Self- and other-repairs in child–adult interaction at the intersection of pragmatic abilities and language acquisition

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Abstract

Children's language acquisition develops at the crossroads of the appropriation of the linguistic system and its use in dialogue. Analyzing how children and adults cooperate to overcome production or comprehension troubles in repair sequences can help us understand those interesting moments when the interdependence of 'language' and 'speech' in interaction is brought to light. These sequences also reflect the mutual influence of linguistic development and socialization in children's language acquisition through the organization of child–adult interactions as socially constructed practices (Forrester, 2008). Furthermore, if other-repairs in dialogue are efficient and help children acquire the linguistic system, self-repairs illustrate children's language development through conversation. Children's capacity to self-repair rests on their ability to monitor conversation, position themselves in dialogue and handle the linguistic system well enough to alter, adjust or correct the form and/or the content of their productions according to conventions and to their communicative intent. Both other and self-repairs could therefore be analyzed as indicators of the child's cognitive, social-pragmatic and linguistic development.

The notion of 'repair', whether it be self-repair or other-repair, implies some intentionality, a target to reach, either from the point of view of the meaning of the utterance or the point of view of its form. A sequence with a repair is a sequence during which one of the interlocutors is confronted with a comprehension or production problem and tries to remediate that in order for the 'cooperative principle' to hold good (Grice, 1989 quoted by Bernicot and Clark, 2010).

Repair sequences have been mainly studied within two theoretical frameworks: conversation analysis (Schegloff et al., 1977; Forrester, 2008) and pragmatic analyses of child–adult interactions (Chouinard and Clark, 2003; Bernicot et al., 2006). The present study on self and other-repairs is at the crossroads of these two theoretical approaches.

Keywords: Self-repairs; Other-repairs; Adult–child interaction; First language acquisition; French

1. Framework and issues at stake

1.1. Repair sequences in conversation analysis

1.1.1. Repair sequences in adult–adult interaction

In the conversation analysis framework, previous research has mainly focused on very detailed descriptions of the progress of repair sequences and on speakers' strategies to solve comprehension or production problems occurring in the...
course of conversations. As Schegloff et al. (1977) have shown, repair sequences consist of several stages: (1) an utterance containing the source of the problem is produced by one of the co-speakers; (2) the problem can be signaled by the speaker (self-initiation) or the co-speaker (other-initiation) who may therefore initiate the repair; (3) the repair is produced by the speaker (self-repair) or the co-speaker (other-repair); (4) the co-speaker can acknowledge the understanding of the repair and the conversation continues. But as these authors also pointed out, the different possibilities are not equivalent: adult speakers tend to show a preference for self-initiated repairs on the one hand, and self-repaired utterances on the other hand.

1.1.2. Repair sequences in child–adult interactions

However, Schegloff et al. (1977) also underlined that in some cases, other-repairs may be the preferred configuration in repair-sequences. Norrick (1991) has shown that in interactions between native speakers and learners, native speakers may spontaneously repair the learners' utterances. Schegloff et al. (1977) also suggested that in mother–child interactions, other-repairs are predominant. However, in a longitudinal study of the development of his daughter's self-repairs between one and three, Forrester (2008) demonstrated that self-repairs are more numerous than other-repairs from the beginning of the data. Very early on, children therefore seem to construct a social practice shared by their linguistic community: the preference for self-repairs. According to Wootton (1997), repairs reveal the child's capacity to make sure comprehension is shared by both co-speakers, and these local understandings are central to the young child's emerging grasp of the world of everyday life in which her linguistic behavior is situated. Through recognizing their existence, the child's sensitivity to "context" in which she acts undergoes an enormous developmental step" (Wootton, 1997:9).

In his study, Forrester (2008) also showed that the strategies developed by the child to self-repair her utterances evolve in parallel to her cognitive, linguistic and interactional capacities. When she is young, Ella uses sound alteration to repair her utterances. As she grows up, she then introduces grammatical alterations and uses gaze more and more to monitor the adult's attention on her speech productions. In the light of Vygotsky's account of dialogic thinking (1978) and its impact on children's productions, self-repairs could thus be viewed as the indication of an internalization process of linguistic and interactional rules.

1.2. The study of repairs in pragmatic studies on language development

1.2.1. Scaffolding language development

Whereas conversation analysts mostly focus on children's ability to self-repair their verbal productions, language acquisition specialists are interested in the role played by the adults as 'expert' speakers in language development. Therefore, their studies do not concentrate on the progress of repair sequences in the course of adult–child interactions, but on the content of the utterances produced by the adult and the child, especially when the adult takes up and reformulates what the child says and the child subsequently takes up the adult's reformulation. Acquisition specialists have thus mostly been studying other-repairs and elicitions of self-repairs.

Among the studies on children's verbal productions, the question is often whether repair sequences favor long-term language acquisition. The research on French data has focused mostly on children and adults' reformulations as a potential device to acquire language in the context of dialogue (Bernicot et al., 2006; De Weck, 2000). When adults and children take up each other's linguistic productions, it enables children to experience dialogic continuity with simpler speakers, but they speak for them, modeling adequate productions in various situations in a high pitched voice and moving the baby up and down. Later on, the Kaluli caregivers do not simplify their speech, nor use repairs or expansions since they consider the child as needing to be "hardened" and believe that "one cannot guess what another thinks" (Ochs and Schieffelin, 1984:304). These features cannot be considered as having a language-facilitating function. Similar findings have been described for lower-middle class American families (Hart and Risley, 1995). If middle-class Western caregivers are described as trying to fit to their children's needs and adapt their speech by using simplifications or making expansions and repairs of the children's utterances, that "negative evidence" is not always explicit or even intentional on their part. It is therefore important to acknowledge the presence in adult–child conversations of embedded repairs,
reformulations with no explicit correction, which facilitate the flow of conversation (Forrester, 2008) and at the same time provide children with target forms (Demetras et al., 1986; Hirsh-Pasek et al., 1984).

