60 minutes.

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**Fig 4.** Comparison of the average amount of utterances that 10 British and 10 American caregivers spoke to their infants in one hour.

### *MLU*

Initial analysis showed that American caregivers had a higher mean length of utterance (MLU) ( $M=3.396$ ,  $SD=.287720$ ) than British caregivers ( $M=3.0555$ ,  $SD=1.195529$ ), but that this difference was not significant ( $t(18)=-.876$ ,  $p=.393$ ). Upon closer inspection of the data, one of the British caregivers ( $MLU=5.833$ ) was an outlier in this sample (more than two standard deviations from the mean). After removing this caregiver from the analysis, the American caregivers had a significantly higher MLU than the British caregivers ( $t(17)=-2.491$ ,  $p=.031$ ,  $d=1.21$ ; Figure 6). Without the British caregiver outlier, the effect size is large, suggesting that the differences in MLU would persist with a larger sample. Table 5 displays the MLU for each caregiver within the transcribed hour, and Figure 5 shows the average MLU for British and American caregivers, respectively.

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MLU	
British Caregivers	American Caregivers
1.627	2.987
1.955	3.065
2.363	3.222
2.386	3.224
2.582	3.36
3.278	3.375
3.316	3.448
3.511	3.697
3.704	3.766
<b>5.833</b>	3.816

**Table 5.** MLU of the 10 British and 10 American caregivers, with the British outlier in bold, arranged in order of smallest to largest MLU.

# AMERICAN AND BRITISH SPEECH DIFFERENCES

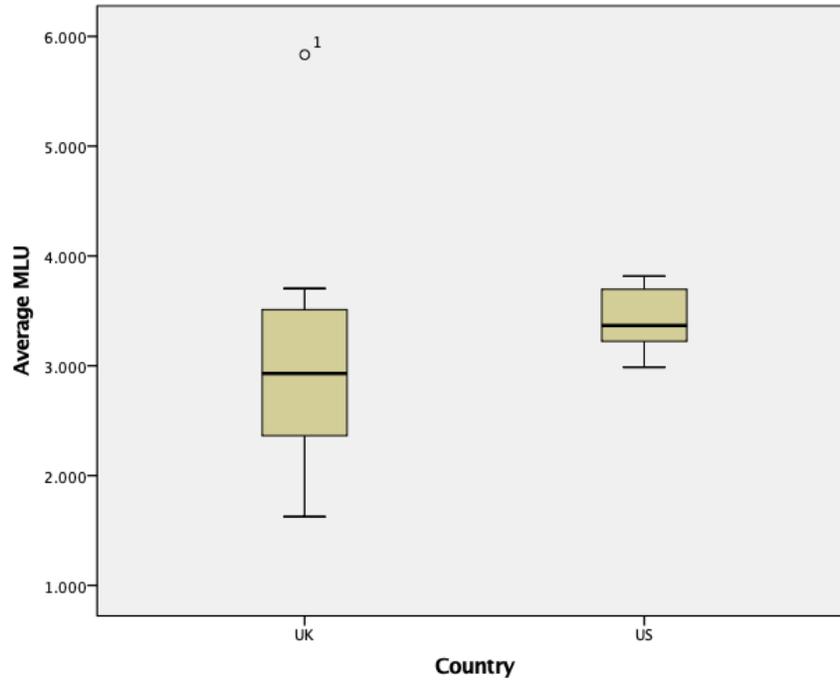


Fig 5. Comparison of the average mean length of utterances of 10 British and 10 American caregivers.

