Using corpus methods to investigate teacher scaffolding in Special Education Needs (SEN) classrooms

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Children with developmental language disorders such as autism spectrum disorders (ASD) have difficulty interacting and expressing themselves coherently and efficiently. The individual's communication skills affect their social and linguistic functioning, which has been positively correlated with academic attainment, psychiatric achievement and overall quality of life (Anderson et al., 2007; Garfin and Lord, 1986; NRC, 2001; Prizant et al., 2003). Hence, research has shown it is important to intervene from an early age in order to help children with communicative disorders develop the skills they need to thrive socially, academically and mentally (NRC, 2001). One primary form of treatment is language interventions, which provide opportunity for both the acquisition of knowledge and the development of communicative skills that allow social and linguistic progression (NRC, 2001). These interventions usually take place in the classroom, given that young children spend the majority of their time in school (Wilson, 2013). In Special Education Needs (SEN) classrooms, language interventions are vital to providing children with language and social skills, and much research has addressed SEN teaching methods. Such research, however, is often limited by its use of small-scale samples of classroom language data, which are then approached via manual analysis. This study addresses that limitation by applying a corpus-based method to the study of one teaching method (scaffolding) in SEN classrooms, thus enabling the exploitation of a larger and therefore more representative sample of language use.

The corpus created for this purpose consists of transcribed interactions between teachers and groups of between 3 and 9 pupils aged 11-16 years in a UK specialist school for children with SEN. All classroom activities recorded surrounded a shared reading or literacy activity led by the teacher. Whilst research on scaffolding and teacher-pupil interactions usually focuses on one-on-one interaction, in this case group interaction was deemed more relevant, because given the children's language difficulties they would often opt not to participate in one-on-one interactions, making such interactions a less productive source of data. Shared reading activities were chosen because they provide an ideal scaffolding environment, one that allows teachers to provide a model whilst simultaneously allowing children to test their own responses and comprehension. Shared reading activities were recorded in two different classrooms in eight separate lessons, amounting to 8 hours and 52,813 words of spoken classroom discourse. A bespoke transcription system was utilised, based upon the schema devised by Gablasova et al. (2015) for the Trinity Learner Corpus. This is a contemporary set of transcription conventions that has been demonstrated as convenient for the construction of spoken learner corpora, providing a model under which both verbal and non-verbal details are transcribed, where meaningful.

Whilst Gablasova et al.'s (2015) model proved extremely useful, some adaptations had to be made to better fit my data. First, both Makaton sign language and the use of speaking communication aids were coded within my modified transcription scheme, as these were heavily used in the SEN classrooms and

represented a successful form of communication, which therefore must be included in transcription of classroom interactions. Second, the process for transcription of questions was reformed to incorporate an initial classification of question types (including non-interrogative clause questions) at the actual point of transcription, as a basis for subsequent analysis (see below). Finally, my modified transcription system encodes overlaps and interruptions, as these were also deemed meaningful in this data set.

The teaching method under analysis is scaffolding, which is among both the most widely used and the most commonly researched teaching methods. Scaffolding is a process involved in learning, in which supports from a more knowledgeable source allow a less knowledgeable participant to develop more complex cognitive skills than those they would be able to attain independently. In its simplest sense, as Reiser (2004:274) notes "the term scaffolding has traditionally been used to refer to the process by which a teacher or more knowledgeable peer assists a learner, altering the learning task so the learner can solve problems or accomplish tasks that would otherwise be out of reach". To analyse scaffolding within the corpus, a necessary step is the definition and development of methods for searching for instances of features of teacher interaction that may indicate the use of scaffolding as a teaching method. Whilst there are multiple scaffolding features, I shall focus solely upon methods for identifying instances of the use of questions in scaffolding here, as this was the most prominent feature in the scaffolding literature (Palinscar and Brown, 1984, 1985; Puntambekar and Kolodner, 2005; Seymour and Helena, 2003; Winn, 1994).

One challenge is that in this literature, the features of scaffolding are often extremely ill-defined from a linguistic perspective. We are often given explanations of the functions of specific scaffolding techniques, but we see little description of their forms, which makes it difficult to search for them within a corpus. Thus, in order to define corpus queries upon which to build a suitable methodology, the first step is to move from these vague descriptions to grammatically sound definitions of linguistic forms. This process was informed by the grammars of Biber et al. (1999) and Huddleston and Pullum (2002). Using these grammars, working definitions for five question types were formulated: wh-questions, alternative questions, yes-no questions, non-interrogative clause questions and question tags. The grammars were also used to provide the linguistics structures of these question types. For example, a wh-question was defined as either:

wh-word + V + S OR wh-word (S) + V

Following the definitions of these structures, the seconds step is to translate these grammatical definitions into corpus queries. In the case of the questions feature, this was done by translating the grammatical forms into a multiword regular expression query appropriate for CWB/CQPweb. For example, the linguistic structure of wh-questions was translated to the following CQP syntax:

[pos=".*Q.*" & pos!="YQUE"] []{0,15} [word!="#" & word!="%"][word="?" %l] within u

These queries were created through a trial and error process, and were successful to varying degrees. Some question types, such as wh-questions or question tags, were very easy to translate, whilst others, such as alternative questions, were considerably more complex and therefore problematic. This exercise underlines the non-straightforward nature of the process of query definition as a part of corpus methodology, and thus also the methodological contribution that this work can potentially make to the field of classroom language.

Finally, I apply the queries outlined to the SEN corpus to look at the use of questions in SEN classroom interactions. This is a two-step analysis: (i) looking at the frequency of different questions types across groups, and then (ii) also looking in more depth at the frequency of different elements within questions, such as types of wh-word. For example, the results on wh-questions include the following:

1. Wh-questions occurred in 32.8% of classroom utterances
2. 47.3% of questions were wh-questions
3. Teachers of lower ability children used wh-questions more than teachers of higher ability pupils
4. 63.4% of wh-questions began with determiners, 22.9% began with general adverbs, 12.6% with pronouns and 1.1% with degree adverbs

We can use these findings to make inferences about teacher-pupil interactions in SEN classrooms. For example, they suggest that lots of discussion revolves around concrete objects (hence the prevalence of determiner-based wh-questions) and that in particular this happens more when teachers address less advanced pupils. Finally, I undertake a comparison of the frequencies for various types of question found within the SEN corpus and those found by Biber et al. (1999) in general spoken English.

In sum, this research involves three key innovations. First, it introduces a novel application of corpus methodology in educational/developmental psycholinguistics. These results provide valuable new approach to analysing how scaffolding operates within the SEN classroom on a scale much greater than that of a handful of individual interactions. Second, it demonstrates how we may search this corpus for the features of teacher-pupil interaction (and specifically features of scaffolding) in an automatic (and therefore more objective/quantifiable) way. Third, the results of these searches allow us to look at the frequencies of different features of scaffolding (and different linguistic constructions of these features) within the data in order to make inferences about how teachers and pupils interact in SEN classrooms.

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