It is also difficult to show short-term effects since children tend to use and rely on fixed forms and do not manifest a lot of flexibility in their manipulations of language. However, Chouinard and Clark (2003) suggest that the “comparison of their own utterance with the immediately following adult version allows children to pinpoint the locus of the error and identify the conventional form that they should have used for that meaning” (2003:643). These corrections done through juxtaposition in the course of conversations enable children to contrast their own productions and those of the adults. When children are capable of remarking the discrepancy between the two, they can memorize the correct forms and use them later. This dialogical process therefore implies that at the beginning, children incorporate what adults say, which requires social and linguistic skills. They need to acknowledge the other-repair and take it into account as negative evidence to learn the adequate formulation for their own meaning. They can then produce self-repairs and directly monitor their own productions.

1.2.2. Triggering self-repairs

When they are very young, children often miss the formal target, either on the phonological, the morpho-syntactic or the semantic level. Since they may not always be aware of comprehension problems that can occur, adults have to check on the meanings children intend to convey during conversation by making requests for clarification (Clark and Chouinard, 2000; Morgenstern and Sekali, 1999). Children are then given the opportunity of repairing their own utterances, in order to facilitate the adult’s comprehension. Once adults have understood the child’s intended meaning, they can improve the repair by offering the child a potential model in the following turn, either to check that they have seized the child’s intention or as part of a scaffolding process (Bruner, 1983). Finally, adults may expect children to ratify the meaning they have understood in order to resume conversation. This requires a certain form of intersubjectivity or ‘theory of mind’: children have to understand and take into account the fact that their interlocutor may not have understood them, and that they need to alter their own production in order to enable comprehension (Morgenstern and Sekali, 1999; Clark, 2003; Clark and Bernicot, 2008). According to Clark and Chouinard (2000), children implicitly accept adults’ reformulations by continuing the exchange. They don’t repeat the repairs in the immediate context. However, according to the same authors, children expect adults to correct them: they listen to their reformulations and then use them in later utterances. Little by little, children are able to manage these sequences all by themselves, as they become more and more aware of what might cause comprehension difficulties for their interlocutor in their productions (Forrester, 2008).

In order to find out if repairs are frequent enough to be efficient, if they change according to children’s linguistic development, and if children actually make use of other-repairs to learn linguistic and social rules, and produce self-repairs, longitudinal data is needed and must be analyzed in detail.

1.3. The focus of this study

In this study, we analyze both other- and self-repairs, and therefore complement the results of studies conducted by conversation analysts and by specialists of the role of adult–child interactions on language development, who have mostly analyzed other-repairs. Our position is that repairs may not be sufficient, but they represent ideal interactional sequences for the acquisition of language to take place.

Adults’ repairs are part of the scaffolding process, which enables children to learn the linguistic system in dialogue. The fact that children acknowledge repairs, that they repeat them and sometimes reject them (Clark and Chouinard, 2000) favors the hypothesis that these sequences do have an impact on children’s appropriation of the target linguistic system. Children seem to take in the “corrected” forms and attend to contrasts between their own productions and the adults’ even when they don’t make direct, local use of them (Clark, 1993; Chouinard and Clark, 2003).

In addition, children’s self-repairs participate in their appropriation of their language and signal when and how children are capable of internalizing linguistic rules and of using them to produce conventional utterances in their target language (Leroy et al., 2010).

Furthermore, the repairs made by the caregivers enable us to have an understanding of their representations of their child’s linguistic, cognitive and socio-pragmatic skills. Similarly, our hypothesis is that self-repairs are particularly relevant phenomena to find out what linguistic levels are taken into account by the child in her appropriation of language and according to her age. We assume that certain linguistic levels are more or less easy to handle according to the child’s cognitive and linguistic development. Repairs might give us access to what the child appropriates and to the adults’ representation of her linguistic skills.

Finally, the study of the development of self- and other-repairs in adult–child interactions gives us crucial insights into the acquisition process of socio-interactional rules at work within a community of speakers in which the child is growing up. We view self-repairs as a signal that shows that the child has incorporated the repair process initiated by her adult interlocutors.

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Our approach is therefore at the crossroads of the studies in conversation analysis on repairs and of the research in language acquisition on reformulations. On the one hand, we focus on a similar process as the language acquisition specialists and we study repairs that provide or elicit a more conventional target but adding specific analyses of the linguistic levels they involve; on the other hand, we take into account both other- and self-repairs and we try to identify the developmental process in the elaboration of a preference for self-repairs in adult–child longitudinal interactive data.

Self-and other-repairs will be analyzed in the longitudinal corpus of three French children aged 1;06 to 2;11. After introducing the data and our coding system, we analyze in detail the development of self- and other-repairs in the three longitudinal follow-ups. We distinguish different linguistic levels – phonological, morphological, lexical and pragmatic - and analyze the repairs in the three data sets according to those four categories. We then concentrate on the role of the mother in these repair sequences focusing on one of the data sets, and we show how her productions guide her child towards self-repairs and the internalization of social and linguistic skills. The overall aim of this research is to highlight how discrepancies between their own productions and the adults’ which is used as ‘negative evidence’ may help children discover grammar in the dynamic course of dialogue (Forrester and Cherington, 2009).

2. Data and methodology

2.1. Three longitudinal case studies

For this research, we used data collected by the CoLaJe project financed by the French National Agency for Research. The three monolingual French children we selected were recorded for one hour every month at home with their family. The mother was always present and was the main interlocutor. The data was transcribed in CHAT format with the CLAN software (Paris corpus, Morgenstern and Parisse, 2007, http://childes.psy.cmu.edu/2). Some information on the three children’s linguistic developmental profile is given by the development of their Mean Length of Utterance (MLU) by age, as shown in Graph 1.

Madeleine’s MLU is always higher than the MLUs of the other children, even at 2;6 when she was a bit tired and sick. The development of the total number of words and number of different words produced during the recordings by the three children are quite similar as well: Madeleine is more talkative, and her lexicon is richer (Morgenstern, 2009).

