The influence of socio-economic status on mothers' volubility and responsiveness in a monolingual Dutch-speaking sample

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Abstract

We investigated the amount of input and the quality of mother-child interactions in mothers who differ in socio-economic status (SES): mid-to-high SES (mhSES), and low SES. The amount of input was measured as the number of utterances per hour, the total duration of speech per hour and the number of turns per hour. The quality of the mother-child interactions was analysed using a simple coding scheme: (1) response or not?, (2) incorporation or not?, and (3) exact repetition or expansion? Main results showed that mothers of lowSES have fewer utterances per hour, shorter durations of speech and fewer turns per hour than mothers of mhSES. Also, lowSES mothers respond significantly less to their children's utterances and use more exact repetitions than expansions.

Introduction

The present study examines the effect of socio-economic status (SES) on the quantity and the quality of the input that primary caregivers provide to their children. More precisely, the input of caregivers[1] with a mid-to-high SES (mhSES) background is compared to that of caregivers with a more disadvantaged SES background (lowSES). In Flanders, the northern, Dutch-speaking part of Belgium where this study was conducted, 11.38% of infants are born in families with a disadvantaged background (Kind & Gezin, 2014). The at-risk-for-poverty incidence is based on several criteria, including the income of the family, and the level of education and occupation of the parents. In the literature, one or more of these criteria are usually used to define a family's SES (Chiu & McBride-Chang, 2006; Hoff & Tian, 2005; Lacroix, Pomerleau, & Malcuit, 2002; Rowe, 2008). Across the region there is variability, but by and large, the poverty rate peaks in larger cities such as Antwerp where 14.3% of the children are born in poverty. Moreover, families not of local origin fare far less well than families from local origin: 29.4% of the former are at risk for poverty versus only 5.1 % of the latter.

At least for the English speaking population, previous research has reported important influences of SES on caregivers' input. More precisely, caregivers from different SES backgrounds provide their children with substantially different amounts of input (Hart & Risley, 1995; Hoff & Naigles, 2002; Hoff-Ginsberg, 1998; Rowe, 2008, 2012). A path breaking study that investigated the influence of SES on caregivers' (and children's) speech was carried out by Hart and Risley (1995, 1999). They analysed the amount of input that caregivers in three different groups provided to their children: 13 high SES families, 20 working class families, and 6 families who lived on public assistance. Tremendous differences in the amount of input that caregivers of different SES provide to their children were found. For instance, they produced

[1] We use caregiver as a generic term for mothers, fathers and other primary caregivers.

significantly different numbers of words per hour. Whereas caregivers of high SES uttered approximately 2,153 words per hour in interaction with their children, the midSES caregivers only used 1,251 words, and the lowSES caregivers even less: 616 words on average. Thus, SES clearly influences the amount of input that children receive.

Moreover, several studies have established clear links between the quantity of input children receive and the children's own language levels (Hart & Risley, 1995; Hoff & Naigles, 2002). How much speech is addressed to children (quantity or amount of input) and how many different words caregivers use (quality or diversity of the input), predicts children's receptive and expressive vocabulary sizes (Hoff-Ginsberg, 1998; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991; Pan, Rowe, Singer, & Snow, 2005; Rowe, 2008). For instance, children of more talkative caregivers acquire new words at a faster rate over time (Huttenlocher et al., 1991). Furthermore, a relationship was established between SES and caregivers' mean length of utterance (MLU) and diversity of language use: children of higher SES background exhibit larger vocabularies, and this has been found to correlate with a more elevated caregivers' MLU and more diversified language use in comparison to low SES caregivers (Hoff, 2003). Children thus benefit from the input they receive. The impact of SES on caregivers', as well as children's, language is far reaching.

Hart and Risley (1995) and many subsequent studies showed that children with a low SES background hear significantly fewer words than their more affluent peers, and this gap has a cascade of consequences: smaller vocabularies (Boyce, Gillam, Innocenti, Cook, & Ortiz, 2013; Wu, & Gros-Louis, 2014), lower intelligence scores, poorer academic success (Nelson, Welsh, Trup, & Greenberg, 2011), etc. Moreover, the dramatic consequences of SES differences are indicated from early on in life. For instance, already at 7 months of age structural and functional differences in brain development are detected (Tomalski, Moore, Ribeiro, Axelsson, Murphy, Karmiloff-Smith, Johnson, & Kushnerenko, 2013). Fernald, Marchman and Weisleder (2013) found less language processing efficiency in 18-month-old lowSES infants.