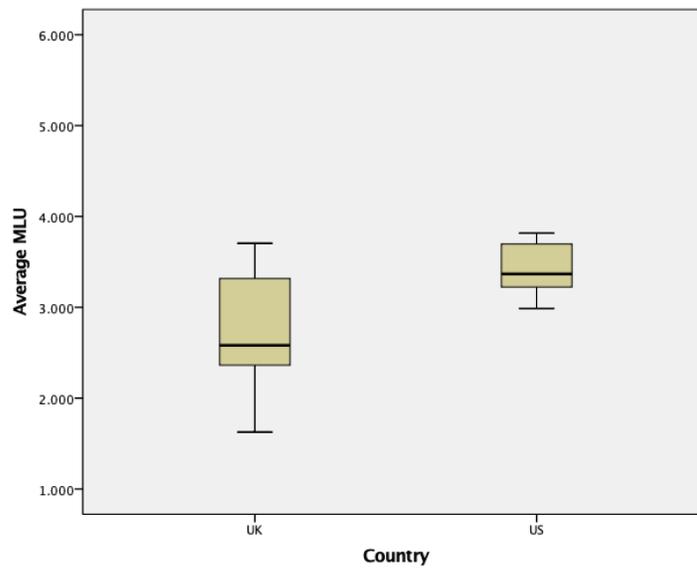


Fig 6. Comparison of the average mean length of utterances of British and American caregivers with the British caregiver outlier removed.

## AMERICAN AND BRITISH SPEECH DIFFERENCES

### *Word and Utterance Repetitions*

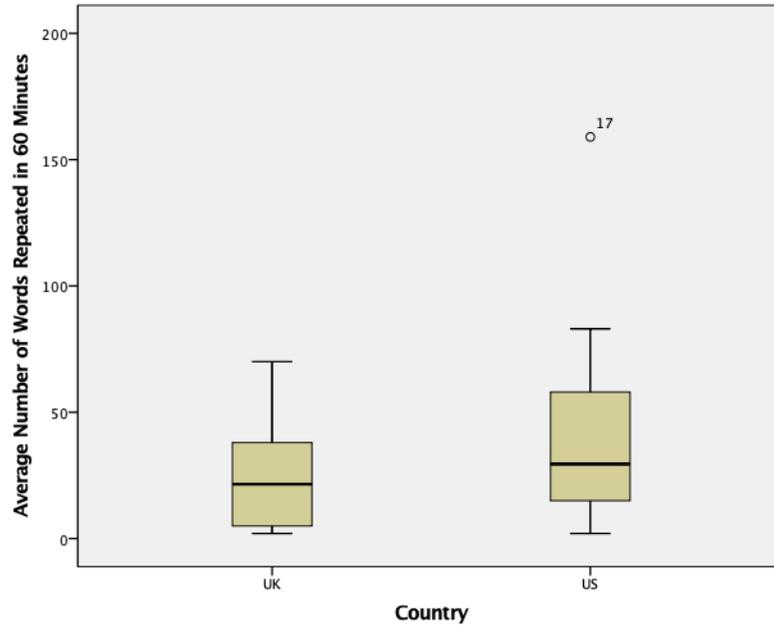
American caregivers repeated more words on average ( $M=48.2$ ,  $SD=45.93667$ ) than British caregivers ( $M=28.1$ ,  $SD=24.06219$ ), but this difference was not significant ( $t(18)=-1.226$ ,  $p=.236$ ,  $d=.58$ ).

American caregivers also repeated more utterances on average ( $M=13.7$ ,  $SD=14.407$ ), than British caregivers ( $M=10.8$ ,  $SD=10.528$ ), but this difference was not significant ( $t(18)=-.514$ ,  $p=.614$ ,  $d=.24$ ). Tables 6 and 7 display the amount of word and utterance repetitions per caregiver, and Figures 7 and 8 show the average number of word and utterance repetitions between American and British caregivers.

Total Number of Words Repeated in 60 Minutes	
British Caregivers	American Caregivers
2	2
4	6
5	15
18	24
20	27
23	32
37	55
38	58
64	83
70	159

**Table 6.** Total number of words repeated for each of the 10 British and 10 American caregivers, arranged in order of least to most number of words repeated in 60 minutes.

