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Narrative skills in deaf children who use spoken English: Dissociations between macro and microstructural devices

A.C. Jones[a,*], E. Toscano[b], N. Botting[c], C.R. Marshall[d], J.R. Atkinson[a], T. Denmark[a], R. Herman[c], G. Morgan[a,c]

[a] Deafness, Cognition and Language Research Centre, University College London, UK
[b] University of Trento, Italy
[c] City University, London UK
[d] Institute of Education, University College London, UK

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ABSTRACT

Previous research has highlighted that deaf children acquiring spoken English have difficulties in narrative development relative to their hearing peers both in terms of macro-structure and with micro-structural devices. The majority of previous research focused on narrative tasks designed for hearing children that depend on good receptive language skills. The current study compared narratives of 6 to 11-year-old deaf children who use spoken English ($N = 59$) with matched for age and non-verbal intelligence hearing peers. To examine the role of general language abilities, single word vocabulary was also assessed. Narratives were elicited by the retelling of a story presented non-verbally in video format. Results showed that deaf and hearing children had equivalent macro-structure skills, but the deaf group showed poorer performance on micro-structural components. Furthermore, the deaf group gave less detailed responses to inferencing probe questions indicating poorer understanding of the story's underlying message. For deaf children, micro-level devices most strongly correlated with the vocabulary measure. These findings suggest that deaf children, despite spoken language delays, are able to convey the main elements of content and structure in narrative but have greater difficulty in using grammatical devices more dependent on finer linguistic and pragmatic skills.

What this paper adds?

This paper provides a description of the development of story-telling abilities of deaf and hearing children who use spoken English. In addition to assessing macro- (global) and micro- (local) level narrative skills, probe questions were used following the story presentation to assess comprehension abilities. A scale was devised to assess the micro-level skills of cohesion, grammatical morphemes, and narrative and evaluative devices. While previous studies assessing narrative development in deaf children have used language dependent stimuli designed for hearing children, the current study uses a non-verbal story presented in video format that does not depend on deaf children's receptive language skills. In contrast to the findings of previous studies, deaf children showed equivalent performance to their hearing peers at the macro-level; however, performance on micro-level narrative skills was poorer, and less relevant and detailed answers were provided to

* Corresponding author at: Deafness, Cognition and Language Research Centre, University College London, 49 Gordon Square, London WC1H 0PD, UK.
E-mail address: a.c.jones@ucl.ac.uk (A.C. Jones).

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the inferencing probe questions than hearing peers. This paper thus highlights the strengths and weaknesses of oral deaf children's language abilities.

1. Introduction

Narrative is a powerful tool that all cultures possess for organizing and interpreting experience (Bamberg, 1997; Labov & Waletzky, 1967). Children learn to tell stories by taking part in narrative practices that their parents and other adults model to them (Van Deusen-Phillips, Goldin-Meadow & Miller, 2001). Profoundly deaf children are increasingly communicating in spoken English, yet even with advances in cochlear implant technology, they continue to lack full auditory access to the spoken language that surrounds them, and so consequently persist with communication delays (Marschark & Spencer, 2015). While there is a good understanding of deaf children's oral language development, their ability to narrate a story in spoken language has previously been addressed in only a small number of studies (Crosson & Geers, 2001). This paper focuses on narrative development in oral deaf children and addresses a broad range of narrative skills at both the macro- (global) and micro- (local) level.

Narrative skill encompasses the ability to communicate a story containing sequential information usually about a past or future event (Gleason, 2002), and is considered a cornerstone of children's language development. Children's emerging narrative ability is crucial for developing social skills (Miller, 1994) and has been shown to predict later literacy skills (Griffin, Hemphill, Camp & Wolf, 2004; Roth, Speece & Cooper, 2002). Typically developing children's language shows a large proportion of personal narratives (Beals & Snow, 2002; Liles et al., 1995), In everyday conversation, children as young as 2–3 years naturally retell stories or recount a sequence of events, and as they get older children increasingly become able to deal with the discourse-pragmatic requirements that underpin narrative. Several concurrently developing, higher-level language and cognitive skills are necessary to form cohesive, coherent and structured narratives (Bamberg & Damrad-Frye, 1991). These include the mastery of a variety of linguistic (lexical, syntactic and pragmatic) skills, the ability to remember and order in sequence a series of events, and to establish and maintain perspectives of a range of characters (Norbury, Gemmell & Paul, 2014).

1.1. Assessing narrative development

Narrative is assessed for typical and atypical language development (Botting, 2002; Cleave, Girolametto, Chen & Johnson, 2010) and is typically measured for two factors: the global organisation of content, known as *macro-structure*; and a local linguistic level which measures devices used within and across sentences, known as *micro-structure* (Liles, Duffy, Merritt & Purcell, 1995). The *macro-structure* level focuses on two aspects: the ability to construct a hierarchical representation of the story's main elements, including the sequencing of events, introduction to the characters and setting of the scene, complicating actions, the story climax and resolution, and internal response felt by the characters and plot evaluations (Norbury & Bishop, 2003); and also a measure of information provided for specific content (e.g., Pankratz, Plante, Vance & Insalaco, 2007). Studies with typically developing children show that at around aged 4 years, children begin to use the macro components (Trabasso & Stein, 1994), and by seven years of age, children are more able to structure a story with multiple episodes. By nine-ten years of age children can tell complete stories with substantial detail (Crais & Lorch, 1994).

Micro-structure elements are assessed at the word and sentence level and include devices for achieving cohesion, such as coordinating (*and*, *but*, *so*) and subordinating (*because*, *when*, *that*, *if*) conjunctions. These devices provide connections from one event to another and create a clearly understood sequence (Berman & Slobin, 1994). A second measure of cohesion is the unambiguous use of reference to specify and distinguish characters in the narrative, both at first mention, and through the use of anaphoric pronouns to refer back to the named character (*he*, *she*, *his*, *her*). Micro-structure becomes more sophisticated with age (Liles, 1993; Liles et al., 1995) and depends on the ability to integrate syntactic and pragmatic information (Hemphill, Picardi & Tager-Flusberg, 1991) as well as the growth of perspective taking (Tager-Flusberg & Sullivan, 1995). Narrative measures are also used to evaluate other local language aspects in children with language learning difficulties (e.g. specific language impairment: SLI), such as frequent grammatical errors of verb tense and pronoun use (Cleave et al., 2010). In addition, during the school-age years, typically developing children develop elements related to evaluative comments (Norbury & Bishop, 2003) and improve their use of literate, decontextualized language (Curenton & Justice, 2004). These features can help reduce ambiguity in a story by increasing the explicitness of character, object and event descriptions, for example through the use of adjectives, adverbs (e.g., to specify manner: *carefully*), or information about spoken dialogue (e.g., *said, shouted*; Greenhalgh & Strong, 2001). It has been suggested that such language use is dependent on vocabulary development, and an ability to mentally represent objects absent from the immediate context (McGillicuddy-DeLisi & Sigel, 1991).