These differences eventually percolate into later school readiness and poorer school achievement (Hoff, 2013).

A large body of research has, then, addressed the influence of SES on caregivers' and children's language. A major gap in the literature reflects the fact that these studies have mainly investigated SES differences in Anglo-Saxon countries (Hart & Risley, 1992, 1995, 1999; Hoff-Ginsberg, 1991, 1998; Pan et al., 2005; Rowe 2000). Indeed, these samples often represent the range of families typically encountered in the United States, resulting in a heterogeneous group of lowSES mothers of different ethnic groups (Boyce et al. 2013; Hart & Risley, 1992, 1995, 1999; Rowe, 2008; Song, Spier, & Tamis-LeMonda, 2014). For instance, Song and colleagues (2014) investigated lowSES mothers' speech in a group that consisted of 45 Black (non-Latino) mothers, 22 Latino mothers and 3 mothers were from mixed or other ancestry. As the authors remark themselves (Song et al., 2014, 323), analysing the data of these culturally differing mothers as a single group may have influenced the results.

Cultural influences on caregivers' speech and behaviour have been well attested. For instance, Italian-speaking mothers respond less to their children's utterances than do English-speaking mothers (Girolametto, Bonifacio, Visini, Weitzman, Zocconi & Pearce, 2002). Taiwanese lowSES mothers talk significantly more than American lowSES mothers: they produce almost twice as many utterances in a book-reading session (Luo, Snow, & Chang, 2011). Studies where the cultural and ethnic backgrounds of the samples are relatively constant are few and far between. The present study collected data from indigenous Flemish mother-child dyads. This meant that the cultural background of both groups of participants (mhSES and lowSES) was relatively homogeneous. In addition, all participants were monolingually Dutch-speaking. Thus, the present study addresses lacunae in the literature.

In the present study, differences in language behaviour between a group of lowSES and a group of mhSES caregivers will be investigated. Hence, our interest is

mainly focused on between-group variance. But the composition of variance also consists of within-group variance. In other words, not only should the differences between the two groups of mothers be assessed but investigators need also to take into account the differences within each group separately (Hoff-Ginsberg, 1992) Even though several studies show that there is a lot of variation in the amount of child-directed speech, the results are mainly presented as differences between two SES groups, and less attention is paid to variation within each SES group (Hoff & Naigles, 2002, Huttenlocher, Waterfall, Vasilyeva, Vevea & Hedges, 2010; Rowe, 2008). Thus, these studies often stress the overall difference between the different SES groups, but the range within each of the groups is usually high, indicating that some lowSES mothers are highly comparable to mhSES mothers. This is addressed in the present study.

How to measure input?

The amount of input a child receives can be measured in several ways, each having its merits and disadvantages. First, the amount of input can be conceived of as the total duration of speech and can be expressed as the number of seconds or minutes per hour that someone is talking (Pearson, Fernandez, Lewedeg, & Oller, 1997; Quigley & McNally, 2014). Even though this measure gives a preliminary indication of the amount of input, it is a rather sparsely used option, because it overlooks turn-taking. Spontaneous conversations are typically characterised by frequent turn-taking and not by monologues (Ervin-Tripp, 1979). For this reason, a second measure (or criterion) to define quantity of input has been used, namely the number of turns per time unit (Tamis-LaMonda, Baumwell, & Cristofaro, 2012; VanDam, Ambrose, & Moeller, 2012; Weisleder & Fernald, 2013; Zimmerman, Gilkerson, Richards, Christakis, Xu, Gray, & Yapanel, 2009). Because turn-taking is characteristic of mother-child interactions, in this study we analysed how many turns mothers of lowSES and mhSES children produce per hour.

However, a turn may consist of several utterances (Sacks, Schegloff, & Jefferson, 1974). The number of turns alone does not provide a complete gauge of the amount of input. One caregiver may produce only one utterance per turn whereas another produces several utterances per turn, resulting in a different amount of input. Hence, a third criterion has been applied. This criterion takes into account the amount of linguistic material and can be computed in several ways: the total number of words (or tokens) directed to the child (Hoff & Naigles, 2002; Huttenlocher et al., 1991; Rowe, 2008; Tamis-LaMonda et al. 2012), the number of words (tokens) per time unit (Henning, Striano, & Lieven, 2005), or the total number of verbal utterances per time unit (Hoff & Naigles, 2002; Pancsofar & Vernon-Feagans, 2006; Tamis-LaMonda et al. 2012). For this study we will, in addition to the total duration of speech and the number of turns, also analyse how many utterances the two groups of caregivers produce per hour.

