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Correcting spellings in second language learners' computer-assisted collaborative writing

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**Abstract**

The present study uses multimodal conversation analysis to examine how pupils studying English as a foreign language make spelling corrections in real time while doing collaborative computer-assisted project work. Unlike most previous related investigations, this study focuses on the process rather than evaluating the final product. The findings establish how the initiation and correction of (perceived) spelling errors involve varying configurations of three agents: the pupil currently typing, the other pupil and the computer software. Almost 80% of spelling corrections are carried out by the pupil typing with no intervention from the other pupil or the spellchecker. It is argued here that both the 'triadic ecology' and the timing of correction trajectories entail a structural preference for self-correction, which in turn reduces the affordances of the spellchecker and collaboration. Nevertheless, the spellchecker and the other pupil do play a role in catching potential misspellings that the typist has missed. Moreover, rather than right-clicking to activate the spellchecker's menu of spelling suggestions, the typist typically deletes back to before the faulty letter(s) and then re-types words, which suggests the importance of progressivity of the typing flow as well as no need for the spellchecker's assistance.

**Keywords:** conversation analysis; spelling corrections; collaborative writing; computer-assisted language learning; spellchecker

**Introduction**

This study focuses on spelling correction in collaborative computer-assisted project work and on what pupils are attending to, by analysing the verbal and non-verbal interaction between participants, as well as their interaction with computer software featuring integrated spelling checkers. More specifically, the focus is on what correction trajectories and participation frameworks look like when pupils attend to emergent spelling problems and make corrections when producing text in generic software such as Microsoft Word® and PowerPoint®. However, due to the frequent complexity of spelling corrections in collaborative writing, the present study focuses almost exclusively on ‘simplex’ spelling corrections, that is, spelling corrections that are completed in one correction cycle (at first attempt). Cases where more than one correction cycle is needed – a phenomenon which I have termed ‘chaining’ – require separate attention (cf. Musk 2014).

Unlike most previous studies of spelling corrections in computer environments, which mostly focus on misspellings in the final textual product and then go on to test and evaluate the ideal performance of spell checkers (see references in the literature review), this study offers new insights into the process of spelling correction, where the software interface is only one party in the local triadic ecology of collaborative writing (cf. van Lier’s [2002, 147] ‘triadic interaction’, where two pupils are working side by side at the computer with a joint focus on the computer screen). Understanding the process better will allow us to see what respective roles the triad play in correcting spellings and thus ascertain what advantages – if any – the spellchecker and collaboration offer in terms of producing correct spellings.

In order to break new ground and follow the process, video recordings have been used to capture the multimodal nature of making spelling corrections. This follows a growing number of studies that have employed digital technology to facilitate detailed analysis using video recordings (Čekaitė 2009,
Greiffenhagen and Watson 2009, Musk 2014); screen capture video recordings (Smith 2008); and eye-tracking data (Smith 2012 and Örnberg Berglund 2012). The analyses of the video data draw heavily on the conversation analytic (CA) literature on repair and correction, i.e. the mechanisms for dealing with various kinds of communication problems in conversation and correctness, respectively (Hutchby and Wooffitt 2008, 57; Macbeth 2004). In keeping with the emic stance adopted in CA, correctness and corrections are approached in terms of what is treated as incorrect and correctable from a participant perspective. The net for what is deemed a spelling correction has been cast fairly wide and involves most corrections made to the same lexical item (further details are given below).

**Previous research**

Since the 1970s, collaborative writing has been on the ascendancy in the second language classroom (Wigglesworth and Storch 2012). Although many researchers have by now shown the potential of collaborative activities for scaffolding writing (e.g. Aydın and Yıldız 2014; Čekaitė 2009; Jeon-Ellis, Debski, and Wigglesworth 2005; Lund 2008; Kessler 2009; Kessler, Bikowski, and Boggs 2012; Musk and Čekaitė forthcoming; Storch 2005; Strobl 2014), to date only some examine the processes involved, particularly when it comes to examining multiple modes of interaction (e.g. talk, gaze, use of artefacts). In the case of electronic collaborative writing, Čekaitė (2009) and Musk and Čekaitė (forthcoming) have examined the processes in collaborative side-by-side writing in Word®, whereas others have focused on writing across a web-based interface, e.g. Lund (2008) in wikis and Kessler et al. (2012) and Strobl (2014) in Google Docs®.

Turning more specifically to studies of spelling errors, there are several studies of second language (L2) writers using computer software (e.g. Bestgen and Granger 2011; Čekaitė 2009; Dagneaux, Denness, and Granger 1998; Hovermale 2008, 2011; Rimrott and Heift 2005, 2008, Rizvanovic 2013). Most of these provide categorisations of error types, some of which are based on ‘edit distance’ (i.e. the minimum number of character editing operations needed to produce a correct spelling [Damerau 1964]) and other more physical characteristics of typing that result in typographical errors (e.g. Bestgen and Granger 2011). Some focus on linguistic categories (Dagneaux, Denness, and Granger 1998), while others are based on the cognitive aspects underlying spelling errors (e.g. Rimrott and Heift 2005). Moreover, most of the studies evaluate the performance of spell checkers (e.g. Bestgen and Granger 2011, Hovermale 2008, 2011; Rimrott and Heift 2005, 2008), and generally their performance is compared to early studies of spelling errors made by first language (L1) writers (e.g. Damara 164, Pollock and Zamora 1984).