Narratives also reveal the links between social cognition and language development through the assessment of children's growing story comprehension and inference-making abilities. There is little written about inference making abilities in deaf children's narratives, but more attention has been given to atypically developing populations with cognitive differences, such as Autistic Spectrum Disorders (ASD) and SLI (Norbury et al., 2014). When a series of probe questions based on elements not explicitly mentioned in a previously heard story are used, children with autism spectrum disorders (ASD) (Tager-Flusberg & Sullivan, 1995) and children with SLI (Bishop, 1997) were more likely to be literal in their responses, showing they had not understood the story's underlying message: a skill that was shown to be closely linked to "theory of mind" (i.e., understanding the intentions of others; Premack & Woodruff, 1978).

1.2. Narrative development in deaf children who use spoken language

With over 90% of deaf children being born to hearing parents, the restricted access to verbal and/or signed information means that this group faces significant difficulties in their language skills, including the ability to produce a coherent narrative (Crosson & Geers, 2001). Typically-developing hearing children have frequent opportunities to engage in narrative discourse, both in interactions with others and indirectly overhearing others recount their experiences. Telling stories about themselves at school, home and in other social settings is an everyday occurrence (Crais & Lorch, 1994). Deafness itself is not a barrier to full language development, for example deaf children of deaf parents has been shown to follow the typical narrative developmental milestones in British Sign Language (Morgan, 2002). In contrast, deaf children who are not exposed to a natural sign language by parents/carers with native level of fluency have reduced opportunities for interaction and particularly incidental learning (Morgan et al., 2014). In many countries the majority of deaf children have hearing parents who themselves do not sign, and instead choose to use oral language with their children (Marschark & Spencer, 2015). Currently these children are most often educated in a mainstream setting using a spoken language. The impact of deafness on general spoken language skills has been widely documented. For example, Geers, Nicholas and Sedey (2003) investigated expressive grammar and found that deaf children with cochlear implants (CIs) showed poorer morphological and syntactic skills than their hearing peers. On average, deaf children with (or without) implants have smaller receptive vocabularies than hearing children of the same age (Eisenberg et al., 2004; Spencer, 2004), and this difference persists over time (Blamey et al., 2001; Kirk et al., 2002). With advances in neo-natal screening and hearing aid technologies, spoken language skills of deaf children are gradually improving but it is less clear what changes are occurring for pragmatic and higher levels of language use as required in narrative (e.g., Rinaldi, Baruffaldi, Burdo & Caselli, 2013).

Previous studies that have specifically investigated the spoken narratives of deaf children have focused on those with CIs and have shown that in general, they lag behind their hearing peers (Boons et al., 2013a; Crosson & Geers, 2001; Guo, Spencer & Tomblin, 2013; Worsfold, Mahon, Yuen & Kennedy, 2010). Crosson and Geers (2001) videotaped 8–9 year old oral deaf children with CIs on a story telling task and found that the deaf children, in particular those with poorer ability to discriminate speech using the CI, scored poorly on narrative structure and cohesion (use of conjunctions and character references) relative to hearing peers. More recent studies have focused on using story retell with the support of picture prompts. At the micro-level, Worsfold et al. (2010) found that oral deaf children with CIs were poorer at producing high-frequency morphemes (e.g., past tense, *-ed*) and used fewer subordinate clauses than their hearing peers when retelling "the bus story" (Renfrew, 1997). Using the same story retell method, Boons et al. (2013a) reported no differences between deaf and hearing groups in referencing story protagonists, but hearing controls outperformed deaf children on the number of subordinate clauses used. The deaf group also had a higher percentage of utterances with morphological, syntactic or semantic errors. Finally, Guo et al. (2013) showed in a longitudinal study that children with CIs used fewer tense markers on verbs in story retelling than age-matched peers with normal hearing. At the macro-level, with the exception of a high-scoring subgroup of children who were implanted early (Boons et al., 2013a), oral deaf children with CIs were reported to achieve lower scores than their hearing counterparts. The deaf group's bus stories were poorer in plot structure and comprised fewer essential elements in story content (Boons et al., 2013a; Worsfold et al., 2010).

A limitation of previous research using story retell with deaf children is that the task depends on receptive language skills. The deaf participant must listen to and speech-read the experimenter telling the story, and must be able to divide their attention between picture prompts and the story narrator, before retelling. A further limitation noted by Worsfold et al. (2010) is that deaf children may convey some of their story content by using gestures. Without videotaping the child, it is not possible to capture this element of the narration. It is possible that deaf children with spoken language delays are still able to produce narrative with the aid of gestural substitutions. Relevant evidence comes from deaf children who spontaneously developed home signs (a form of systematic gestures) and were able to use these to create rudimentary narratives (Morford & Goldin-Meadow, 1997; Van Deusen-Phillips et al., 2001).

Finally, the use of mental state vocabulary and other evaluative devices in the narratives of deaf children using spoken English has received little attention to date. This is important given the consistent finding that oral deaf children display difficulties in mental state reasoning as evidenced by a delay in passing the false belief task (e.g., Schick, De Villers, De Villiers & Hoffmeister, 2007). A recent longitudinal study found that although length of time since CI significantly improved deaf children's narrative performance, deaf children still used fewer evaluative devices and less mental state vocabulary compared to hearing peers, which was linked to a reduced opportunity to overhear discussions about people's intentions and emotions (Huttunen & Ryder, 2012).

In summary, research to date suggests that deaf children have difficulty with both macro- and micro narrative skills, yet assessment has generally depended upon verbal story retell methods designed for hearing children. The focus in much of this previous research has been with deaf children who wear CIs, while many deaf children using spoken language are still using hearing aids. Furthermore, there is scope to provide a more comprehensive assessment by additionally including probe questions to gauge deaf children's understanding of the characters' intentions and mental states. Finally, some studies

Table 1
Background characteristics of the deaf participants.

Background characteristic	*N*	% of *N*
Total N	59	
Aetiology of deafness		
Genetic	23	39%
Illness	5	8%
Unknown	31	53%
Level of hearing loss		
Mild-moderate (above 30 dB)	10	17%
Severe (>70 dB)	27	46%
Profound (>90 dB)	22	37%
Hearing device		
Hearing Aid	37	63%
Cochlear Implant (CI)	22	37%

have concurrently investigated deaf children's spoken English narratives and vocabulary ability (e.g. Boons et al., 2013b), but have not examined the relationship between these two abilities. The current study aimed to address each of these factors.