The amount of input has been shown to influence children's language and will be measured in the present study. But also caregivers' responsiveness, i.e. if and how they contingently respond to the children's utterances, has a tremendous impact on the children's language development (Gros-Louis, West, & King, 2014; Warren, Brady, Sterling, Fleming, & Marquis, 2010; Zimmerman et al., 2009). For instance, children of more responsive caregivers reach a vocabulary level of 50 words earlier and start to combine words into sentences at a younger age (Tamis-LeMonda, Bornstein, & Baumwell, 2001; Tamis-LeMonda, Bornstein, Kahana-Kalman, Baumwell, & Cyphers, 1998). Because not only the amount of input is important for children's linguistic development, we will also take a closer look at the contingent responses of the two groups of caregivers to their children's utterances during the first years of their lives. We analyse caregivers' responsiveness on three different levels: (1) whether they do respond to their children's utterances, (2) whether this response is an incorporation (is the child's utterance repeated or expanded in some way?) or not, and (3) whether this incorporation is an exact repetition or an expansion.

Research questions and hypotheses

The aim of the current study is to analyse caregivers' volubility (amount or quantity of input) and responsiveness (quality of input) in a monolingual Dutch-speaking, homogeneously indigenous group of dyads who differ in socio-economic status. Our research addresses the following questions: (1) Are there differences in the amount of input (quantity) provided to children by caregivers who differ in SES? (2) Are there differences in the quality of caregivers' speech, as measured by their contingent responses to their children's utterances?

Based on previous research that mainly analysed English-speaking samples (among others, Hart & Risley, 1995; Rowe, 2008), we expected lowSES caregivers in our sample to be less voluble than mhSES caregivers. In a similar vein, we expected lowSES caregivers to respond significantly less contingently to their children's utterances. However, as suggested by Hoff-Ginsberg (1992), we also expected a lot of variability in both groups of mothers.

Method

Participants

Two groups of children and their caregivers participated: 25 children of mid-to-high socio-economic background (mhSES children), and 9 children of low socio-economic background (lowSES children). All children were monolingual Dutch and had no patent hearing or developmental problems. Children's hearing was checked with an otoacoustic emissions test approximately one month after birth by the Flemish infant welfare organisation Kind & Gezin.

The families' SES was based on the parents' education level, their occupation at the time of data collection, and their income. The lowSES families had an income around the minimum wage and the parents had at best finished high school. Concerning their job position, 8 out of the 18 parents worked (at least halftime), and 6 parents were unemployed at the time of data collection. Four parents did not provide information about their current job position, suggesting they were not working at the time of data collection. The family situation was not always transparent for the researchers: most lowSES mothers indicated that they currently had a partner, who was not always the child's father. In at least one case it was not clear if both partners actually lived together.

In the mhSES families, at least one parent had finished high school, and in 80% of the families at least one parent held a bachelor or master degree. In all cases, their income level was above the minimum wage. All mhSES parents worked full time (50 out of 50).

All children were video-recorded during spontaneous, unstructured interactions with their parents, other family members and the researcher. Recordings were made every month at the children's homes. The mhSES children (n=25) were video-recorded between 6 and 24 months of age (total number of recordings=475) whereas the lowSES children (n=9) were video-recorded between 6 and 23 months of age (total number of recordings=59). It can readily be inferred that mhSES dyads participated in all planned recording sessions, while this proved to be extremely difficult to arrange in the case of the lowSES dyads. In fact, our initial goal was to recruit 10 lowSES families. We drew on generous support from colleagues of the department Social Work and Social Care of the Karel de Grote University College to achieve contact but it proved very difficult to recruit and then retain participants from lowSES background.

Procedure

Volubility

Mothers' volubility was measured as the number of utterances per hour, the number of turns per hour and the total duration of speech (expressed in seconds). For this purpose, the entire video-recordings of the 25 mhSES children and the 9 lowSES children were analysed. These video-recordings lasted on average 1'03"58 hours for the mhSES children (median = 1'02"30; range = '38"26 – 1'54"26), and '46"18 for the lowSES children (median '45"51, range = '33"57 – 1'13"26). For the mhSES children, seven recording sessions each spaced three months apart were selected starting at six months of age (total number of recordings=175, average=7, SD=0). This selection of the recordings was made because of the highly time consuming annotation procedure. Annotating one full mhSES recording took on average 8 hours. Because fewer data were available for the lowSES children, all video-recordings were analysed (total number of recordings=59, average=6.56, SD=2.74).