## AMERICAN AND BRITISH SPEECH DIFFERENCES

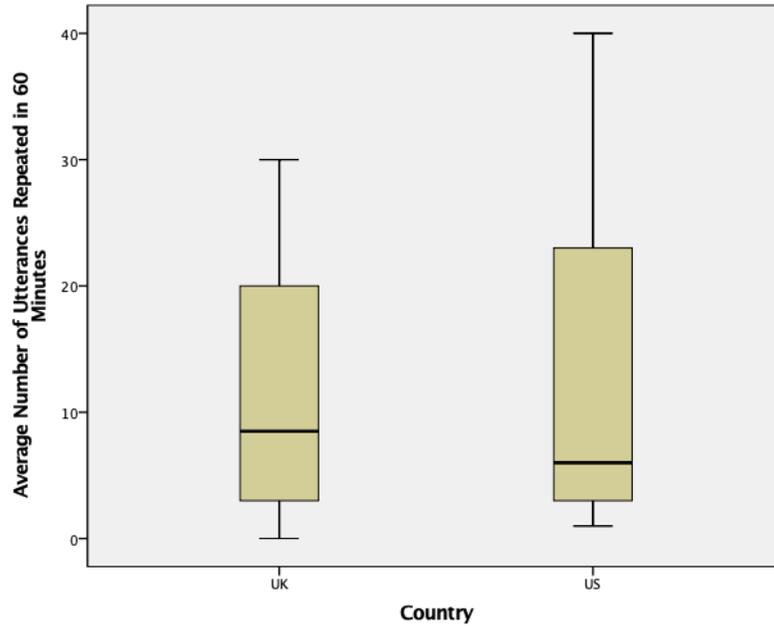


**Fig 7.** Comparison of the amount of words repeated by 10 British and 10 American caregivers in one hour.

Total Number of Utterance Repetitions in 60 Minutes	
British Caregivers	American Caregivers
0	1
0	2
3	3
3	4
7	6
10	6
11	17
20	23
24	35
30	40

**Table 7.** Total utterances repeated for each of the 10 British and 10 American caregivers arranged in order of least to most utterances repeated in 60 minutes.

## AMERICAN AND BRITISH SPEECH DIFFERENCES



**Fig 8.** Comparison of the amount of utterances repeated by 10 British and 10 American caregivers in one hour.

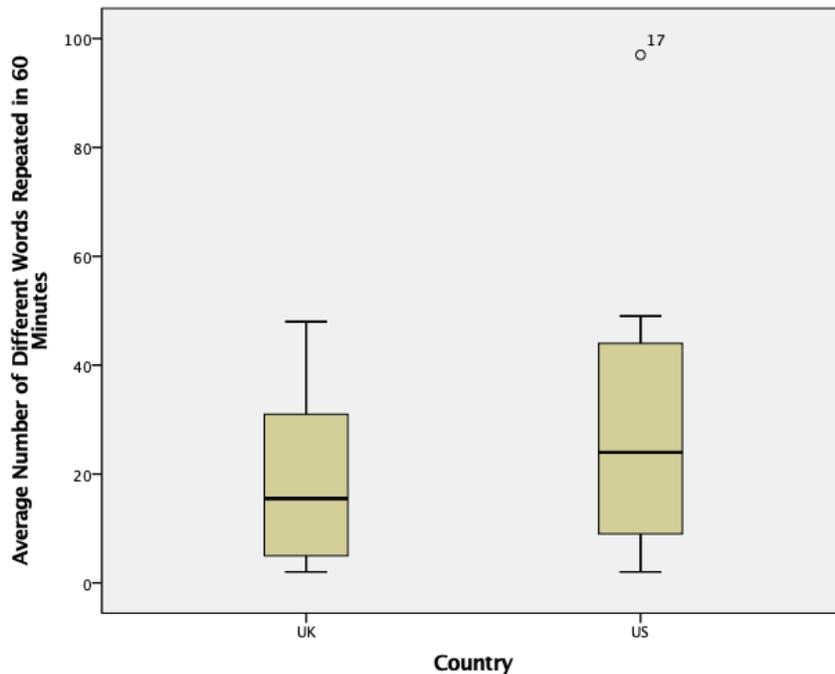
### *Different Words Repeated*

The average number of different words repeated was higher for American caregivers ( $M=31.5$ ,  $SD=28.34$ ) than British caregivers ( $M=19.1$ ,  $SD=14.985$ ), but this difference was not significant ( $t(18)=-1.223$ ,  $p=.237$ ,  $d=.58$ ). Table 8 displays the amount of different words each caregiver repeated within the hour, and Figure 9 shows the average amount of different repeated words between American and British caregivers.

## AMERICAN AND BRITISH SPEECH DIFFERENCES

Total Number of Different Word Repetitions in 60 Minutes	
British Caregivers	American Caregivers
2	1
4	2
5	3
11	4
14	6
17	6
27	17
31	23
32	35
48	40

**Table 8.** Total amounts of different words repeated for each of the 10 British and 10 American caregivers, arranged in order of least to most different words repeated in 60 minutes.