1.3. Present study

We investigated the narrative abilities of deaf children who use spoken English. The children were recruited from across the UK and were representative of deaf children who used both hearing aids and cochlear implants. The deaf children were compared with a hearing control group who were carefully matched for age and non-verbal intellectual ability. To overcome the limitation of using a measure that is dependent on receptive language abilities, a video clip of a story acted out silently by two actors was employed to elicit a narrative (Herman et al., 2004). The advantage of this elicitation method is that it relies on the children's visual rather than auditory memory. This reduces the processing demand of dividing attention between the story pictures and communicating with the experimenter, which may enable the deaf and hearing children to complete the task on more equal level. Children were assessed on their macro level skills (content and structure) and comprehension was evaluated by probe questions, which assessed understanding of the mental state and intentions of the story characters. The children's story telling was videotaped, enabling representational gestures to be included in the scoring of narrative content and structure. In addition, a novel grammatical scale for English was devised to assess micro-level narrative skills. The children were also assessed on their one-word expressive vocabulary. As a secondary aim, the relationship between expressive vocabulary and narrative skills was then examined.

It was predicted that the deaf children would show comparable performance to hearing children in terms of narrative content and structure, given that the task is not dependent on receptive language skills. However, given previous reported delays in finer linguistic, pragmatic skills, and mentalizing abilities, it was expected that deaf children would be poorer in their micro-level narrative skills and their ability to answer the comprehension questions, relative to hearing controls. As the language used in narratives tends to be more decontextualized and requires the use of more elaborate vocabulary, as well as more exact syntactic marking of temporal and causal nature of events (Curenton & Justice, 2004), it was expected that there would be a positive relationship between vocabulary and micro-level narrative skills for both deaf and hearing groups. In addition, it was expected that a relationship between micro-level narrative skills, vocabulary and the ability to infer the mental states of others as measured by the probe questions would be found, given that language ability has been shown to be a strong predictor of theory of mind skills in both hearing (Milligan, Astington & Dack, 2007) and deaf children (Schick et al., 2007). On the other hand, it was reasoned that macro-level narrative skills would depend less on the children's general language abilities, particularly in light of the evidence that even deaf children with limited language abilities but typical non-verbal intelligence are able to construct stories through home signs.

2. Method

2.1. Participants

Fifty-nine deaf children (30 boys) were recruited based upon the following inclusion criteria: (1) pre-lingual deafness (congenital or occurrence at age ≤ 1 year), (2) aged between 6 and 11 years, (3) spoken English as the preferred modality of communication, (4) no known learning disabilities or concomitant disorders such as attention deficit or autism. The deaf children's ages ranged from 6;0 to 11;8 (*M* = 8;9, *SD* = 1;8). Their non-verbal ability was derived from scores on the Matrix Reasoning subset of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) and their T-scores (*M* = 50; *SD* = 10) ranged from 30 to 69 (within 2*SDs* above/below the mean). Table 1 summarises the background characteristics of the deaf participants in terms of cause of deafness, level of hearing loss in their better ear and type of hearing device used. All children received auditory amplification or cochlear implants (CIs) and used these devices during testing. The mean age of first implant for the CI group was 3;5 (*SD* = 2;0, range = 1;0 to 10;2).

Table 2
Participant characteristics of deaf and hearing group children.

	Deaf (*N* = 59)	Hearing (*N* = 67)		
	Mean score (*SD*)		*t*	*p*
Chronological age (year; months)	8; 9 (1;8)	8; 10 (1;6)	−0.37	0.71
WASI matrix T-scores (non-verbal ability)[a]	50.46 (9.56)	52.75 (8.71)	−1.41	0.16
	Percentage		χ^2	*p*
Gender	51% male	55% male	0.24	0.62
Parents FE (% yes)	73%	76%	1.29	0.27

[a] Standard scores, *M* = 50, *SD* = 10.

The majority of the deaf children's parents were hearing, but twelve had a deaf parent: 7 of these parents specified BSL as their own preferred language, and the remainder spoke English as a first language. All deaf parents however reported that their deaf child's preferred language was spoken English. To gain a broadly representative sample the deaf group were recruited from specialist deaf schools (5 from day schools and 2 from residential schools) but the majority from mainstream schools across the UK (24 from schools with a specialist support unit and 28 from schools without specific provision). Forty-three parents (73%) had some level of education after leaving school (university or further education college). The majority of the deaf children were White British or White European (*N* = 49; 83%), 4 were Asian British, 2 were Black British, and 4 were mixed race or other. Table 2 shows the participant demographic information (age, non-verbal ability, gender and whether parents had further education) for deaf and hearing children.

A group of 67 hearing children (37 boys) were recruited as a typically developing control group. These children were from a range of primary schools in rural and urban settings, and when possible were from the same schools and year groups as the deaf children ensuring similar demographic backgrounds to control for social status and match on chronological age. Table 2 shows that deaf and hearing groups did not significantly differ in terms of age (*M* = 8;10, *SD* = 1;6; range = 6;0 to 11;11) and non-verbal ability. There were no significant differences between groups in terms of gender, whether the parents had further education (*N* = 51) (Table 2), or ethnicity (χ^2 (3) = 3.54, p = 0.32).

2.2. Procedure

The UCL Research Ethics Committee gave ethical approval for the study. Children were recruited either by contacting deaf schools and specialist support units directly, or by establishing contacts with parents via the National Deaf Children's Society. Informed written consent was obtained from parents/guardians prior to testing. Children gave verbal consent at the start of the testing session and were informed they could opt out at any time.

2.3. Language measures

All children were tested using measures of narrative ability and spoken English expressive vocabulary.

2.3.1. Narrative ability

Children were tested on the Narrative Production Test (originally the BSL Production Test; Herman et al., 2004) with an English grammar adaptation. First the child watches a short, silent story on a laptop. The two children in the video act out a series of events without the use of language (see Table 3 for a descriptions of each story episode). Participants are instructed to watch the story carefully and to remember it so they can retell it immediately after viewing. To encourage the child to tell the whole story, the experimenter leaves the room and returns once the video has finished. The child is able to watch the film a second time if they wish. When the experimenter returns, the child is asked to tell the story and the experimenter listens to the child's response without prompting. After completion, they are asked two probe questions to assess story comprehension and inferencing skills: (1) Why did the boy throw the spider? (2) Why did the girl tease the boy? The children's narratives and responses to the questions were video recorded and then transcribed for analysis. All transcripts were checked against the video recordings by a second examiner. Discrepancies were discussed and agreement between examiners was obtained for all transcripts.