The video-recordings were time stamped using CHILDES' CLAN software (MacWhinney, 2000). This procedure amounts to manually identifying the beginning and end point of each utterance. That information was subsequently automatically written in a CHAT file by the CLAN editor. The speaker of each individual utterance was identified as either adult (i.e. every person addressing the child) or child. This information allowed to automatically compute the number of adult and child utterances per hour and to analyse the total duration of speech that the adult and child produced within an hour. A Python script (version 2.6.5, Python Software foundation, 2015) was written to analyse the number of turns per hour. An utterance was considered to belong to the same turn when it followed the previous utterance within an arbitrarily set pause limit of 2 seconds (Yoder, Davies, Bishop, & Munson, 1994). If the pause was longer, this was counted as a new turn. If another speaker intervened, this was coded as a new turn for that speaker.

A total of 137,317 utterances was analysed: 124,789 utterances in the mhSES group, and 12,528 in the lowSES group.

Responsiveness

The monthly recordings were orthographically transcribed using the CLAN software and CHAT transcription conventions (MacWhinney, 2000). For 10 randomly selected mhSES mother-child dyads, the orthographic transcription comprised a selection of 20 minutes from each full monthly recording (total number of transcribed recordings=188, average per child=18.8, SD=0.42). The selection was meant to contain the episodes in which the child was most vocally active. Since less material was available for the lowSES group, the full monthly video-recordings were orthographically transcribed (total number of transcribed recordings=59, average per child =6.56, SD=2.74).

Three coding layers were distinguished in the annotation scheme for the caregiver responses, which was based on the coding system originally proposed by Otomo (2001). The coding layers reflected how a caregiver responds to a preceding child utterance, which, for the sake of convenience, will be called (caregiver) response in what follows.

On a first level, the actual (non)occurrence of a response to a child utterance was coded. A response was defined as any verbal utterance within two seconds following a child utterance. In the literature, several time spans can be found, ranging from 1 second up to 5 seconds (Gros-Louis, West, Goldstein, & King, 2006; Otomo, 2001; Paavola, Kunnari, Moilanen, & Lehtihalmes, 2005; Tamis-LeMonda et al., 2001). Gros-Louis and colleagues (2006) used 2 seconds from the onset of the child's vocalisation as a time span. It has been shown that that a 2-second pause is enough to take one's turn (Yoder et al., 1994); hence, we decided to consider 2 seconds to be ample time for a response. When a caregiver did not respond, i.e. did

not take a turn in the conversation, this was coded as “no response”. Only responses coded as “response” (within 2 seconds) were further analysed.

On the second level, codes identified if the response somehow incorporated the preceding child utterance, i.e. repeated it in some way. This was labelled a “reproductive response”. When the caregiver did respond within two seconds, but did not incorporate the child’s utterance, this was coded as a “non-reproductive response” as in example (1).

(1) *CHI: auto car
*MOT: ja, een grote rode yes, a big red one

In this example, the mother (*MOT) acknowledges that what the child (*CHI) names is a car without incorporating the child’s utterance.

Finally, the third level further evaluated the reproductive responses. The code identified if the child’s utterance was merely imitated or further elaborated on in the response. Thus, the caregiver’s response was analysed as either an expansion of the child’s utterance, i.e. one or more words were added, or an exact repetition or imitation. Example (2) shows an expansion of the child’s utterance.

(2) *CHI: bal. ball
*MOT: ja ze spelen met de bal. yes they are playing with the ball

The mother (*MOT) replies to her child’s (*CHI) utterance – she incorporates her child’s utterance – and gives extra information, namely that they are playing with a ball. The mother thus adds supplementary information, which is coded as an expansion.

Using this scheme, a total of 49,655 utterances were annotated and analysed: 42,153 in the mhSES group, and 7,502 in the lowSES group.

Reliability

For the reliability of the amount of input, two researchers not involved in the original transcription independently coded approximately 15% of the data. They received the same instructions and marked the beginning and end points of the utterances. The reliability was investigated by means of a Spearman's Rho that reached 0.91 for the total duration of speech ($p<0.001$), and 0.94 for the number of utterances (Spearman's Rho, $p<0.001$). Because the number of turns was calculated automatically we do not have a reliability score for this measure.