2.2. Coding

This study focuses on the children’s ‘non conventional’ utterances that are the starting point of a corrective direct or embedded self- or other-repair sequence (whatever the source of their variation might be: phonological, morphological, lexical or pragmatic). We coded all self- and other-repairs on the three children’s productions in six recordings (six hours of video): at 1;06, 1;09, 2;01, 2;04, 2;07 and 2;11.

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1 The CoLaJe project http://colaje.risc.cnrs.fr/ is directed by Aliyah Morgenstern. The other authors are all members of the research team. Anaé and Théophile were filmed by Aliyah Morgenstern. Madeleine was filmed by Martine Sekali (Université Paris Ouest Nanterre). The transcriptions were supervised by Aliyah Morgenstern and Christophe Parisse (MoDyCo, Université Paris Ouest Nanterre).

2 For information on how to use CHILDES and CLAN see MacWhinney (2000); for our transcription choices, see Morgenstern and Parisse (2007).
When the children produce a non-conventional or nonstandard utterance, there are several possible alternatives to be found in the data:

- The mother might signal the problem. In this case she can (a) either encourage the child to correct herself, (b) reformulate her utterance implicitly (she takes up the child's production and embeds the conventional form in her own utterance), or (c) she explicitly makes a corrective repair. The child can then take the repair into account by repeating it, or implicitly accept it and continue the exchange (Clark and Chouinard, 2000).
- The adult does not make any comment and either (a) the conversation goes on, or (b) the child makes a self-repair which signals her internalization and her awareness of linguistic and social norms.

We therefore distinguish other-repairs made by the adult, which take up the semantic content of the nonstandard utterances produced by the child in order to give them a grammatical and conventional form (Clark and Chouinard, 2000) and self-repairs made by the child herself.

Other-repairs formulated by the mother can be explicit or implicit. In the first case, the adult corrects the child's utterance and gives explicit explanations such as "no it is not X, it's Y", or "no, you don't say X, you say Y". In the second case, the correction is implicitly included in the adult's utterance and she simply reformulates the child's production with a more conventional form. We therefore coded whether other-repairs were "direct" and clarified or "embedded".

Whether they are explicit or implicit, other-repairs can be taken up by the child. We added a code for "uptake" or "no uptake" for each other-repair sequence.

Self-repairs can be spontaneous – the child corrects her nonstandard productions of her own initiative – or elicited by the adult who signals a problem in the child's production without formulating the "correct" form herself. We included in the elicited self-repair category the adult's requests for clarification ("quoi?"/"what?"; "hein?"/"what do you mean?"; "comment?"/"what?"). Contrarily to Clark and Chouinard (2000), they excluded all utterances to which the adults respond by expressing their incomprehension with "what?", since according to them those utterances simply signal their lack of attention. In the case of Madeleine and her mother, all instances of "quoi?" or "comment?" (what?) were instances of the mother's incomprehension or elicitation of a repair.

The various reformulations were also coded according to the linguistic level targeted by the corrections: phonological, morphological, lexico-semantic or pragmatic. We give examples along with our analyses.

Only the mother and child's utterances were coded for each session. We therefore did not include in this study the productions of the other speakers who sometimes intervened.

The eight sessions were entirely coded by the three authors together. Each complex case was discussed at length and an agreement was found for every single occurrence. A coding guide was established on the basis of those discussions in order to conduct further studies on other children in the future.

3. Global development of repairs and linguistic levels involved

In this section, we first present the overall distribution of self- and other-repairs in the data. We then present our quantitative and qualitative analyses of the development of the linguistic levels involved in these repair sequences.

3.1. Overall distribution of repairs

In order to understand the development of repairs in the children and their mothers' interactions, we counted the number of self- and other-repairs separately between the ages of 1;06 and 2;11. Graph 2 illustrates the development of the proportions of each type of repair (out of the total number of utterances) in each recording.

The percentages of self- and other-repairs are especially high at 1;09 for Anaé and Madeleine (a total of about 30% of Madeleine's utterances are repaired either by her mother or by herself) and they then decrease (about 8.5% at 2;11). Self-repairs in particular appear suddenly and in high proportions at 1;09 (10.5%). At that time, Madeleine and Anaé are reaching an important stage in their linguistic development: their lexicon is becoming much richer, they start using longer utterances (their MLU is around 2) and more grammatical markers. As their verbal productions demonstrate the development of their linguistic skills, their mothers also start being more demanding and intervene quite a lot to help them reformulate and clarify their utterances, especially since their phonology is still quite unstable. Théophile's linguistic development is slower. He only starts making self-repairs at 2;01 and the number of other-repairs only decreases significantly when he is 2;11.

For Anaé and Théophile throughout the data, and for Madeleine up to age 1;09, the data are consistent with findings by Norrick (1991) and Schegloff et al. (1977) according to which other-repairs are more numerous in adult–child interactions than in adult–adult interactions. In fact, children and adults are in asymmetrical positions, and adults act as experts who have to transmit their language to their children, just as in conversations with non-native speakers (Norrick, 1991; Wong, 2000). However, after 1;09 for Madeleine, that tendency is reversed: self-repairs become more numerous than other-repairs.
Madeleine has the cognitive and linguistic means to repair her verbal productions by herself, just like adults do, as observed by Forrester (2008) in Elia's longitudinal data. Other-repairs as well as self-repairs progressively decrease, as during this age-range, the child's utterances become clearer, more precise, in meaning and form. 

Madeleine's data enable us to corroborate that by a very early age, 2;04, but with quite a high MLU (close to 4), the nature of repairs in adult–child interaction could be in the data of precocious children very similar to what has been observed in adult–adult interaction. We need to study repairs in Anaé and Théophile's data between the ages of 3;0 and 4;0 in order to find out whether they eventually follow the same tendency since at the end of our data (2;11), their MLU is barely of 3.