2.3.1.1. Scoring narratives. Table 4 provides an overview of the method used to score the children's narratives. At the macro-level, the narratives were evaluated for content and structure following the scoring guidelines of Herman et al. (2004). *Narrative content* (i.e., the level of detailed information in the narrative) was scored by awarding one point for each mention of 15 specific story episodes (Table 3), plus a further point for mentioning any "additional information" in the story (e.g., the spider was horrible) giving a maximum of 16 points. As the stimuli material contains only gestures and actions, this prompted some children (deaf and hearing) to use gesture in their story retellings. This was mainly co-speech gesture, but on a few occasions children used silent mime e.g., a gesture to represent holding a sandwich up to the mouth and pretending

Table 3
Story Episodes.

Episode	
1	The girl brings in a tray of food and drink
2	The boy is watching TV
3	The girl helps herself to sweets, which the boy demands (using an outstretched arm movement and an insistent facial expression) and she gives to him
4	Episode 3) is repeated with a cake
5	Episode 3) is repeated with a drink
6	The girl sees a spider
7	She tiptoes over to pick up the spider (whilst the boy continues to watch TV)
8	She makes a sandwich by placing the spider be- tween two pieces of bread
9	She pretends to eat the sandwich
10	The boy demands the sandwich
11	The girl hands over the sandwich to the boy
12	The boy bites the sandwich (and realizes there's a spider inside)
13	He takes the spider out of his mouth
14	He chases the girl round the room
15	He throws the spider at the girl
16	Additional information provided, e.g. the boy is lazy or the spider is horrible

Table 4
Summary of narrative scoring system.

	Scoring	Points allocated
Macro-level		
Narrative Content	Reference to 15 key story episodes (see Table 3), plus a point for additional information, to measure level of detail in a narrative.	0–16
Narrative Structure	Global organisation of story content. Inclusion of detail given based on key elements: orientation, two complicating actions, climax and resolution. A further point for evaluation and correct narrative sequencing of story episodes.	0–12
Micro-level		
Narrative cohesion		
• Referential cohesion	Points awarded for clarity of first introduction of story characters (i.e. maximum points for the use of indefinite article), and for maintenance of clear references (i.e. correctly using pronouns to contrast characters).	0–4
• Conjunction score	Points awarded for inclusion of coordinating conjunctions, logical markers and subordinate clauses to link semantic relations in stories.	0–6
Grammatical morphemes	Comprises the correct inclusion of articles and prepositions, regular verb inflections, irregular verb inflections, agreement in gender, agreement in person, and use negatives and modal verbs.	0–15
Narrative and evaluative devices	One point awarded for including one example of each of the following: direct or indirect speech or thought; adjectives; adverbs describing manner; intensifers or deintensifers.	0–4
Comprehension/inferencing questions	Two probe questions testing understanding of actions and intentions of story characters.	0–4
Total score		0–29

to eat it. These gestures/mime were included in the scoring of story content for both deaf and hearing children, therefore both the video and transcribed speech were referred to when scoring narrative content.

Narrative structure, the global organisation of story content, was scored using a high-point analysis (Labov & Waletzky, 1967) based on six key elements: (1) orientation (2) two complicating actions, (3) climax and (4) resolution. Each section is awarded 1 or 2 points depending on the amount of detail given. A further point is awarded for: (5), evaluation (i.e., where the child presents their own perspective on the characters' feelings or expresses their own views). Responses to questions were also included; and (6) narrative sequence (i.e., correct order of story episodes). A maximum of 12 points was thus awarded for narrative structure.

After extensive piloting and comparison of English narrative norms from other research, a scoring scheme was created to assess micro-level narrative skills in English for the same stimuli: a score for *grammatical markers and narrative devices* was generated by considering narrative cohesion, grammatical morphemes, and narrative and evaluative devices (Maximum 29 points). Responses to both the spontaneous story and the probe questions were included in scoring. *Narrative cohesion* included the use of referents to specify a character, and the use of conjunctions. A *referential cohesion* score (maximum 4 points) was based upon the first introduction of the story character(s) and whether references were consistently clear throughout. A maximum of 2 points for first introduction was scored in the following way:

- 0 points for no first mention

- 1 point for unspecified pronoun (e.g., the girl)
- 2 points for non-presupposing introduction using indefinite article(s) and noun or number (e.g. a girl).

Reference maintenance points (maximum 2) were assigned based on the following:

- 0 points for unclear referencing
- 1 point for some ambiguity in references
- 2 points for clear references throughout (i.e., uses pronouns and contrasts characters effectively).

A *conjunction score* (maximum 6 points) comprised the use of basic coordinating conjunctions (e.g., *and*, *but*), the use of logical markers (e.g., *because*, *if*) and the inclusion of subordinate clauses (e.g., *the girl picked up the spider that was crawling across the floor*). A maximum of 2 points were awarded for each based on the following scale:

- 0 points for no inclusion.
- 1 point for 1–2 uses.
- 2 points for 3+ uses.

Nine types of English *grammatical morphemes* were analysed: articles, prepositions, regular verb forms, irregular verb forms, agreement in grammatical gender, agreement in grammatical person, use of negatives and use of modal verbs (maximum 15 points):

- 1 point was awarded for inclusion and correct use of articles throughout the narrative
- A maximum of 2 points were awarded for inclusion and correct use of prepositions:
  - 0 points for no prepositions or rare correct use
- 1 point for including 2–3 prepositions (at least 2 different examples e.g., *on*, *in*, *at*) correctly (accuracy <50%)
- 2 points for 4+ prepositions correctly used (accuracy >90%)

- A maximum of 2 points each was rewarded for regular verb inflections (e.g., *she walk*<u>*ed*</u>*/walk*<u>*s*</u>*/was walk*<u>*ing*</u>), irregular verb forms (e.g., he bites/*he bit/had bitten*), agreement in grammatical gender (e.g., <u>*she*</u>*shook*<u>*her*</u>*head*) and agreement in grammatical person (e.g., *they*<u>*were*</u>*brother and sister*) using the following scoring method:
  - 0 points when errors were made most of the time (>50%)
- 1 point when errors were made some of the time (10–50%)
- 2 points when errors were rarely made (<10%)

Errors included both omissions (e.g. *the girl walk__ in*; *the boy __ angry*) and commissions (e.g. *the boy throw*<u>*ed*</u> *the spider*).