The above-mentioned studies conclude that generic software has not been sufficiently adapted to the kind of spelling errors that L2 writers make (Dagneaux, Denness, and Granger 1998). For example, lexical errors are undetected more often than morphological errors (Rimrott and Heift 2005) and multiple errors are less likely to be corrected (Bestgen and Granger 2011; Rimrott and Heift 2005). Furthermore, spell checkers ‘overflag’ as well as ‘underflag’ spelling errors, that is, correct spellings can be signalled as incorrect, while misspellings may not be detected, respectively (Bestgen and Granger 2011).

With the notable exception of Čekaitė (2009) and Rizvanovic (2013), studies to date focus on the kind of spelling errors that L2 writers make. For example, when the spellchecker flagged errors, they initially relied on their own skills and abilities to pinpoint the exact problem rather than utilising the potential suggestions offered (e.g. by right-clicking on a red underlining; 2009, 337). The role of the spell checker therefore served more as an ‘under-specified’ diagnostic tool, which ‘opened a space for the students’ creative engagement’ (2009, 319). Čekaitė also highlights the significance of the ‘material ecology of correction’, which includes the pupils’ rights and responsibilities vis-à-vis the mouse and keyboard (2009, 323). Rizvanovic’s (2013) study, on the other hand, is a pilot study on part of the data used for the current one, which corroborates most of the correction categories given below.

Even though all of the above-mentioned studies are based on real spelling errors, the studies based on examining the final product most frequently focus on the potential of spell checkers in an ideal world by ideal users (e.g. Bestgen and Granger 2011, Hovermale 2008, Rimrott and Heift 2005).
Rather than examining how spell checkers are actually used by real foreign language learners, it is the researchers who check whether the software detects errors and offers correction suggestions. On the basis of this, they then evaluate the spell checker’s performance. Examining only the final product also means that any errors that are corrected in the writing process are simply overlooked.

In contrast to product-focused studies, the current study does not focus primarily on the performance of generic spellchecking software, but rather examines naturally occurring correction practices from an emic perspective between pupils writing collaboratively on computers. All cases of spelling correction are examined and categorised on the basis of how the spellings are detected and corrected (or not), where the computer software is only part of the ‘material ecology’ (Čekaitė 2009, 323). This approach can provide rather different insights into the efficacy of the software interface by homing in on an in situ user perspective.

**Repair and correction**

Since this study draws heavily on the conversation analytic understanding of repair in everyday conversation and the distinction generally made between repair and correction, a brief overview of the field is called for here. In CA the term ‘repair’ is generally used to denote the ‘practices for dealing with problems or troubles in speaking, hearing, and understanding the talk in conversation’ (Schegloff 2000, 207). Thus repair is essentially a mechanism for solving problems to do with achieving mutual understanding.

Schegloff, Jefferson and Sacks’ seminal article on repair (1977) distinguishes between three steps that regularly occur in repair trajectories: 1) the occurrence of a retroactively established trouble source (Schegloff 2007, 217), 2) a repair initiation and 3) a repair outcome.

‘Correction’, on the other hand, can be seen as a narrower concept, which presupposes that an error has been made and entails the ‘replacement of a trouble item by another item’ (Seedhouse 2007, 530, italics in the original). Thus correction can be contrasted with the more generic concept of repair which is ‘neither contingent upon error, nor limited to replacement’ (Schegloff et al. 1977, 363).

However, what is deemed to be correct should be seen as ‘locally adequate or acceptable […] for the practical purposes at hand’ (Macbeth 2004, 722). Since correctness and the replacement of a locally deemed incorrect item are demonstrably salient in writing and spelling practices, the term ‘correction’ has been adopted in this study.

Repair has also been examined within the second language classroom (e.g. Hellermann 2009, Jung 1999, Kasper 1985, Seedhouse 2004). All of these studies note the significance of the ‘activity contexts’ (Hellermann 2009, 113) in which the repairs are embedded. For example, Seedhouse (2004) advocates a ‘variable approach’ to repair and illustrates how the different second language classroom contexts typically yield different configurations of participants (e.g. self vs other), different repair trajectories, different repair types (e.g. embedded vs exposed correction) and different repair foci (e.g. repairing breakdowns in communication or producing grammatically correct forms) (141–159). These concerns also inform the present study, which makes recourse to the above criteria.