3.2. Repairs according to linguistic levels: a progressive transition

Repairs do not all involve the same linguistic level. As illustrated in Graph 3, in the interactions between the children and their mothers, repairs are essentially phonological and morphological at first. The following graph presents the percentages of the different types of repairs (SR refers to self-repairs, OR refers to other-repairs) in the three dyads according to the children's MLU in order to take the differences in the children's developmental rhythms into account.

In the rest of this study, we will focus on Madeleine whose linguistic development enables us to study a more extended repair process.
As shown in Graph 4, at 1:09, 62 occurrences (50% of repairs) are phonological and 34 occurrences (35% of repairs) morphological. Then both phonological and morphological repairs diminish progressively and lexical repairs become more and more important (at 2:11, there are 20 occurrences which represent 65% of all repairs). Repairs at the pragmatic level only appear at 2:04 and represent a maximum of 8% of the total number of repairs.

Examples 1–4 illustrate this progression of the linguistic levels involved in repair sequences in Madeleine and her mother's interactions, from the phonological level, to the morphological and lexical levels. The pragmatic level (repairs due to social conventions such as politeness) is not prevalent when Madeleine is between two and three years old.

**Example 1 – Madeleine 1;09: repair at the phonological level**

CHI: e nen: t (filler) glasses
MOT: des lunettes où ça? Glasses, where?
CHI: e nyn: t e la (filler) glasses are here

In Example 1, Madeleine and her mother are looking at the computer screen and Madeleine shows a picture of a pair of glasses and designates them but with a phonological change in her attempt at producing the word ‘lunette’ (glasses). The mother's repair is indirect but her uptake of the word « lunettes » has some influence on Madeleine who repairs her [nen: t] into [nyn: t] even if the adult target is not quite achieved yet. In agreement with Tarplee's study (1996), Madeleine seems to be sensitive to her mother's uptakes and often embeds the adult phonological model in her responses.

**Example 2 – Madeleine 1;09: repair at the lexical level**

CHI: un aut(re), un balai another, a broom
MOT: ça c'est une pelle that's a spade
CHI: pelle spade

The repair in Example 2 was coded as an indirect repair: the mother does not explicitly formulate the fact that she is correcting the child's use of “balai” instead of “pelle” but does insist by pointing on the picture and using the demonstrative “ça” that she is labeling the same referent with a different name. The repair is perfectly integrated by the child who takes up the exact term her mother has offered. This repetition of a word introduced by the mother is a prototypical example of the uptake of a new term during a picture naming activity (Clark, 2006).

**Example 3 – Madeleine 2;04: repair at the morphological level**

CHI: elle s'endorma she fall asleep (mistake in the morphology of the 3rd person)
MOT: elle s'endormit? she fell asleep?
CHI: s'endormit fell asleep (adds a consonant)

In Example 3, the indirect repair is offered by the mother in the form of a question in order to solicit the child's agreement. It is accepted and taken up by Madeleine who over-repairs her own utterance. This repair at the morphological level is in line with the mother's general tendency to repair her child's formal 'errors'. However, the mother's reaction to her child's verbal production in which she is narrating a story from a book, is also produced to keep Madeleine engaged in the narrative. The mother stimulates her daughter to stay engaged in social interaction and to acquire the formal system all at once.
4. Focus on the mother's role

Section 2 offered some insights about the development of self- and other-repairs in the three children's interactions. We then focused on Madeleine, whose precocious linguistic development enabled us to study how the type of repair seems to change according to her MLU. In Section 3, we observed how self-repairs progressively take over other-repairs, and how these repairs are made at different linguistic levels according to Madeleine's age and MLU. The expression 'corrective repair' seems particularly relevant in the dyad formed by Madeleine and her mother. It implies that the utterances are rendered 'straighter, clearer, more correct, more adequate' according to the linguistic and social rules of the family. Madeleine's mother could be compared to the Samoan mothers described by Ochs (1984) in comparison to middle class American mothers, leading the child to a position symmetrical with the adult's. The point of reference for the Samoan as well as for Madeleine's mother is the adult, whereas in other children's family in the 

4.1. Direct other-repairs

We focus here on the other-repairs, which create side sequences (Jefferson, 1972) in the flow of the conversation: direct other-repairs. This type of repair often occurs when the mother corrects items or structures that Madeleine has not yet fully mastered. For instance, the mother sometimes elicits the use of specific items that may or may not already be part of the child's lexicon. If the child does not produce the expected target, the mother then helps her by offering a repair. Different types of direct repairs can be observed. Example 5 illustrates a somewhat modulated direct repair.

Example 5 – Madeleine 1;09: Madeleine and her mother are looking at a picture book.

*MOT: oh et là qu’est-ce qu’ils font ces enfants là? oh, and what are these children taking?
%point: show

*CHI: une douche. a shower

*MOT: un bain plutôt. a bath, rather.

In Example 5, a repair is proposed within the same semantic domain to describe the action on the picture. The use of "plutôt" (rather) enables the mother to repair the child's utterance in a less straightforward manner: Madeleine was not completely wrong, but not precise enough. This strategy may help the child enlarge her lexicon and its use. However, the mother does not make a pervasive correction of the child's production. In a conversation with an older child, the expected answer could have been "ils prennent un bain" (they're taking a bath). The mother does not introduce a predicate: her daughter has answered with a noun, which she could consider as an incomplete reply on the syntactic level. The mother grounds her repair on the child's production to scaffold her lexical acquisition without asking her to reformulate her utterance on the syntactic level all at once. She therefore adjusts to what she expects the little girl can do at that stage of her development. Example 6 is also typical of mothers' strategies for eliciting lexical items from their child. This example illustrates a non-modulated direct repair.

Example 4 – Madeleine 2;04: repair at the pragmatic level

CHI: tu peux apporter de l'eau, là comme ça je bois de l'eau là. can you bring water so that I drink water
MOT: ah, comment est-ce qu'on dit? Oh, what do you say?
CHI: je voudrais... I would like...