For the responsiveness, the first author assessed intra-rater reliability after approximately three months. Approximately three quarters (75%) of the data set were re-annotated. The percentages of the codes response vs. no response were calculated and correlated by means of a Spearman's rho. For all measures (response vs. no response, reproductive vs. non-reproductive response, and expansion vs. imitation) Spearman's rho = 0.99 ($p<0.001$).

Statistics

Both datasets (volubility and responsiveness) exhibit three hierarchically nested levels: observations or utterances constitute the first level (level 1) which are nested in observation sessions at particular ages (level 2), which are in turn nested within dyads (level 3). Because multi-level modelling (MLM) can handle nested data and takes the sampling hierarchy into account (Hox, 2008; Quené & van den Bergh, 2004), this statistical tool was used to analyse our data. MLM consists of two parts: a random part in which the variance between mothers and ages is represented and a fixed part in which the fixed effects are added.

Models were constructed in an incremental way: fixed effects (predictors or independent variables) were added one by one until the model that best fitted the data was discovered. Children's age was centred at 12 months because at that age

enough data for both groups were available. Independent variables were children's SES (mhSES or lowSES), and (child's) age. An interaction between age and SES was added as well to analyse whether the development was the same for the two groups of caregivers. The cut-off level for significance was set at 0.05.

To investigate caregiver' volubility, three analyses were performed with the number of utterances per hour, the total duration of speech, and the number of turns per hour as predicted or dependent variables. For the responsiveness dataset, three analyses with binomial dependent variables were performed: response vs. no response, reproductive vs. non-reproductive and expansion vs. exact repetition. The R software was used to analyse the data (R Core Team, 2013). In R, binomial data are automatically converted to logits. The lme4 package was used for the analyses (Bates, Maechler, Bolker & Walker, 2015).

Results

Quantity or amount of input

The statistical analyses of volubility, measured as the total duration of speech, the total number of utterances and turns, are presented in Table 1. It appears that – as a group – caregivers of lowSES children are significantly less voluble in terms of the number of utterances ($p<0.001$), the total duration of speech ($p<0.001$), and the number of turns ($p<0.001$). Even though a lot of variability between and within the two groups is attested in the random part of the model, the analyses show a significant effect of SES. Age is a positive effect ($p<0.001$ for all measures), indicating that as the child becomes older caregivers become more voluble. Yet, this development is different in the lowSES group, as indicated by a negative interaction between the variables ses and age ($p<0.01$ all measures): whereas caregivers of mhSES children become more voluble over time, caregivers of lowSES children

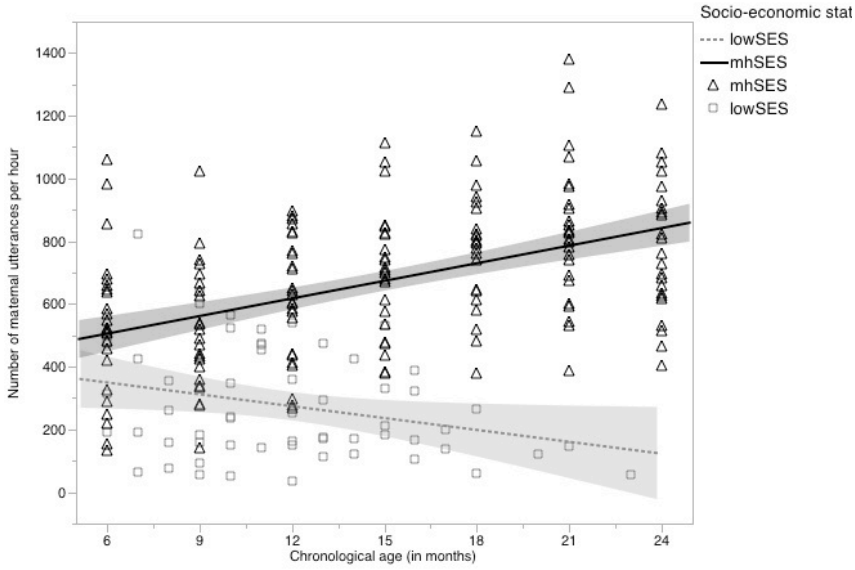
become less voluble (all measures). This is also clearly illustrated in Figure 1 in which the number of caregivers' utterances (per hour) is plotted against children's chronological age: the mhSES group becomes more voluble (black line), whereas the lowSES group becomes less voluble (grey line) over time.