**Fig 9.** Comparison of the amount of different words repeated by 10 British and 10 American caregivers in one hour.

## AMERICAN AND BRITISH SPEECH DIFFERENCES

### *Isolated Words*

British caregivers used more isolated words on average ( $M=45.7$ ,  $SD=47.796$ ) when compared to American caregivers ( $M=35.3$ ,  $SD=40.216$ ), but this difference was not significant ( $t(18)=-.527$ ,  $p=.605$ ,  $d=-.25$ ). Table 9 shows the total number of isolated words spoken by each caregiver, and Figure 10 displays the average amount of isolated words spoken by American and British caregivers.

Total Number of Isolated Words in 60 Minutes	
British Caregivers	American Caregivers
1	0
4	3
10	9
25	14
25	14
34	19
35	47
64	48
124	69
135	130

**Table 9.** Total amounts of isolated words spoken for each of the 10 British and 10 American caregivers, arranged in order of least to most isolated words spoken in 60 minutes.

AMERICAN AND BRITISH SPEECH DIFFERENCES

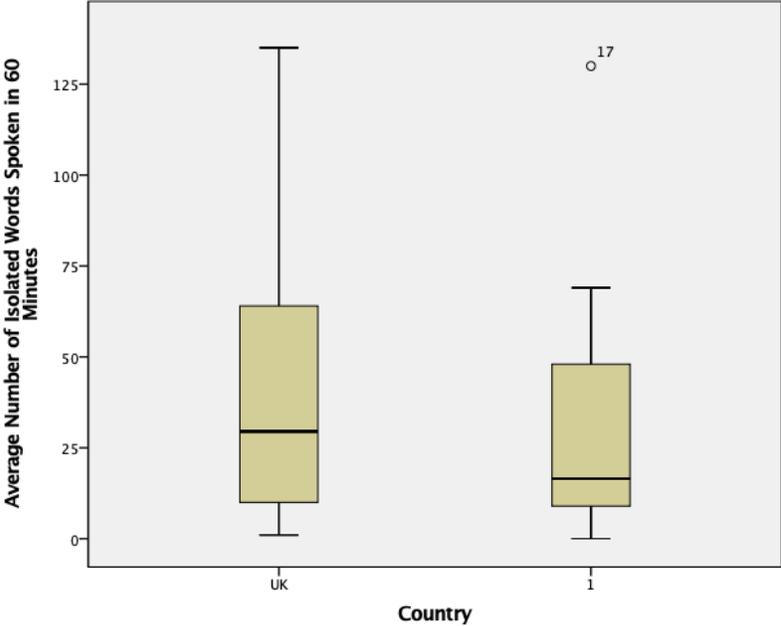


Fig 10. Comparison of the amount of isolated words spoken by 10 British and 10 American caregivers in one hour.

### Discussion

The study's findings supported the hypothesis that there would be no differences between British and American IDS once maternal education was controlled for. In the LENA analysis, there were no statistically significant differences between American and British caregivers. In the language sample analysis, American caregivers had a significantly higher MLU than British caregivers and higher average counts for every measure except for the isolated word count. This discussion will first highlight the results, and then will point out differences between the two studies that the data were drawn from that may have affected those results. Additionally, the following paragraphs will discuss the impact of the results on the current literature regarding British and American caregiver speech and infant language development.

In summary, no statistically significant differences were found in the LENA automated analysis for AWC, CVC, or CTC. Despite this, there was a large amount of variance observed both between the British and American groups as well as within these two populations. This variance was especially prevalent when looking at CVC between British and American infants. Recall that at the time of LENA recording, British infants were 11 months old and American infants were eight months old. With that in mind, one could hypothesize that British infants would have a higher CVC when compared to their younger American infant counterparts. However, this was not the case. Even after the removal of an American outlier, the younger American infants had a higher CVC per hour on average ( $M=88.94$ ,  $SD=48.694$ ) than the older British infants ( $M=77.91$ ,  $SD=27.918$ ). This finding is even more intriguing considering that LENA estimated that British caregivers vocalized more on average per hour ( $M=894.81$ ,  $SD=345.80$ ) than American caregivers ( $M=858.44$ ,  $SD=468.40$ ). This aligns with findings from Hamilton & Plunkett (1999), which suggest that American infants have higher levels of receptive and expressive vocabulary levels starting at 12 months. Findings of the present study suggest that

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the known vocabulary differences between British and American infants might begin earlier than 12 months.