In Example 4, the mother's role is to teach social rules, which are already well integrated since she only needs to solicit them for Madeleine to offer the expected forms. As we will see later on, self- and other-repairs involve the linguistic levels in different ways, but the examples illustrate the mother's key part in these exchanges in which the acquisition of the linguistic system and the social code are intertwined.
Madeleine’s prosody (a rise) indicates her uncertainty regarding the answer she provides. Although the lexeme used was appropriate, the mother corrects the gender of the determiner in a straightforward manner with prosodic intensity. There are also cases where the mother directly repairs the child’s utterance in a school-like manner, as illustrated in Example 7.

Example 7 – Madeleine 2:04: Madeleine has just tried on new shoes
*MOT: t’es bien dans tes chaussures? do you feel good in your shoes?
*CHI: oui. yes
*CHI: [œ] bien. I have good
*MOT: bon je suis bien. (with emphasis on the repair) well. I feel good
*CHI: je suis bien. (with emphasis on the repaired item) I feel good

This example illustrates a pedagogical type of repair. The mother’s utterance contains a model, which constitutes a literal correction of the child’s morphological error (and she maintains the first person pronoun instead of reversing pronouns). She initiates her own repair with “bon” and emphasizes the target word “suis”. The fact that the child takes up the mother’s formulation seems to indicate that she accepts and understands the repair. The force with which Madeleine repeats the mother’s repair shows that the child is not just ratifying what the mother has said. She seems to repeat the repair process, now that she has the relevant term at her disposal. The child is therefore able to acknowledge the discrepancy between her own production and that of her mother. The contrast between the two utterances helps her acquire the right term, which she repeats as if she were integrating it into her own grammar. We will see in Section 4.4.1. how these uptakes evolve in Madeleine’s data.

4.2. Elicitations of self-repairs

We suggested that direct other-repairs occur when Madeleine’s mother might consider that some items or structures have not yet been completely acquired by her daughter. In parallel, if the mother considers that Madeleine knows a word, she can also rely on her daughter’s linguistic and interactional skills, and simply elicit a repair without offering a model. She signals the fact that there is a problem either in the child’s production of the utterance or in its reception thanks to various procedures: she can repeat an element of the utterance with a rising intonation, explain that she doesn’t understand, use an interrogative pronoun or just begin the repair and expect the child to finish it. We categorized these procedures as elicitations of self-repairs. Graph 5 sets out the proportions of these elicitations among repairs by the mother compared to spontaneous self-repairs by the child. In this graph, self-repairs are categorized as either elicited by the mother or spontaneous.

Graph 5. Percentage of other-repairs, elicited self-repairs and spontaneous self-repairs out of the total number of repairs according to age in Madeleine’s data.
As previously observed, the mother directly repairs Madeleine's utterances less and less often. The proportion of elicited self-repairs (repairs elicited by the mother but done by the child) is variable, but they become as important as direct other-repairs (repairs directly done by the mother): about 25% for each of them when Madeleine is 2;11. It therefore seems that the mother adapts to the linguistic and pragmatic tools the child has at her disposal as she grows up and becomes a more expert speaker. The mother elicits more and more repairs in order for the child to reformulate her own utterances. These types of repairs are therefore co-constructed in the dialogue between the mother and the child.

Examples 8 and 9 give two illustrations of elicitations of self-repairs, one leading to a repair by the mother, the second leading to a repair by Madeleine herself.

Example 8 – Madeleine 2;01: Mother's elicitation of self-repair (and other-repair)
*MOT: Et celui-là il est... And this one is...
*CHI: jaune. yellow
*MOT: hum, pas tout à fait. hem, not really
*CHI: 0.
*MOT: orange. orange
*CHI: orange. orange

Example 8 illustrates the role of the mother in the progress of the child's skill at repairing her own productions. Madeleine probably knows the word orange and the mother, by modulating Madeleine's production and saying "hum, not exactly" is giving her the option of correcting her own production. Since Madeleine doesn't answer, her mother goes on to provide the expected target.

Example 9 – Madeleine 2;04: Self-repair elicited by the mother
*CHI: c'est pour clocher les cloches it's to bell the bells
*MOT: pour quoi? to what?
*CHI: pour sonner les cloches to ring the bells

In Example 9, Madeleine's mother perfectly understands what the child meant, but she invites her to work on her own verbal production in order to make it closer to the adult target. Here, thanks to the pronoun "quoi" (what) following "pour" (for), the question also signals which grammatical category (the verb) needs repair. Such strategies allow the mother to guide the child on her way to self-repair, also focusing the child's attention on particular parts of speech. The next section describes the linguistic levels involved within repairs produced by the mother at different stages of the child's linguistic development.

4.3. Linguistic levels involved in the mother's repairs

As we have seen so far, Madeleine's mother may repair her daughter's production, either directly or after an unsuccessful elicitation of a self-repair. The linguistic levels involved in these other-repairs vary over time. Graph 4 presents the linguistic levels in self- and other-repairs as a whole. Graph 6 illustrates the occurrences of other-repairs involved within repairs produced by the mother at different stages of the child's linguistic development.
involving the different linguistic levels. It appears that the mother's focus evolves from phonology to morphology and semantics as the child grows up.

The semantic level and sometimes the morphological level are mostly associated with explicit corrections. As far as the phonological level is concerned (and in some cases the morphological level as well), the mother simply takes up the child's productions, reformulates them in accordance with the adult target, and replaces them in the following utterance, providing the child with an embedded model through recasts that also serve as “negative evidence” for the children (Chouinard and Clark, 2003). This strategy may sometimes be more efficient since it does not disturb the flow of the conversation.