Table 1 Parameter estimates for amount of input[2]

	Total duration of speech		**Number of utterances**		**Number of turns**	
Effect	**Estimates**	**(se)**	**Estimates**	**(se)**	**Estimates**	**(se)**
Fixed Parameters						
Intercept	699.68***	45.73	618.87***	18.68	335.10***	17.09
Children's age	22.88***	3.22	18.60***	3.38	15.89***	1.97
SES[low]	-397.98***	88.07	-325.39***	61.43	-164.76***	30.27
Age*SES[low]	-25.21**	8.52	-27.27**	7.92	-17.56**	4.44
Random Parameters						
$S^2_{Mother\_intercept}$	46025.5		20533.6		4546.36	
$S^2_{Mother\_age}$	117.9		124.9		31.68	
$Cor_{Mother\_intercept\_age}$	-0.17		-0.27		-0.07	
$S^2_{Age\_intercept}$	613.2		1044.8		485.14	
$S^2_{residual}$	20378.7		16002.5		5528.65	

Closer inspection of Figure 1 also shows that most (but not all) values
group are in the higher ranges and those of the lowSES group in the
However, in both groups substantial variance is present (as can be infe
dispersion of the data points and from the shaded area around
confidence interval), indicating that some caregivers in the lowSES g
more utterances per hour than do some caregivers in the mhSES gro
number of utterances is 673.62 in the mhSES group (range=134-1,38
and 275.11 in the lowSES group (range=36-825; SD=178.24). Thus, o
means of the two groups are quite distinct: a difference of almost 4
Nevertheless, these are overlapping distributions: a lot of variability
within the groups is evident.

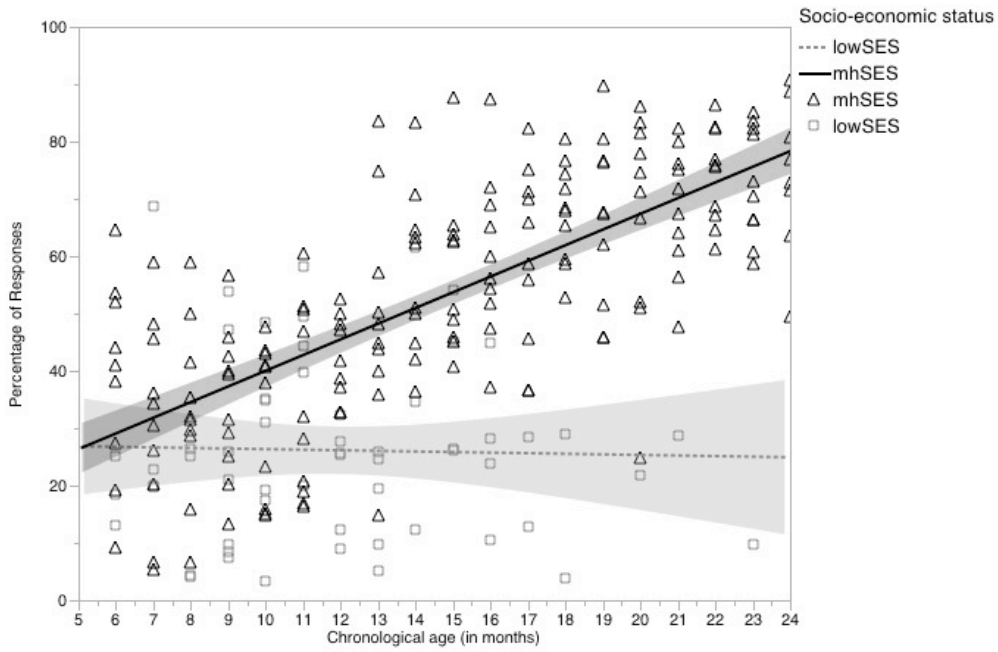
**Figure 1 Development of the number of maternal utterances pe
lowSES and mhSES mothers as a function of children's chronological a**



Quality of the input: responsiveness

Responsiveness (expressed as the percentage of child utterances that a caregiver responds to) is illustrated in Figure 2. This figure shows that even though the lowSES caregivers appear to be less responsive as a group (grey line), a lot of variability is present (as can be inferred from the dispersion of the data points and from the confidence interval). The descriptive statistics reveal striking differences as to the mean responsiveness: overall, lowSES caregivers respond to 26.14% of their children's utterances (range=3.45-68.82; SD=20.63), whereas mhSES caregivers respond to 53.62% (range=5.29-90.79; SD=15.68) of their children's utterances. Yet, again it should be emphasized that the most responsive lowSES caregiver (68.82%) is far more responsive than the least responsive mhSES caregiver (5.29%). Striking differences among caregivers are thus revealed.