- A maximum of 2 points each were awarded for the correct inclusion of negatives, e.g. *the girl didnt/did not know* (excluding "I dont know") and modal verbs, e.g., *there*<u>*might*</u>*have been, he*<u>*should*</u>*have got*) using the following scoring method:
  - 0 points for no usage
- 1 point for 1–2 occurrences
- 2 points for 3+ occurrences

A maximum of 4 points was awarded for the inclusion of ***narrative and evaluative*** devices. One point was awarded for the inclusion of one or more examples of each of the following:

- Direct (e.g. *the girl said no*) or indirect speech or thought (e.g., *the girl thought to herself*)
- Adjectives e.g., *lazy*, *hungry*, *bored*
- Adverbs describing manner e.g., *slowly*, *cunningly*, *carefully*
- Intensifiers e.g., *very*, *really*, *so*; or de-intensifiers e.g., *quite*, *nearly*, *almost*

Finally, the ***story comprehension and inferencing questions*** were allocated a maximum of two points per question depending on whether responses were partially or fully correct. The questions tested whether the children had understood the content of the story, as well as the intentions of the story characters (maximum 4 points; see Appendix A for example correct responses).

2.3.1.2. Reliability of the narrative production test. As there is no previously published reliability data for the Narrative Production Test used for English, intra-rater reliability of the test was assessed by two independent coders. All narratives were scored by both coders for structure and content, and relevance of answers to the probe questions. High inter-rater reliability was found for each score on each sub- scale of the test (Content: $r\,(128) = 0.98$, $p < 0.001$; Structure: $r\,(128) = 0.95$, $p < 0.001$; Questions: $r\,(128) = 0.92$, $p < 0.001$). The second experimenter also scored 110 randomly selected narratives (86%) for grammatical markers and narrative devices, and inter-rater reliability was also excellent ($r\,(110) = 0.96$, $p < 0.001$). Thirteen of the

Table 5
Mean and standard deviations of deaf and hearing children's narrative skills with t values for group comparisons.

	Max. score on subtest	Deaf ($N = 59$)	Hearing ($N = 67$)	*t*	*p*	Effect size (d)
		Mean score (*SD*)				
Narrative content	16	9.98 (3.6)	10.28 (3.6)	0.22	0.64	0.08
Narrative structure	12	8.73 (2.21)	8.94 (2.21)	0.29	0.59	0.10
Grammatical markers and narrative devices	29	15.42 (5.89)	20.13 (2.99)	−5.76	<0.001	1.01
Referential cohesion	4	2.19 (1.36)	3.19 (1.02)	−4.75	<0.001	0.83
Conjunction score (cohesion)	6	2.95 (1.12)	3.61 (0.92)	−3.64	<0.001	0.64
Grammatical morphemes	15	7.72 (0.46)	10.6 (0.12)	−4.48	<0.001	8.57
Narrative and evaluative devices	4	2.66 (1.33)	2.75 (1.51)	−0.33	0.74	0.06
Inference questions	4	1.75 (1.01)	2.55 (1.15)	17.36	<0.001	0.74

narratives (10%) were randomly selected and scored a second time by the same coder. An overall total score was calculated and a strong correlation between scores at both time points was found ($r(13) = 0.98$, $p < 0.001$).

2.3.2. Vocabulary
The expressive one word picture vocabulary test (EOWPVT; Brownell, 2000) was used to assess single word vocabulary production. The EOWPVT was standardised on children with normal hearing, but has frequently been used with deaf children as a measure of English vocabulary (Geers, 1997; Kyle & Harris, 2006; Moeller, 2000). The full test was administered as per the instruction manual. The children are presented with single pictures that test knowledge of primarily simple nouns (e.g., *train*, *pineapple*, *kayak*), but also some verbs (e.g., *eating*, *hurdling*), and category labels (e.g., *fruit*, *food*). The EOWPVT was developed in the USA and so a few pictures ($n = 3$) were substituted with alternative pictures to make the test more culturally relevant for children in the UK (e.g., *raccoon* with *badger*).

2.4. Statistical analyses

Independent *t*-tests were used to compare group means on narrative skills using raw scores. Significance criteria were set at $p < 0.05$ and Bonferroni corrections were applied to all multiple comparisons. A series of correlations were carried out to explore the relationship between narrative ability and age, nonverbal ability, and vocabulary. A hierarchical multiple regression was conducted to explore the extent to which vocabulary contributed uniquely to performance on the grammatical markers and narrative devices (micro-level narrative skills). Analyses were performed using SPSS v22.0. Post hoc power analysis (G*Power 3.1 software) showed sufficient power for the total group ($n = 126$, effect size (d) = 0.64, Power = 0.97).

3. Results

3.1. Preliminary analysis

Overall, the hearing group children ($M = 41.91$, $SD = 7.78$) had a significantly higher total Narrative Production Test total score (maximum score = 61) than the deaf group children ($M = 35.88$, $SD = 10.70$; $t(124) = -3.65$, $p < 0.001$, Cohen's $d = 0.64$). The hearing children ($M = 108.86$, $SD = 11.04$) also had significantly higher standardised EOWPVT scores than the deaf children ($M = 91.95$, $SD = 18.87$; $t(124) = -6.08$, $p < 0.001$, Cohen's $d = 1.09$).

To account for the heterogeneity of the deaf children, within group differences on overall scores on the Narrative Production Test were investigated according to type of hearing amplification (CI vs. HA) and level of hearing loss, groups were matched on age and non-verbal ability ($ps > 0.05$). No significant difference in total Narrative Production Test scores were found between deaf children using CIs ($N = 22$; $M = 34.5$, $SD = 10.14$) and those deaf children wearing hearing aids ($N = 37$; $M = 36.70$, $SD = 11.07$; $t(57) = -0.76$ $p = 0.45$, Cohen's $d = 0.21$). There was no relationship between severity of hearing loss in the better ear and total narrative scores (mild-moderate: $N = 10$; $M = 35.1$, SD = 13.52, severe: $N = 25$, $M = 36.48$, $SD = 9.82$ or profound: $N = 22$; $M = 34.72$, SD = 10.49; p all > 0.05).

3.2. Main group comparisons

Table 5 displays means, standard deviations, group comparisons and effect sizes for the children (deaf and hearing) on each of the narrative skills subscales: content, structure, grammatical/narrative devices, and inference questions.

3.2.1. Macro-level narrative skills
Narrative content. For total scores on story content, the *t*-test showed that there was no significant difference between deaf and hearing children, suggesting the level of information recall in the narrated stories was similar in the two groups of children.

Table 6
Partial correlations (controlling for age and non-verbal ability (WASI matrix)) between vocabulary (EOWPVT) and narrative skills.

	1	2	3	4	5
1. EOWPVT	1	0.15	0.26*	0.09	−0.01
2. Narrative content	0.26	1	0.87***	0.15	0.34**
3. Narrative structure	0.31*	0.88***	1	0.22	0.27*
4. Inference questions	0.33*	0.39**	0.38**	1	0.17
5. Grammatical markers and devices	0.64***	0.42***	0.48***	0.40**	1

Note. Correlations for deaf children are below the diagonal and correlations for hearing children are above the diagonal
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Narrative structure. Similarly, there was no significant difference between groups on overall scores for global narrative structure indicating that the deaf and hearing children were similar in their ability to organise story content following key elements (i.e., including detail on the orientation, complicating actions, climax, resolution, evaluation and story structure).