Another aspect of the LENA analysis that was surprising was the difference in homogeneity between the two samples. When looking at AWC, the British caregivers were a very homogenous group, and the American caregivers were bimodal. There was more variability across American low SES caregivers. To look closer at this issue, the five American caregivers below the mean AWC were compared to all 10 British caregivers, and the five American caregivers above the mean AWC were compared to all 10 British caregivers. In this segmented analysis, there was a significant difference in AWC in both comparison groups. When comparing the lower five American caregivers to the 10 British caregivers, the British caregivers were significantly higher in AWC ( $M=894.81$ ,  $SD=345.80$ ) than the American caregivers ( $M=455.84$ ,  $SD=218.76$ ) ( $p=.023$ ). When comparing the higher five American caregivers to the 10 British caregivers, the American caregivers were significantly higher in not only AWC ( $p=.049$ ), but also in CVC ( $p=.01$ ) and CTC ( $p=.017$ ). This suggests that in the American sample, there was higher variance in the way that low SES caregivers interact with their infants. This variance could be explained by differences in methodology. Additionally, the differences point to the limits of using SES as a categorization of groups, especially when using maternal education as a matching variable.

In the language sample analysis, the only statistically significant difference between British and American caregivers was MLU. However, it is important to note that American caregivers had higher counts on average for all measures (total words, total number of utterances, total different words repeated, utterance repetitions, MLU, total words repeated) except for the isolated word count. This shows that American caregivers are using longer utterances than British caregivers due to a significantly higher MLU and higher total word counts on average.

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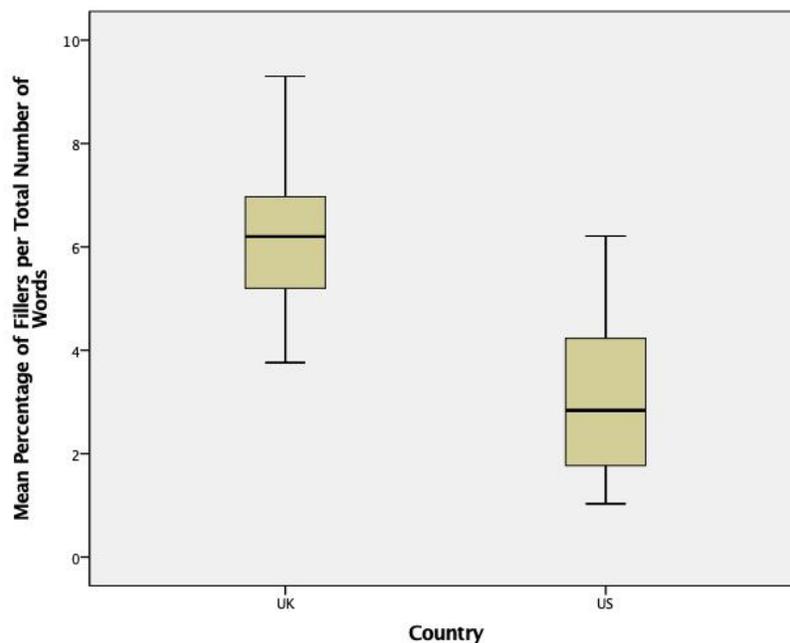
This contrasts with the results from Vest (2013), which found that British mid SES caregivers had a slightly higher MLU on average than American mid SES caregivers. This difference between studies could be due to the small sample sizes, or there may be differences in grammatical structure between low and mid SES British and American caregivers.

There is currently no consensus in the literature regarding what type of grammatical structure in IDS best supports infant language learning. Hoff (2003) found that children who heard longer utterances built their vocabularies more quickly than children who heard shorter utterances. Although the present study did not measure infant vocabulary levels, the findings that American low SES caregivers are speaking with longer utterances and that American low SES infants are vocalizing at a higher rate suggest that American infants could be learning vocabulary more quickly. Additionally, the findings suggest that the data may fit into the previous findings by Hamilton & Plunkett (1999). Contrastingly, other studies suggest that isolated words are better for infant vocabulary learning due to their prosodic salience (Keren-Portnoy, Vihman, & Fisher, 2019). Recall that British caregivers had a higher isolated word count than American caregivers, but that this difference was not significant. Further questions about the impact of isolated words on average MLU in this study were brought up by the use of filler words.