Figure 2 Percentage of lowSES and mhSES mothers' contingent responses to children's utterances as a function of children's chronological age



The statistical analyses of the three responsiveness measures are presented in Table 2. Note that these estimates are expressed in logits, indicating the estimated odds of response, reproduction and expansion as reference categories.

Table 2[3] Parameter estimates for responsiveness (proportions are expressed in logits)

	Response		Reproduction		Expansion	
Effect	**Estimates**	**(se)**	**Estimates**	**(se)**	**Estimates**	**(se)**
Fixed Parameters						
Intercept	-0.22	0.17	-2.10***	0.18	-0.48**	0.17
Children's age	0.12***	0.03	0.14***	0.01	0.13***	0.01
SES[low]	-0.73**	0.25	-0.15	0.27	-1.08***	0.31
Age*SES[low]	-0.11**	0.04				
Random Parameters						
$S^2_{Mother\_intercept}$	0.29		0.32		0.23	
$S^2_{Mother\_age}$	0.006		0.002		0.0004	
$Cor_{Mother\_intercept\_age}$	-0.54		-0.53		-0.02	
$S^2_{Age\_intercept}$	0.03		0.02		0.01	

Response or no response

As a group, caregivers of lowSES children are significantly less responsive to their children's utterances as is shown by the main effect of SES ($p<0.01$). Children's age is also a significant main effect ($p<0.001$), meaning that caregivers become more responsive as their children grow older. However, a negative interaction between SES and age implies that the overall increase in responsiveness is specific to mhSES caregivers, and is not present in the lowSES group ($p<0.01$). This effect can also be readily seen in Figure 2: the percentage of responses decreases slightly for the lowSES group.

Incorporations: reproductive or non-reproductive responses

LowSES caregivers incorporate their children's utterances less often than mhSES caregivers, but the effect is not significant ($p>0.05$). Over time, incorporation of children's utterances becomes more frequent as is shown by a significant positive effect of age ($p<0.001$). This developmental trend was the same for the two groups, as the interaction between SES and age did not reach significance ($p>0.05$).

Expansion or exact repetition

LowSES caregivers expand their children's utterances less frequently than mhSES caregivers, as is shown in Table 2 by a negative significant effect of SES ($p<0.001$). This means that they simply imitate their children's utterances more often without adding supplementary words. Over time, both groups expand their children's utterances more frequently as is indicated by the significant effect of age ($p<0.001$). This developmental trend was comparable in the two groups.

Discussion

The overarching issue addressed in the present study concerns the variation of the language input provided by caregivers with different SES backgrounds. More specifically, the aims of the current study were (1) to investigate the amount of input caregivers provide to their children, measured as the number of utterances they produce per hour, the total duration

of their child-directed speech, and the number of turns they take per hour. (2) The second aim was to analyse a more qualitative aspect of the input: how often do caregivers respond contingently to their children's utterances, and what form does that response take? The participating mothers originated from two different SES backgrounds. A major asset of the current study is that, compared to the literature, which is mainly focused on analysing SES differences in heterogeneous English-speaking samples (e.g., Song et al., 2014), caregivers' volubility and responsiveness in a different and hitherto unexplored linguistic setting was analysed, namely in a homogeneous monolingual group of Dutch-speaking dyads.

Even though the cultural and linguistic settings of the current study differ from those of previous studies (such as Hart & Risley, 1992, 1995; Hoff, 2003; Rowe, 2008), the main finding reported in those studies was corroborated. Dutch-speaking autochthonous caregivers of lowSES backgrounds are less voluble than autochthonous mhSES caregivers. The present study thus adds to the current knowledge that the effect of SES seems to be persistent across different cultural and linguistic settings. Our results showed that, as a group, lowSES caregivers produced significantly fewer utterances per hour and shorter total durations of speech, and they took fewer turns per hour. Moreover, it was shown that over time the differences in volubility between mhSES and lowSES caregivers became even more pronounced: over time lowSES caregivers addressed less speech to their children while the amount of speech increased in the mhSES group. LowSES caregivers were not only less voluble, but also less responsive to their children's utterances, confirming earlier results (Hoff-Ginsberg, 1998).