After a peek at 1;09, other-repairs decrease over time and become less numerous than self-repairs (cf. Graph 2). It is not only a quantitative decrease but also an important qualitative transformation of the mother's repairs as the child's linguistic skills and capacity at self-repairs develop. She adapts to the child's needs, or the needs she attributes to her child in terms of social rules and conventions (at least those used in this family). The distribution of the linguistic levels involved in the mother's repairs therefore provides insights into the mother's conception of her child's linguistic skills. For instance, when the child is 2;04, she does not repair her phonology any longer but still provides some morphological and semantic repairs. This representation of her daughter's linguistic development probably informs her interactions with Madeleine, not only from the linguistic point of view (and the linguistic levels she focuses on) but also from an interactional point of view (and the strategies she adopts in repair sequences). In the following section, we try to identify how this behavior influences Madeleine's productions.

4.4. Effects of other-repairs on Madeleine's self-repairs

The effects of the mother's intervention in repair sequences are threefold. First, when the mother makes a repair, she provides Madeleine with a target for the child to take up. Second, the way the mother slowly switches strategy from repairing her daughter's utterance to eliciting a self-repair offers Madeleine the option of developing her social-interactional skills. Third, increasing opportunities for Madeleine to self-repair and reformulate her own utterances facilitate the acquisition and consolidation of her linguistic skills at all linguistic levels. The next three sections illustrate these processes.

4.4.1. Taking-up and integrating other-repairs

The effect of other-repairs can be observed by looking at the development of Madeleine's reaction after her mother repairs her production, whether she takes up the repair or not. We quantified other-repairs according to whether they were (1) taken up by the child with a repair, (2) taken up by the child without a repair (simply repeated), (3) not taken up by the child. As shown in Graph 7, Madeleine does not take up her mother's repairs more than 50% of the time: she simply continues the conversation. Nevertheless, when she does take up her mother's repairs, the way she does it changes over time.

At first, Madeleine sometimes repeats her original production, even after the mother has repaired it. Progressively however, she starts taking up her mother's repairs and changes her earlier production. This process becomes particularly important at 2;04. The rate of the repetitions without modification diminishes and finally disappears, as she gets older.

Although other-repairs decrease (as we observed in Graph 2), the mother's repairs are more and more integrated and accepted since the child repeats them and uses them to re-elaborate her own productions. This does not mean that the child will always use the right term after having been corrected once or twice (see Example 3, when Madeleine over...
corrected her production by saying “elle s’enRdormit”) but it does show that the child tries to take her mother’s repairs into account.

4.4.2. The preference for spontaneous self-repairs

Graph 2 shows that after 1:09, self-repairs became more numerous than other-repairs. In order to self-repair her utterances, the child needs to identify some kind of trouble in the reception of her utterance or in her own production, which implies fine conversational/pragmatic skills, and the appropriate linguistic tools to construct utterances that are closer to the adult target. The child needs to have acquired both sensitivity to the conversational process and the ability to monitor her own talk. These abilities are apparent from very early on. As illustrated in Example 10, at 1:09 Madeleine is already making attempts at self-reformulations, especially when her mother’s reaction does not seem to match her expectations.

Example 10 – Madeleine 1:09: early spontaneous self-repair

*CHI: le ça met là
%act: she plays with the mugs.
*MOT: oui.
*MOT: bah oui ça va mieux.
*MOT: ça c’est une soucoupe alors que l’autre c’est une assiette.
%act: MOT is not looking at Madeleine.
*CHI: 0.
%act: CHI picks up the bowl and puts it on the table, then gazes directly at her mother.
*CHI: on le met là maman.

Madeleine is playing with a toy coffee set. The child cannot get her mother’s attention and probably wants her approval or help to put the bowl on the table. She can check whether her mother is paying attention to her through gaze exchanges and notices that her mother is not looking at her. She keeps repeating her utterance and finally produces an adequate reformulation as she actually puts the bowl on the table herself.

The child repairs her own production when her interlocutor’s response or reaction is not what she would have expected and she therefore grasps the fact that her utterance might not have been adequate or sufficient as observed by Forrester (2008) in father-child interactions. In pursuit of a response from the co-participant, she repeats her utterances with some alterations. Since repairs are set in a multimodal interactional context, the child uses gestures, actions, prosody and gaze to attract attention, and check comprehension, especially when it is linked to her own actions or projects. As she gets older, Madeleine uses different linguistic levels and different strategies to repair various aspects of her speech.

4.4.3. Linguistic levels involved in spontaneous self-repairs: development of linguistic rules

We have shown how the linguistic levels associated with repair sequences generally change over time. We also saw how the mother’s repairs were carried out at different linguistic levels, and this can offer some insight into the mother’s conceptions of her child’s linguistic development. Analyzing the linguistic levels involved in self-repair also informs us about what the child is focusing on, at particular stages in her development. Graph 8 illustrates how self-repairs are made at different linguistic levels over time.
Self-repairs are mostly made at the phonological level at first (when Madeleine is trying to talk about a character named Monsieur Malchance, she says [a/âs], and then repairs this to [ma/âs]). Her other self-repairs are mostly morphological repairs. Those two types of repairs deal with formal aspects of her utterances. Semantic or lexical repairs (for example, when Madeleine is trying to talk about baby ducks she says “ton” – the word in French is “canard” – but her mother only understands her when she says “canard”/duck) increase in number, as the child gets older, while her phonological repairs diminish.

With age, more self-repairs also contain expansions: Madeleine adds determiners, prepositions and deictics as she acquires grammatical markers. At 2;11, she reformulates her utterances quite often. For example “hum on peut aller lui le chercher?” (hem, can we go him it get?) becomes “tu peux aller le chercher?” (can you go and get it?) with a change of pronouns (from “on”/we to “tu”/you) which transforms her utterance into a direct request made to her mother. She is also able to complete her explanations: “il faut pas qu’il l’attrape parce que c’est un jouet” (he must not reach for it because it is a toy – talking about her little brother) and then she adds: “c’est un jouet pour les grands” (it’s a toy for big children). She continues to expand her lexicon, eager to make her meaning as precise as possible, and gleefully tells the observer who has come just the day she has two little friends over: “toi tu vas nous voir, nous regarder... toi tu vas nous FILMER” (you are going to see us, to watch us... you are going to FILM us).