A qualitative observation that was made during analysis was that the British caregivers seemed to use more filler words, such as ‘eh’ and ‘oy’. This observation was supported by Vest (2013), who mentioned in her discussion section that filler words may have impacted her analysis of mid SES British and American caregivers and that future researchers should investigate filler words. As a result, the British and American orthographic transcripts were re-examined, and the filler words counted (see Appendix C for list of filler words that were counted). Initial analysis showed no significant difference between British ( $M=19.9$ ,  $SD=17.304$ ) and American ( $M=17.1$ ,  $SD=21.434$ ) use of filler words in IDS ( $t(18)=-.321$ ,  $p=.752$ ). However,

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variability in the length of transcripts undoubtedly influenced the filler count for each individual sample. Because of this, we calculated the percentage of words in each transcript that were fillers and compared the use of filler words again. This time, the difference was significant, with the percentage of filler words per total number of words being significantly higher for British caregivers ( $M=6.292$ ,  $SD=1.70739$ ) than American caregivers ( $M=3.2030$ ,  $SD=1.89559$ ) ( $t(18)=3.829$ ,  $p=.001$ ) (Figure 11). This finding shows that British caregivers use filler words more frequently in IDS than American caregivers do. It is currently unclear as to whether the increased use of filler words could impact infant's abilities to learn vocabulary. This is an interesting avenue for future research.



**Fig 11.** Comparison of the percentage of filler words that British and American caregivers used in a one-hour long transcribed language sample.

This filler word finding brings into question the development of segmentation, or the ability for infants to hear a sentence and recognize familiar words within that sentence. A previous study showed that British infants could only segment at 10.5 months with extremely

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exaggerated IDS, whereas American infants could segment IDS starting at 7.5 months (Floccia et al., 2016). Floccia et. al also suggested that the differences between British and American IDS are linguistic or sociolinguistic in nature, which supports the idea that differences in the use of filler words could be impacting segmentation or other word learning skills in infants. If filler words do have a negative impact on word learning, this could suggest that this observed difference in British and American IDS might be a reason for differing levels of receptive and expressive vocabulary levels in British and American infants.

Although the intention was to compare only maternal speech in the language sample analyses, the primary caregivers present in two of the ten British samples during the hour after the infant's nap were fathers. Ideally, the study would have controlled for this and only transcribed maternal speech, but that would not have given an accurate picture of the IDS that those two British infants were exposed to during that hour. Fernald et al. (1989) found minimal differences between British and American paternal IDS and found that both American and British fathers were comparable to mothers in that their mean F0 range increased when using IDS rather than adult-directed speech. This helped to justify the choice to include the paternal IDS rather than excluding those two samples entirely for the language sample analysis portion of this study.

Since the present study was done retrospectively, there were some differences between the UK and US studies that were unavoidable. First, child age was not equivalent at the times of recording (UK mean child age = 334 days, range: 327-344 days; US mean child age = 281 days, range: 251-326 days). The primary caregivers between studies also came from different educational backgrounds in two different educational systems. Since the educational systems in the US and UK are very different, it was not possible to precisely match for maternal education. Additionally, the low SES families from the UK study were a much more homogenous group

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when compared to the US families in regard to employment, child age, and recording length.

Although these differences were accounted for as closely as possible, they are still important to consider when interpreting the results.

### **Conclusion**

This retrospective study compared 10 low SES British and 10 low SES American caregivers and their infants. Using LENA recording devices, automated LENA counts and orthographically transcribed language samples were analyzed. Although there were no statistically significant differences in automated LENA counts between British and American caregivers and their infants, the language sample analysis points to some differences that exist between this sample of British and American caregivers. American caregivers had a significantly higher MLU than British caregivers and also had higher averages in every measure of the language sample except for the isolated word count. Additionally, British caregivers used significantly more filler words in their infant-directed speech, the impact of which is currently unclear.