3.2.2. Micro-level narrative skills: grammatical markers and narrative devices

Overall, the deaf group children obtained significantly lower scores for grammatical markers and narrative devices ($p < 0.001$; Table 5).

Cohesion. The deaf children's scores on the referential cohesion scale was significantly poorer then the hearing children ($p < 0.001$; Table 5), suggesting that hearing children made better use of reference (e.g., the use of anaphoric pronouns was less ambiguous). The hearing group also scored significantly higher on the conjunction score ($p < 0.001$), showing that they were more sophisticated in their use of temporal conjunctions and subordinate clauses in order to express semantic relations across their stories.

Grammatical morphemes. The deaf group's score for grammatical morphemes was significantly lower than the hearing group (Table 5). This suggests that deaf children made more omissions and errors with words that carry grammatical information. An example from an 8-year-old deaf child illustrates incorrect regular and/or irregular verb inflections, either omissions (e.g., *he pick_ it up*) or commissions (e.g., *he put<u>ted</u>*); the omission of articles (e.g., *on _ floor*); and the omission of prepositions (e.g., *he putted it _ the sandwich*):

"Then he saw the spider on floor. Then he pick it up. Then he putted it the sandwich."

Narrative and evaluative devices. There was no significant difference between groups for the use of narrative and evaluative devices (Table 5), suggesting that the deaf and hearing children were equally able to use evaluative language such as adjectives (e.g., *the spider was <u>horrible</u>*) or spoken information about the dialogue (e.g., *the boy said, "give me the sandwich"*).

3.2.3. Comprehension and inference questions

Finally, the hearing group's mean score on the story comprehension and inference questions was significantly higher than the deaf group children ($p < 0.001$; Table 5) and the effect size was large (Cohen's $d = 0.74$). This suggests that on average the hearing children demonstrated greater understanding of the underlying messages and provided more detailed explanations based on inferencing of the reasons for the characters' actions.

Appendix B shows two example narrative transcripts of a deaf and hearing child to further illustrate the group differences found in narrative abilities.

3.3. Predictors of performance

Age and non-verbal ability were first investigated as predictors of performance on the narrative skills. Deaf children's age was found to correlate moderately with scores of story content, $r(57) = 0.47$, $p < 0.001$, and structure, $r(57) = 0.47$, $p < 0.001$, but not for inference questions or grammatical markers and devices. For hearing children, age had a weak-moderate correlation with all of the narrative skills (Content: $r(65) = 0.39$, $p < 0.001$; Structure: $r(65) = 0.38$, $p = 0.002$; Inference questions: $r(65) = 0.30$, $p = 0.01$; Grammar: $r(65) = 0.33$, $p = 0.006$ $ps \leq .05$), and non-verbal ability (WASI matrix) correlated weakly with grammatical markers and narrative devices, $r(65) = 0.34$, $p = 0.004$.

Table 6 shows partial correlations (controlling for age and non-verbal ability) between vocabulary (EWOPVT) and narrative skills for both groups. The vocabulary measure (EOWPVT) correlated strongly with deaf children's use of grammatical markers and narrative devices scores ($p < 0.001$) and there were weaker correlations with scores on inference questions and narrative structure ($p < 0.05$). The scatterplot in Fig. 1 illustrates the strong positive correlation between the residual scores of grammatical markers and vocabulary for deaf children. Vocabulary (EOWPVT) correlated weakly with narrative structure ($p < 0.05$), but did not correlate with any of the other hearing children's narrative skills (all $ps > 0.05$).

The relationship between each subscale of the Narrative Production Test showed a moderate to strong correlation between each section for deaf children. For the hearing children, mean scores on narrative content and structure strongly correlated, but the correlations with grammatical markers, while significant, were weaker (Table 6). There were no correlations between inference questions and other narrative subscales for hearing children.

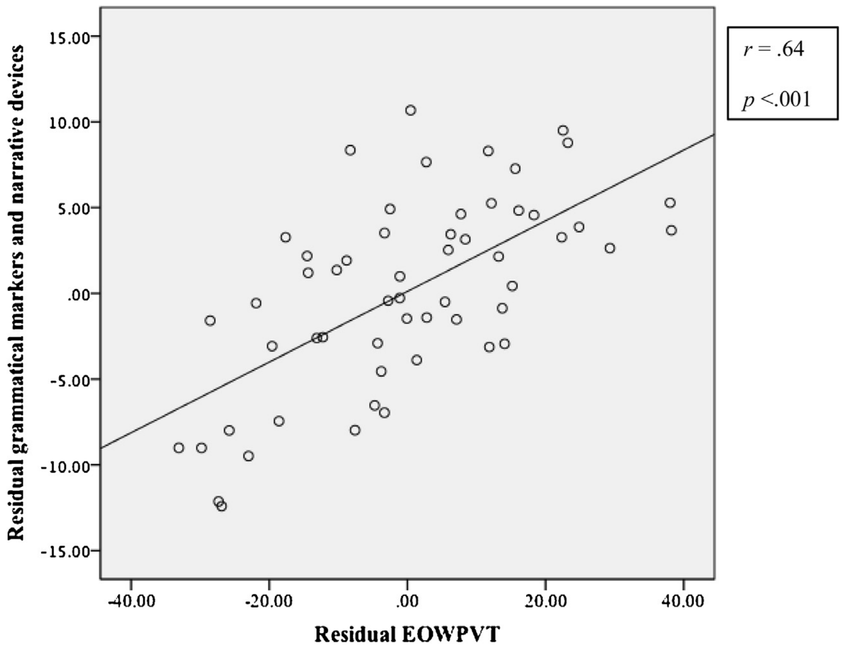

Fig. 1. Scatter plot showing partial correlation between deaf children's receptive vocabulary (EOWPVT) and grammatical marker subscale score (controlled for non-verbal ability (WASI matrix) and age, so both variables are expressed as residuals).

Table 7
Summary of Stepwise Hierarchical Regression Analysis for variables predicting scores on the grammatical markers and narrative devices subset (final model).