Interestingly, the linguistic levels involved in Madeleine’s self-repairs and in her mother’s other-repairs diverge over time (cf. Graph 7). Up to 2;01, the linguistic levels involved are quite similar: the child seems to take up her mother’s concern for form (phonological and morphological levels) and to a lesser extent for meaning. After 2;01, Madeleine continues to elaborate her phonology and morphosyntax, whereas the mother’s repairs mainly involve lexical choices. The child makes no spontaneous self-repairs at the pragmatic level. There are either directly produced or elicited by the mother.

Our hypothesis is that, just as other mothers, as shown in a number of studies (Pratt et al., 1988; Plumert et al., 1996), Madeleine’s mother sets her intervention one step above Madeleine’s actual development, in what Vygotsky (1978) termed as ‘zone of proximal development’ (ZPD). This natural process seems to pervade the entire interaction: at the linguistic level as we have just illustrated, but also at the interactional level, where Madeleine’s mother slowly distances herself from the repair process. She lets her daughter reformulate her utterances on her own, and allows her to gradually acquire linguistic as well as social-interactional rules. The child seems to take a certain distance towards her own productions quite early on (1;09), as soon as her utterances reach the MLU of 2 and she makes a number of repairs on her own, following the steps of her mother’s previous scaffolding. This hypothesis needs to be confirmed in a future study by a very close analysis of the possible match between the child’s phonological, morphological and syntactic development and the exact content of the repairs offered by the mother.3 We also need to code and study the data collected for Anaé and Théophile when they reach Madeleine’s linguistic development, between the ages of 3;0 and 4;0.

5. Discussion

Our study of repairs in the interactions between Madeleine and her mother is at the crossroads of issues raised by conversation analysis and language development. We have focused both on the increase of Madeleine’s preference for self-repairs (Forrester, 2008), and on the evolution of the different linguistic levels involved in the repairs (Chouinard and Clark, 2003). We have tried to appreciate the mother’s representations of her child’s cognitive, linguistic and interactional abilities in the type of repair strategy she uses. We also underline Madeleine’s ability to adjust her productions to the adult target according to how much her mother actually understands what she says.

5.1. Self- and other-repairs

Our results demonstrate that repairs do not have similar importance at all ages. Self- and other-repairs are particularly numerous when Madeleine is 1;09. We suggest that this phenomenon is linked to a qualitative change in the child’s productions and in the related transformation of the quality of the interactions with her mother. At 1;06, Madeleine starts producing a larger number of comprehensible referential words (Vihman and MacCune, 1994). Her mother, who tries to understand what she says, takes up those words with reformulations. But it is only at 1;09 that all Madeleine’s utterances are interpreted as having a meaning and as having an actual adult target. This is visible at the quantitative level since Madeleine produces two times more words than at 1;06 (from 500 to 1000 tokens) and four times more different words (from 62 to 250 different types). She also enters syntax at 1;09, her MLU reaches 2.0.

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3 See Yamaguchi et al. (2011) for detailed analyses of Madeleine’s phonological development compared to her mother’s phonological repairs.
Our results also show that at 1;09, other-repairs are more frequent than self-repairs. At that age, the pattern is therefore similar to what has been observed by Norrick (1991) and suggested by Schegloff et al. (1977). However, after 1;09, there are more self-repairs than other-repairs in our data. These results are different from what was predicted or observed by these authors since in expert/non-expert dyads, experts are expected to make more repairs. How could that difference be explained? The previous studies seem to describe static interactional situations between expert and non-expert speakers. However, language acquisition is a dynamic process during which non-expert speakers end up becoming experts themselves. Repair sequences are continuously evolving and self-repairs progressively become predominant as in adult–adult interactions. This explanation could be complemented by the fact that Madeleine and her mother are not a student and a teacher and their conversations do not have Madeleine's language acquisition as primary (conscious) goal. However, her mother's scaffolding is jointly created through those conversations and is the result of the child and mother's collaboration: they are constantly adjusting to each other (see Mercer, 2000 quoted by Pike, 2010:164). We hope to study Théophile and Anaé and their mothers and might not find the same exact type of collaboration and adjustment between them. Particular children with their particular mothers might take on their own path.

There is also a difference between our study and the one conducted by Forrester (2008), who finds self-repairs to be predominant at all ages. This difference is probably due to our different theoretical frameworks and methodologies. We have restricted our study to corrective repair sequences. In Conversation Analysis, repairs are a larger phenomenon that includes sequences that we did not take into account in our coding and which could be labeled as ‘speech elaboration’. When analyses are restricted to corrective repairs, the mother's role seems to be more important than the child's during a certain period. The mother in our data makes a great amount of repairs when Madeleine is 1;09 and the little girl starts taking up those repairs. Madeleine starts correcting her own utterances more than her mother does only after 1;09, which is still quite young.

Our results are therefore different from those found by conversation analysts, but they are quite comparable to those of Chouinard and Clark (2003) who also note a higher proportion of other-repairs at first, followed by a higher proportion of self-repairs later on in the data. These similarities are probably due to more comparable categorizations and theoretical frameworks. However, the authors observe the transition from other- to self-repairs somewhat later (between 2;0 and 2;06) than in Madeleine's data (between 1;09 and 2;01), but that is probably due to inter-individual cognitive, social and linguistic differences, which are extremely important and must be considered carefully in the study of language acquisition, as we saw when we made the comparison with Anaé and Théophile. Indeed, as we have shown in Graph 1, compared to the other children, Madeleine's linguistic development seems quite precocious. Besides, as we have suggested in previous studies (Leroy et al., 2010), Madeleine's mother seems to have particular expectations as far as her child's verbal productions are concerned. Her expectations might shape her interactional behavior and influence the dynamics of corrective repairs in that particular dyad.