Future research should examine language input beyond the data that is available from the LENA analysis. Transcriptions and analyses of the language used by caregivers should be conducted to provide a more thorough description of the parent-child interaction. Future research should also investigate the impact that filler words may have on infant word learning. Additionally, linguistic differences between British and American IDS should be further explored to better understand how caregivers are interacting with their infants. This data could also be compared with higher SES British and American data to gain a greater understanding of how these populations differ across a diverse range of SES. In conclusion, this study points out some differences between British and American caregivers and infants that could help direct future research to better understand the linguistic differences that exist between these cultures.

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Appendix A

Guidelines for Transcription

**Transcription Guidelines for CI and SES: May, 2015**

**Only transcribe infant directed speech, do not transcribe speech that is clearly addressed to another adult.**

**Punctuation/Symbols**

- The only punctuation marks allowed are apostrophes, which are used to indicate absent letters in a contraction (with no spaces), such as *don't*.
- There are no periods (.) or commas (,). If you hear *saint* or *street*, type it that way, do not abbreviate.
- Do not use dashes except to indicate false starts (e.g. *p- papa*). For example, *mother in law* would be 3 separate words.
- Do not use apostrophes to mark possessives. For example, *John's car* would be *Johns car*.

**Capital Letters**

There is no need to use capitalization except for:

1. The personal pronoun *I*.
2. Anything that is spelled out, such as "A T and T", "S M I T H", "A O L"; make sure to leave a space between each capital letter to indicate the letter itself was said.
3. Proper nouns and adjectives, for example:
  - names of places (cities, states, rivers, etc.): Florham Park, New Jersey, New England, the United States, Mississippi River, Rocky Mountains, Death Valley, East Tennessee, the South, Main Street, River Road, Mountain Avenue; if they say *University Ave*, type it just that way, don't expand *Ave* to *Avenue*.
  - names of companies: Charlie Browns, Texaco, American Express
  - names of people: Ann, Jim Jones, Walt, Honey and Hon (not *dear* and *darling*)
  - names of groups: Senate, Congress
  - months of the year, days of the week: December, Thursday
  - God and words for God: God, Lord, Allah, Buddha
  - holidays: Thanksgiving, Christmas, New Years Day, New Years Eve, Easter
4. Letters in isolation: J T Jones, A M (for the time of day)

**Titles**

Spell out all words: *mister, doctor, junior, miss, misses, miz* (for *Ms.*), *monsignor, father*.

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### Shortened Words

When words are shortened by the speaker, attempt to maintain the pronunciation in your transcription, for example:

- *Tryintryin*, → trying
- *an* instead of *n* → *and* if the /d/ is not produced,
- *cause* → *becau*, *e*
- *til* → *till*
- *ccuse* → excuse
- *ok* → *okay*
- *mm'kay*, *y* → *okay*
- *na* → *no*
- *, 'bout* → *about*,
- *'em not* → *them*
- Examples of other common words that should be kept as produced are:

*The following words, however, should be transcribed as indicated:*

- *jeez*,
- *oops*,
- *gee whiz*.
- *gotcha*,
- *betcha*,
- *thingy*,
- *ma'am*,
- *yeah*,
- *wanna* (but be sure it is not *want a* or *want to* that was said)
- *Gonnagonna*,

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- *y'all*,
- *kinda*

### Disfluencies

1. Filled pauses are non-speech vocalizations. They are transcribed as *uh*, *um*, *er*, *ah*, *mm*, *eh* and sometimes *oh*, in the orthographic tier. They can also be combined to include *uhhm*, *uhhuh*, *mmhm*.

2. False starts, whether they are repaired or not, are indicated as such with a hyphen. These occur when the speaker stops in the middle of a word and either substitutes another word or continues with the same word. If the incomplete word is not known, indicate so with '?-'. Examples:

- “I wanna call nine 0o two sev- nine four nine 0o six hundred”
- “hi I want to make a ph- phone call”
- “directory assistance ple- ”
- “it is below the ?- blue lion”

### Digit Rules

All numbers are to be typed out as words:

- *one eight hundred, two forty five Eighth Street, three o'clock four A M, December fifth*
- The number 0 said as *oh* is typed as <0o> (the number zero followed by a lower case letter o).