Variable	*B*	*SE B*	*β*	*t*	ΔR^2
Step 1					0.10**
Age (months)	0.06	0.02	0.23	3.29**	
WASI	0.04	0.04	0.08	1.08	
Step 2					0.40***
EOWPVT	0.14	0.02	0.48	5.72***	
Step 3					0.43***
Group	−2.12	0.80	−0.21	−2.64**	

** $p < 0.01$.
*** $p < 0.001$.

As performance on the grammatical markers and devices narrative subscale was weaker for deaf children we wanted to explore the contribution of vocabulary as a measure of language ability to children's performance on this subscale, over and above age, nonverbal ability and a diagnosis of deafness. A hierarchical multiple regression was carried out across all participants (Table 7). In the first stage of the analysis, non-verbal ability (WASI matrix) and age were entered as independent control variables (IV) at step 1. The resulting multiple regression equation was statistically significant, F (2, 123) = 7.91, p =0.001, adj. R^2 = 0.10.

At step 2, with the entry of EOWPVT scores into the equation, there was a statistically significant increment in the prediction of variability in the children's grammatical markers and narrative devices score, F (change) = 60.73, p <0.001. The overall model remained significant, F (3116) = 26.90, p <0.001, R^2 =0.40, accounting for an additional 30% of variance. At step 3, a dichotomous IV: deafness (1, deaf; 0, hearing) was additionally entered as a dummy variable. The model remained significant, (F (4, 115), = 22.96, p < 0.001) and group accounted for only a further 3% of the variance (R^2 =0.43). The final beta weights indicated that EOWPVT scores, age, and deafness all significantly independently contributed to predicting performance on grammatical markers and narrative devices. Therefore, children's vocabulary skills (EOWPVT scores) contributed significantly to predicting variability in performance on grammatical markers subscale even after controlling for age and diagnosis of deafness.

4. Discussion

As deaf children are starting to communicate exclusively in spoken language, the main aim of the current study was to compare deaf and hearing children's narrative ability in spoken English at both macro and micro levels. Narrative is an important skill for children to master for several social-emotional and educational functions. A different method of elicitation was employed from the conventional picture prompt and verbal story retell, by showing all children a non-verbal story in video format, in order to reduce the demands on deaf children's auditory memory. As predicted, there were no differences at the macro level of narrative (content and structure) between deaf and hearing children. Additionally, both groups of children displayed the same pattern of improved performance for content and structure with age. However, there were clear differences in micro-level skills; in particular, the deaf children's performance was significantly poorer in terms of grammatical morphemes and narrative cohesion. These micro-level findings are consistent with previous studies, but our other results contrast with other findings that show that deaf children also lag behind typically developing peers on global narrative skills (Boons et al., 2013a; Crosson & Geers, 2001; Worsfold et al., 2010). There was also a key difference in narrative understanding and inferencing as measured by the probe questions, suggesting that linguistic development is important for deeper understanding of narratives.

Equivalent performance between oral deaf and hearing children in narrative structure and content indicates that if the task is designed so that assessing story retell ability is not dependent on receptive language skills, deaf children are able to tell a coherent story at the global level. The dissociation between deaf children's narrative macro- and micro- structure in the present study suggests that the latter is more dependent on purely linguistic and pragmatic skills. In support of this suggestion, micro-level narrative skills correlated strongly with deaf children's vocabulary, whereas in terms of macro-level narrative skills, there was only a weak correlation between vocabulary and narrative structure for both groups. While micro-level narrative skills depend on an elaborate vocabulary and syntactic cohesion to clearly mark the temporal and casual nature of events (Curenton & Justice, 2004), macro-skills may depend less on linguistic skill and more on general cognitive mechanisms.

The videotaping of all children in the present study enabled the coding of gesture to capture some additional content in children's narratives that would otherwise be overlooked. While the children predominantly used co-speech gestures in their story telling, both deaf and hearing children used a number of representational gestures in their narratives to convey particular sequences of events (e.g., gesturing holding a sandwich up to the mouth to represent the episode where the girl pretends to eat a sandwich). Even deaf children with very limited language, reliant on an invented gesture system, have previously been found to recount stories of the same type and structure as hearing children when non-linguistic gestures have been coded (Van Deusen-Phillips et al., 2001). The findings of the present study support the argument that despite language delays in vocabulary and micro-level devices, deaf children experience social interactions, which can trigger an interest in recounting and linking past events. It is possible that the story telling function is robust in spite of reduced linguistic capabilities (Morford & Goldin-Meadow, 1997; Van Deusen-Phillips et al., 2001). Strengthening this possibility, deaf and hearing children showed comparative performance for narrative and evaluative devices including the use of direct or indirect speech, intensifiers, adjectives and adverbs of manner. This suggests that deaf children are aware of the importance of these elements in story telling.

Consistent with previous studies, the deaf and hearing children's performance was markedly different for micro-level skills that are dependent on more efficient linguistic and pragmatic abilities (Boons et al., 2013a; Crosson & Geers, 2001; Guo et al., 2013; Worsfold et al., 2010). The use of grammatical morphemes was notably different between the two groups of children. Deaf children were more likely to over-generalise regular verb rules (e.g., the boy putted), and make errors in the omission of articles, prepositions and verb inflections. This finding is expected because previous studies have found that even a moderate hearing impairment can impact a deaf child's ability to perceive these difficult to segment morphemes, which leads to less well instantiated representations (McGuckian & Henry, 2007; Moeller et al., 2010). The deaf children also used fewer conjunctions and subordinate clauses, which are important for linking semantic representations across a narrative (temporally and causally) to form a well-structured, cohesive story (Crosson & Geers, 2001). The deaf group also had a greater tendency to introduce characters with ambiguous references. For example, using a definite article (*the*), rather than indefinite article, (*a*) plus noun (*boy*). In addition, they were also more likely to refer to both characters (i.e., the girl and the boy) as "he" throughout the story, creating confusion. These referencing errors and lack of syntactic cohesion suggest some deaf children are unfamiliar with discourse and pragmatic conventions presumably linked to reduced exposure to direct and indirect narrative language, and/or lack the pragmatic skill that requires an awareness of the needs and perspective of the listener (Bruner, 1986; Morgan et al., 2014). Therefore, despite being able to convey the rudimentary elements of the content and structure of a story, these findings suggest that a disruption to language acquisition has a detrimental effect on narrative skills in oral deaf children.

Linked to social-cognitive influences on narrative, the deaf group provided less relevant and/or detailed answers than the controls to probe questions that focused on understanding a characters' intentions or feelings. While deaf children are able to use emotion and mental state terms in their narratives (e.g. *the boy was angry*), our results point to a difficulty in determining the psychological causes of these mental states. Studies investigating narrative skills in children with autism (Tager-Flusberg & Sullivan, 1995) and SLI (Norbury et al., 2014) have also found this distinction between emotion and mental states. The deaf children's poorer performance in answering the probe questions in the present study was expected given that deaf children generally show difficulty with theory of mind (false-belief) tasks (Peterson & Slaughter, 2006). Language ability is strongly related to theory of mind understanding in typically developing (Milligan et al., 2007) and deaf children (Schick et al., 2007). For the deaf group in the current study, grammatical markers showed a moderate positive correlation with the probe questions, suggesting that a threshold of linguistic skills are necessary to make causal links about others' mental states and actions. The relationship between vocabulary and probe questions, while significant, was weaker. The precise role of language ability remains uncertain, but it is thought that reduced exposure to conversational interactions caused by deaf children missing out on the conversations that surround them in hearing families and educational environments is likely to impact the ability to give emotional explanations and engage in causal discourse (Morgan, Hjelmqist, & Meristo, in press; Rieffe, Terwogt & Cowan, 2005).

