Towards the Automatic Extraction of Corrective Feedback in Child-Adult Dialogue

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Abstract

We present the first steps of a project that aims to investigate the effects of *corrective feedback* on language acquisition. We propose a methodology for the automatic extraction of instances of corrective feedback from child-adult dialogue corpora and discuss our plans for a data-driven investigation of this phenomenon.

1 Corrective Feedback as Negative Input

Children learn language in interaction with proficient speakers around them. This naturally allows them to be exposed to *positive input*, i.e., grammatical utterances in context. It is however a matter of debate whether children receive any form of *negative input*, i.e., corrections or indications that point out the mistakes in their utterances. Researchers such as Brown and Hanlon (1970) have pointed out that caregivers' explicit approval or disapproval of a child utterance is not contingent on its grammaticality, but rather on the appropriateness of its meaning. This has for a long time been taken to show that children do not receive any negative input (see e.g. Chouinard and Clark (2003) for a discussion of these issues).

This judgement, however, can arguably be considered premature since explicit disapprovals are not the only possible means of highlighting grammatical errors. Indeed, Brown and Hanlon (1970) already noted that "[r]epeats of ill-formed utterances usually contained corrections and so could be instructive". In a similar trend, Chouinard and Clark (2003) and Saxton (2010) make a case arguing that corrected repetitions of children's ungrammatical utterances constitute a form of negative input. In addition to pointing towards an error, this strategy also presents the correct form, as shown in the following example from CHILDES (MacWhinney, 2000) by 2-year-old Lara:

(1) CHI: what about kiss ?
DAD: what about a kiss ?

We refer to this kind of child-adult exchanges as *corrective feedback*. As can be seen in (1), they are characterised by a child utterance with some grammatical anomaly followed by an adult response that repeats part of the child's utterance and modifies it, thereby offering a grammatically correct counterpart to the child's error.

Different accounts have been put forward to explain what triggers this kind of adult responses. For instance, Chouinard and Clark (2003) consider that they arise as a side effect of parents checking up on the *meaning* of children's utterances, while Saxton et al. (2005) claim that it is the *form* of the child utterance that is directly at issue. In any case, all approaches agree that such responses create a contrast that may act as a correction.

2 Manual Annotation

In order to study the properties of corrective feedback and the effect it may have on language learning, we are interested in developing data-driven methods that allow us to automatically extract instances of corrective feedback from dialogue transcripts at a large scale. For our long-term investigation, we consider all the CHILDES transcripts from children with no impairments for which there is data for a minimum period of 1 year with at least five dialogues per year. We select only those dialogues with a minimum length of 100 utterances (and at least 50 child utterances) where the child speech has a minimum mean length of utterance (MLU) of 2 words.

From this set, we select 16 files from 4 randomly selected children (4 files per child) for detailed analysis. To arrive at an automatic extraction algorithm, we first apply a very simple heuristics to obtain child-adult utterance pairs that are candidates for corrective feedback: we select all

Linguistic level		Type
Syntax (49.3%):	Subject, Verb, Object, other	Omission (81.3%)
Noun Morphology (3.3%):	Possessive -'s, Regular Plural -'s, Irregular Plural, other	Addition (3.0%)
Verb Morphology (3.7%):	3rd Person singular -s, Regular past -ed, Irregular past, other	Substitution (14.6%)
Unbound Morphology (31.5%):	Determiner, Preposition, Auxiliary verb, Present progressive, other	Other (1.0%)
Other (12.2%):	–	

Table 1: Distribution of errors according to linguistic levels and types, together with their frequency counts in exchanges containing corrective feedback (307 instances in total).

exchanges where there is partial overlap between the child and the adult utterances and where the child's utterance includes at least two word types (a total of 2072). We then manually annotate these instances to filter out false positives. Those exchanges identified as corrective feedback are additionally annotated with information regarding the error being corrected: the linguistic level at which the error occurs (based on Saxton et al. (2005)) and the type of error (based on Sokolov (1993)) – see Table 1. For example, the exchange in (1) would be annotated as *Unbound Morphology: Determiner – Omission*. To compute inter-annotator agreement for the *corrective feedback* identification task, 350 instances from two different files were annotated by two coders, obtaining a Cohen's κ of 0.77.

3 Results and Next Steps

Next we describe the results obtained so far. Of the 2072 pairs of utterances annotated, 14.8% are identified as instances of corrective feedback. Note that this number is not representative of how many *errors* are met with corrections, since the candidate utterance pairs also contain correct child utterances. The frequency distribution of error types amongst the exchanges tagged as corrective feedback is shown in Table 1. As can be seen, most errors are of syntactic nature (49.3%) and concern omissions (81.3% over all linguistic levels). The high number of omission errors is perhaps not surprising in child language, given the comparably low MLU. Corrective feedback decreases over time, as children make less errors – see Figure 1, which also shows that frequency of corrective feedback varies largely between children. This will be useful for the comparative investigation of its effects on language learning.

Our next step is the development of algorithms for the automatic extraction of corrective feedback. We will first extract a set of features representative of the instances annotated as corrective feedback, including level of overlap, syntactic

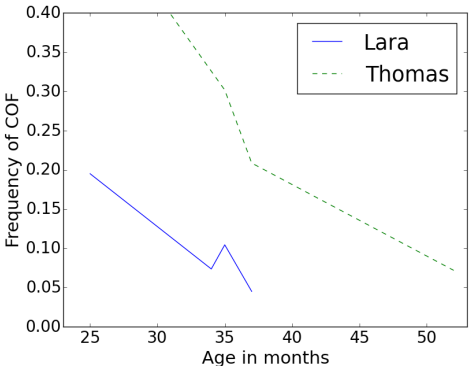

Figure 1: Frequency of corrective feedback against child age for two children. Pearson coefficient for Lara is -0.96, for Thomas -0.95.

dependency information, and semantic distance, and train a supervised machine learning classifier. Once we have a sufficiently reliable extraction method, we will investigate to what extent corrective feedback is helpful in language acquisition. For this we will compare adult constructions which often occur as corrective feedback to those which occur in non-contingent environments.

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