### Unintelligible Speech

• When you do not have a clue as to what is being said transcribe the utterance as xxxx, if you are making a guess at the speech put it in brackets and review with a second transcriber. If two transcribers cannot resolve the speech, enter it as xxxx

### Liaisons counted as single words

- All the most common written contractions, e.g. *can't*, *don't*, *coulda*, *wanna*, *nowt*
- Any instances of northern article reduction e.g. *to't*, *in't* (UK)
- Innit – isn't it
- S'at (zat) – is that?
- K'at [<sup>ə</sup>kæt] – look at
- C'mon – come on
- Geddit – get it

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- Y'gotta (ɥjɔrə) – you gotta
- T'other
- D'you
- Wannit – wasn't it
- Warrit (Yorkshire) – what it
- Wi'you – with you
- Wi'your - with you
- \* Y' / a' / o' – your / are / of – often contracted at start of following lexical item (y'socks)
- \*I' – as above (I'can – I can:)
- Sh'we – shall we
- D'y'want – do you wanna
- Y'gonna – you gonna
- In'ere – In here
- Y'are – you are
- 'kat – look at
- in't it – isn't it
- Dun't-she – doesn't she
- What're – what are
- The'y'are – there you are
- Whassup – what's up
- What've – what have
- Y'done – you done
- Did'ya – did you
- Cos – because

## AMERICAN AND BRITISH SPEECH DIFFERENCES

- Shuddup – shut up
- Y’doing
- Wannit – want it
- D’y’not – do you not
- ‘ant’you – haven’t you
- Flippin’ec – flipping heck
- Babye – bye bye
- Scuse – excus
- ‘owabout – how about
- I’sa – it’s a
- Isn’tit – isn’t it
- What’sis – what’s this
- Ere’y’go – here you go
- D’place – the place (Mother)
- S’not – it’s not
- Downen – down
- On’is – on his
- Not’is – not his
- D’y’have – did you have

# AMERICAN AND BRITISH SPEECH DIFFERENCES

## Appendix B

### Analysis Rules

#### 1. Start with Total Words

- a. Follow the rules from Julie Vest's thesis to determine what is/is not a word.

Delete any indistinct utterance, and move any non-words into "Not Words" tab on Charts excel spreadsheet (ex: Brit Moms PNH Charts)

- b. Make sure the numbering function is off
- c. Look at the bottom of the Word Doc page to see total number of words.
- d. Paste that number into appropriate section of chart on excel sheet

#### 2. Total # of Utterances

- a. Turn on numbering function (shortcut: hit Control A to highlight everything, then hit numbering button)
- b. Paste total number of utterance into appropriate section of excel chart

#### 3. MLU

- a. Divide Total Words number/Total # of Utterances
- b. Paste value into excel chart

#### 4. Isolated Words

- a. Look through and count how many utterances only had one word
- b. Paste value into excel chart

#### 5. Utterance Repetitions

- a. Follow Julie Vest's rules on utterance repetitions
- b. Pull up "Utterances Repeated" tab on excel charts
- c. Document any utterance repetition, and include a parenthesis containing how many repetitions of that utterance there were within three utterances

## AMERICAN AND BRITISH SPEECH DIFFERENCES

- d. Paste number of utterances repeated into excel chart (this does NOT include any of the values from the parenthesis. It's only the number of rows in the excel sheet of utterance repetitions)
6. Word Repetitions
- a. This one takes the longest. Follow Julie Vest's rules on word repetitions
  - b. Pull up "Words Repeated" tab on excel charts
  - c. Document any words repeated within three utterances.
    - i. Include how many times it was repeated within three utterances beside word in "frequency" column
  - d. Once finished, click under the bottom of "frequency" column. Type "=", click "SUM", and select entire column of numbers.
    - i. Paste this value into your "Word Repetitions" section on excel chart
  - e. Beside "frequency" column on "Words Repeated" tab, begin typing every word that was repeated to find total different words repeated.
    - i. As you (slowly) type each word, Excel's prediction software should bring up any previously typed words in that column. If it does, do not type that word again and continue with the next.
    - ii. Once finished, determine number of different words and paste value into "Total Different Words Repeated" section of excel chart.

Now you are finished!

(This method was modified by Dr. S. Pavelko's SUGAR model for language analysis)

# AMERICAN AND BRITISH SPEECH DIFFERENCES

## Appendix C

### Filler Words Counted for Analysis

ah (but not with laughter [eg. 'ah ha'])

ay

eh

er

hmm

huh

mhmm

mm

oh (but not 'uh-oh')

oy

uh (but not 'uh-oh')

um