It is important to highlight that a number of previous studies have shown that groups of deaf children implanted with a CI at a very early age (Boons et al., 2013a) and those with an early diagnosis of deafness (Worsfold et al., 2010) perform at the same level as their hearing peers in micro- as well as macro- narrative skills. However, Boons et al. (2013a) acknowledged the variability in spoken language skills within the early implanted children. In the present study, there was no difference between deaf children with conventional hearing aids and those with CIs in narrative performance; neither was there a difference based on level of hearing loss. However, among the group of CI users in the current study there was large variation in the age at implantation and length of exposure to auditory input, which might explain the lack of consistent findings.

In conclusion, the deaf children in the present study were able to construct a narrative at the macro level, but showed a weakness with micro-structural devices that are more dependent on finer linguistic and pragmatic skills. More research is needed to explore the factors that drive the development and possible dissociation of macro- and micro- narrative skills in deaf children. The narrative task and subsequent coding presented in this study also has the potential to be used with other groups of children and to therefore have a broader impact across the field. The study of deaf children compared with other groups with atypical narrative skills will be informative in delineating the particular influences of sensory and neuro-cognitive impairment on this crucial aspect of language development.

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Appendix A. Example responses to the probe questions

- ***Why did the boy throw the spider?*** *1 point for each relevant answer (maximum 2)*

- Because he was angry/annoyed
- He wanted to get revenge/his own back
- He didn't like spiders
- The spider was in his mouth/he found a spider in his mouth
- The girl put the spider in the sandwich
- The girl laughed/was naughty/teasing him
- He was messing/playing about

- *Examples of inappropriate responses*

- He was scared of spiders
- The boy was hungry/sad/frightened
- It was dangerous

- *Why did the girl tease the boy?*

- He kept taking all of her food
- She was fed-up
- She wanted to surprise him
- The boy should get food himself
- The boy was greedy/selfish/lazy
- Every time the girl went to get something the boy would demand for it

- *Examples of inappropriate responses*

- She was hungry/happy
- Because he doesn't know
- She laughed at the boy
- The boy ate the spider

Appendix B. Examples of a deaf and hearing child's narrated story

Appendix B provides an example narrative of a 10-year-old male deaf child and hearing child, matched on gender, age and non-verbal ability. The hearing child (Appendix B.2) refers to more episodes of the story's content, but the deaf child (Appendix B.1) does refer to the majority of these episodes in the correct sequence. The deaf child repeatedly uses a gesture to represent the boy demanding the girl's food/drink by putting out his hand (flat hand shape palm facing upwards). Although some knowledge of narrative devices is shown in the deaf child's narrative (e.g., reported speech: "*he said fine there you are*"; and the use of an intensifier *"he really really want the chocolate sweet"*), there are consistent errors in verb inflections (e.g., *"he look at something"*), a lack of referential cohesion, and fewer conjunctions and subordinate clauses are used. In contrast, the hearing child's more sophisticated use of syntax enables him to make causal links to convey the girl's secretive behaviour (e.g., *"she acted as if she was going to get something else."*) Finally, the hearing child gives more detailed and developed responses to the probe questions. For example, while the deaf child is able to offer an explanation for the boy throwing the spider *("he don't like spider"),* the hearing child is able to give a causal explanation for the boy's actions based on his mental state (e.g., "*he threw the spider because he was angry. . .to get back at her*").

B.1. Deaf male aged 10 years and 3 months. Implanted with a CI at 36 months. WASI score = 52; EOWPVT = 67

Narrative Production Test score = 29/61; Content = 11/16; Structure = 9/12; Grammar = 7/23; Questions = 2/4

The girl walk in with the tray and got orange juice cake sweet and sandwich
he pick up the sweet and go sit down open the sweet
and the boy said that [gesture: puts his hand out]
that mean he really really want the chocolate sweet
and he said fine there you are
And when he get another one I think cake
And when he sit down he take the wrap the- that
He go to eat it
He is like like [gesture: puts out his hand]
may I have the cake like that [gesture: puts out his hand].
and the girl she say ok there you are
And the girl get up and get orange juice brought in the middle
and he got down
he go to drink it
and he said girl no no
and he said ok fine there you are
And next time he look at something
He look on the floor
he found a spider
he looked down
the boy thought I go and get nothing something
And he go there walking for there get something
and when he go down knee down go under get the spider
look down oh there is a spider
Get the spider and go to the trolley, put sandwich on it
The boy said look there you are
look give me a sandwich give a sandwich
and the girl said, ok there you are
And when he bite it
and the boy scream a spider!
And he screamed everywhere trying to get the girl.
Question 1 (*Why did the boy throw the spider?*)
Oh because he don't like spider
Question 2 (*Why did the girl tease the boy?*)
Because when he get some food
the boy give that give me that
and he said oh I know get the spider

*B.2. Hearing male aged 10 years 4 months. WASI score **= 54; EOWPVT = 104***

Narrative Production Test score = 52/61; Content = 15/16; Structure = 11/12; Grammar = 22/29; Questions = 4/4

There was a boy sitting down on the couch watching TV

then a girl comes in with loads of stuff on the plate
It had a sandwich on it
it had OJ
and it had a bun on it
First she picks up a sweet
and she goes to sit down with the sweet
and he reaches out his hand
then he gives it to him
She rolled her eyes got up and got another one
She got the bun
and then she brought the bun and went to sit down
and then he did it again as he did with the first sweet
and he ate it
Then she got of got a drink the drink of orange
then he did the same thing again
took it off her
and then she sat down watching tv
then a spider came up
then she saw the spider
and she didn't tell him
she acted as if she was going to get something else
she picked up the spider and put it in the sandwich
and she brought the sandwich over like she was going to eat it herself
and the he did the same thing again
and then she said no no
and then she eventually gave it to him
and then he bit into it
and then there was a spider and all the web was coming out
He spat it out
and then he started chasing her around the room.
Question 1: *He threw the spider because he was angry at the girl*
To get back at her
Question 2: *Because he kept on asking her for the food that she went up and got*

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