This transition from other- to self-repairs is not abrupt: both mother and child use processes that favor the development of self-repairs. The decrease of other-repairs parallels the increase of the proportion of the mother's elicitations of self-repairs. The mother solicits her daughter in order for her to correct her own utterances. In parallel, Madeleine sometimes takes up her mother's corrections. The number of uptakes does not increase, but they are qualitatively transformed: at first they are simple repeats of the corrected word, but they are soon expanded into a more explicit acknowledgement and incorporation of the mother's correction. Madeleine therefore signals her understanding of the contrast between her own production and that of her mother's (Clark and Chouinard, 2000) and her appropriation of the adult form. The child illustrates that she accepts and understands the corrective repair but also that she accepts and understands that her mother is the language expert.

The fine-grained analysis of this transition from other- to self-repairs could be considered as a window on the mother's conception of her child's cognitive, linguistic and interactional skills. Indeed, the mother tends to offer words or constructions in direct repairs when she seems to think that her child does not know them. However, when she thinks that her child knows the word or is capable to make a self-repair, she prefers to elicit the repair rather than providing her with the adult target. She relies on her child's ability and invites her to work on her own productions. She treats her as an apprentice and guides her with 'good-enough' scaffolding towards self-repair. Little by little, she is going to withdraw from the repairing process in order to allow her child to do the repairing job by herself.

The transition towards self-repair also indicates what the child takes into account in language and in dialogue. Before Madeleine develops the capacity to self-repair, she listens to her mother and sometimes repeats what she says. She will progressively respond to her mother's elicitations and then be able to complete the whole repairing sequence by herself. The development of self-repairs is thus co-constructed by mother and child in their interactional exchanges through time. They are both attentive to each other's role as expert and apprentice – the child being considered as an "expert to be" and in constant progress. The evolution of self-repairs is also very much linked to the child's sensitivity to conversational processes, her capacity to monitor her discourse according to the other's attention (Forrester, 2008),
her ability to understand what the other cannot grasp and to her development of "a theory of mind" or to intersubjectivity.

5.2. Linguistic levels of repair sequences

We have focused part of this study on the linguistic levels involved in the repair sequences in order to understand what mother and child are concentrating their attention on. In contrast to what has been observed in Chouinard and Clark's paper (2003), all linguistic levels are not corrected in similar ways at all ages by the mother. In our data, the mother first repairs child's phonology and morphology, then her lexicon and finally her pragmatic adequacy. This difference might be due to the ages under study: we have conducted our analyses on Madeleine between 1;6 and 2;11, whereas Chouinard and Clark have studied an age-range that goes from 2;0 to 3;03. The period before 2;0, during the emergence of first words, might be more favorable to variation.

We suggest that this variation in linguistic levels targeted by the mother in her repairs informs us on her representation of Madeleine's linguistic development and on what Madeleine is capable of understanding and taking up. The transition in repairs immediately follows a transition in Madeleine's actual linguistic development which, as linguists, we measure as objectively as possible with various tools (number of tokens, number of types, MLU, language complexity as she grows older, diversity of her speech acts, ability to answer different types of questions, to initiate topics), but which her mother seems to evaluate quite intuitively or according to her own expectations of her child's language development.

Our study underlines the various linguistic levels taken into account in the child's self-repairs. This type of analysis was hinted at in Forrester's conclusions (2008) but not conducted in detail and systematically. Our results suggest that Madeleine's self-repairs follow a similar pattern to her mother's other-repairs: the child first repairs her phonology, then her morphology, and then her lexicon. But the temporal anchoring of this pattern is slightly different from her mother's. Although her mother stops correcting her phonology when she is 2;04, Madeleine continues to make phonological alterations in her self-repairs. Besides, pragmatic repairs are not observed in the period under study, for Madeleine does not seem capable of spontaneously acknowledging the necessity to use certain politeness forms in specific contexts. Self-repairs are therefore a window on what the child can take into account and manipulate at each specific time point of her language development.

6. Conclusion

This study aimed at showing how the construction of children's verbal productions is woven into dialogue thanks to the mother's scaffolding. The mother initially makes other-repairs, and then moves to eliciting repairs from the child. The child gradually makes more and more self-repairs, with no adult intervention. Both conversational partners therefore play their part according to the cognitive, linguistic and social-relational skills that the child develops over time. We actually pointed at the evolution of the mother's expectations about Madeleine's linguistic skills: the mother tries to get her child to be more precise at the phonological level at first, then at the morphosyntactic level and finally at the semantic and pragmatic levels. If in the dyad formed by Madeleine and her mother, adequacy and correctness are important, what seems to count most is the efficiency of the conversation. The child's productions are mostly repaired to enhance comprehension between the two conversational partners.

The child internalizes the adult's role and appropriates linguistic tools, social codes and behaviors, which are intertwined in language, in and thanks to dialogue. The construction process of grammatical tools and constructions takes place through collaboration between adults and children. Our study's aim is to illustrate how repairs made in dialogue help reduce the discrepancies between children's production and the language they hear from others, and therefore enhance comprehension. The repairs are made first by the mother are then taken over by the child herself and she seems to focus in turn on the same linguistic levels as her mother, but with a slight time-lag. Self-repairs thus seem to result both from the 'grammaticalization' and the socialization of children's language through internalization of adult grammar and constructions in dialogue. Since the two other children studied in this paper were less precocious and since the successive linguistic levels seem to be repaired at higher MLUs than the ones they reached at the end of our present data, we need to make further analyses to confirm the results we found for Madeleine's data.

Children elaborate transitory systems (Cohen, 1924), which contain 'errors' or discrepancies compared to the adult system, and it takes time for them to learn all the relevant conventional forms. But through constant exposure to adult input, their language slowly develops, gets enriched and becomes closer and closer to the model they hear. And little by little, as children internalize this model, they become more and more able to make self-repairs, thus creating additional locus of language elaboration and acquisition.
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