Caregivers of lowSES children speak less and respond less contingently to their children's vocal efforts. In other words, there is much less "conversation" going on in the lowSES dyads. Caregiver-child conversation has been shown to be a key factor in language growth (Snow, 1977; Hirsh-Pasek, Adamson, Bakeman, Owen, Golinkoff, Pace, Yst & Suma, 2015), and caregivers' amount of input and their active participation in conversational exchanges have been shown to influence their children's language development (Hoff & Naigles, 2002; Huttenlocher et al., 1991; Song et al., 2014; Zimmerman et al., 2009). Consequently, lowSES children might be at risk for slower or delayed language development. There are ample indications in this direction: the lowSES caregivers participating in the current study took significantly fewer turns than did their mhSES counterparts. The number of caregiver turns is a solid predictor of children's expressive vocabulary sizes at 21 months of age (Vanormelingen, De Maeyer & Gillis, in press), and general language development as

assessed by standardized tests (Gilkerson & Richards, 2009). And, indeed, lowSES children have been found to have significantly smaller vocabularies (Fernald et al., 2013).

In the analysis of the type of responses, we specifically focussed on the type of incorporation, and more precisely the proportions of exact imitations and expansions. Roughly speaking, imitations can be considered to be acknowledgements of the child's previous turn, while expansions pick up the content of that turn and elaborate on it. In the lowSES group significantly more exact repetitions were used whereas caregivers in the mhSES group expanded their children's utterances more frequently. In other words, lowSES caregivers simply imitate their children's vocalisations more often without attributing meaning or additional relevance to them. In contrast, caregivers of mhSES attribute meaning to the children's vocal productions, as also suggested by Snow (1977). Moreover, by expanding their children's utterances more than merely repeating them, mhSES caregivers invite their children to engage in more extended conversational exchanges. Caregivers of lowSES are less inviting for that matter, respond less to their children's verbal efforts, do so less frequently over time and, if they do, their turn is less fruitful for linguistic information exchange.

To sum up, as a group, caregivers of lowSES children provide less input, respond less frequently, and less informatively to children's utterances. These characteristics are known to have consequences for children's language development (Hoff & Naigles, 2002; Rowe, 2008, 2012; Weisleder & Fernald, 2013). For instance, lowSES children are found to reach the canonical babbling milestone significantly later than their mhSES peers (Vanormelingen & Gillis, submitted). Since a delayed onset of canonical babbling has been shown to be a possible marker of delayed and even deviant language development (Oller, Eilers, Neal, & Schwartz, 1999; Oller, Eilers, Neal, & Cobo-Lewis, 1998), most of the lowSES children are at risk for slower or delayed language development. Corroborating evidence comes from studies showing significantly smaller vocabularies in lowSES children. Moreover, these are accounted for by significant disparities in language processing efficiency: by 24 months, lowSES children were found to have a 6-month delay in processing skills critical to language development that are causally linked to vocabulary development (Fernald et al., 2013).

Even though the main effect of SES is highly significant in most of the analyses reported in this paper, it should be stressed that in addition to between-group variability there is also a lot of variability within the two groups (see also Hoff-Ginsberg, 1992). For instance, in our own corpus, some of the caregivers in the lowSES group perform better than those in the mhSES group (see Figures 1 and 2). This calls for a deeper explanation: why do

some caregivers talk a lot with their children and provide expanded (linguistic) information, while others do not? And, furthermore, why is this phenomenon characteristic for lowSES caregivers, and why do some lowSES caregivers interact more like mhSES mothers? Rowe (2008) conjectures that parental knowledge about child (language) development is a mediating factor between SES and child-directed speech. A deeper understanding of these mediating factors is needed to answer the question why caregivers of less advantaged backgrounds interact less with their children. However, Rowe (2008) also suggests that, if parental knowledge is indeed a mediating factor, the limited knowledge of child development may be expanded in order to change lowSES caregivers' interactional involvement. In other words: they can be guided to change their behaviour when they are instructed how and why to interact more actively and appropriately with their children. Recently, Suskind et al. (in press) set up a pilot-study taking this idea as a starting point. A researcher visited lowSES mothers at their homes and informed them inter alia about the importance of interacting with their children and turn-taking. The outcomes are positive: mothers' language knowledge and behaviours seem to be malleable, meaning that mothers are able to change their ideas about the importance of child-directed speech over time and to act accordingly. Several other intervention studies report analogous positive effects, suggesting that lowSES caregivers can be coached to become active conversational partners when given the proper tools (Leffel, & Suskind, 2013; Sparks, & Reese, 2012; Taumoepeau, & Reese, 2013).

In conclusion: on average, there are SES differences in the quantity and quality of linguistic input provided by caregivers; but, within SES, there are important individual differences and, furthermore, these differences may be modifiable.

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