Primarily situated in an interactionist framework within cognitive SLA (Second Language Acquisition), there have also been a number of studies examining a varyingly broad umbrella of ‘repair moves’ (Jepson 2005) in text-based synchronous computer-mediated communication (SCMC) (e.g. Jepson 2005; Kitade 2000; Lai and Zhao 2006; Lee 2002, 2008; Smith 2004, 2008; Yuan 2003). These studies include both repairs and correction in the CA sense, though only one includes spelling corrections (Yuan 2003). Almost all evaluate the SCMC medium in terms of its affordances for correction and provide various classifications of errors and error correction. As with most of the studies of collaborative writing, the focus is on the final product (successful error corrections), rather than the process. Most of the above studies make sole use of chat logs (but see Smith 2008 and Lai and Zhao 2006), which, as Smith (2008) points out, conceals self-repairs made before a typed entry is made public. Thus Smith advocates video screen capture technology (2008, 98), which indeed would be a prerequisite to studying repair processes.
Data and methodology

The participants in this study are four pairs of pupils (two girls and two boys of approx. 17 years of age) from two classes in year 10 of one Swedish upper secondary school (gymnasium). Video recordings were made in 2012 by Honti, Rizvanovic, and Wigardt of a series of four classes, amounting to approximately 13 h of pairwork. Two video cameras were used throughout, one zooming in on the computer screen from behind and one from the side to capture the actions of each pair. All four pairs received the same instructions, i.e. to write a text about a famous American and also present the person in front of the class. The spelling corrections in focus in this study come from the pair work in class using the school laptops. Their corrections arise while writing text in Word® or producing PowerPoint® slides for their presentations.

The project work on famous Americans was carried out by all the pupils in both classes, but only those pupils who had agreed beforehand to take part in the study were video recorded. Indeed, the study followed the ethical guidelines recommended by the Swedish Research Council (Vetenskapsrådet 2002), for example as regards informing the participants of the general purpose of the study, obtaining their consent to participate and ensuring their anonymity. Pupils have either chosen or been given pseudonyms, and any screen shots used from the videos have been blurred.

The method of analysis is video-based multimodal conversation analysis (CA, cf. Seedhouse 2004, Hutchby and Wooffitt 2008; Mondada 2006), a data-driven or inductive approach, which views talk and other kinds of interaction primarily as social action. Central to this approach is uncovering the methods that participants use to interpret each other’s actions and solve potential problems. This entails taking an emic (participant) perspective wherever possible, as it emerges sequentially move by move.

An important part of processing and analysing phenomena in CA involves making collections of particular interactional phenomena, which are systematically organised according to features such as participation frameworks (who does what) and their sequential development (the order in which actions occur). In this way, it is possible to go beyond each individual occurrence of the phenomenon in question and establish whether there are recurrent patterns.

One indispensable step in discovering and demonstrating recurrent patterns is transcribing the sequences which display the phenomenon in question. For the purposes of this study where writing, rather than talk, is the central activity, transcriptions need to be multimodal. This means showing not only talk but also body movements, gaze and, not least, the handling of artefacts, particularly the computer. The transcriptions in this study follow the general conventions established for talk in CA (cf. Jefferson 2004), but additional lines and snapshots have been added in order to show other salient interactional features, especially those related to typing and handling the computer. Most of these additional features are labelled and explained in Figure 1. Since the transcription also represents actions that may be taking place simultaneously, where there is accompanying talk, only the lines of talk and pauses are numbered. Subsequent unnumbered lines thus occur at the same time as the closest numbered line above it. For example, while Bruce says ‘was that’ in line 1 in Figure 1, he also types ‘was that’.
Analyses and findings

One overarching finding of the present study is that correcting spellings – like repair in ordinary conversation – regularly comprises three steps (cf. Schegloff, Jefferson, and Sacks 1977, 365):

1. the retroactive emergence of a trouble source (Schegloff 2007, 217)
2. correction initiation (by self, other or the computer)
3. correction outcome (by self, other or the computer)

As indicated in steps 2 and 3, the initiation and correction of (perceived) spelling errors involves three agents: the pupil currently typing (self), the other pupil (other) and/or the computer software. The analyses of 439 corrections reveal five permutations, listed in order of their frequency in the data:

1. Self-initiated self-corrections (SISC)
2. Other-initiated self-corrections (OISC)
3. Computer-initiated self-corrections (CISC)
4. Computer-initiated computer-corrections (CICC)
5. Other-initiated other-corrections (OIOC)

The more exact frequencies of each category are shown in Figure 2. Each of these permutations will be described and illustrated below, though as previously mentioned, the systematic analysis of each category is limited here to simplex cases of correction, whereby the correction is satisfactorily completed within one (primarily three-step) correction cycle.
Before we proceed, a more detailed explanation of what constitutes a spelling correction is called for. Apart from not typing the right (number of) letters in the right order, spelling errors can include errors of capitalisation, apostrophes, verb tense (e.g. ‘loves’ > ‘loved’), homonyms and word segmentation (where a space is omitted between words or added within a word). In short, corrections include all changes made to a lexical item without replacing it with another (e.g. ‘belief’ > ‘scepticism’).  

However, since this study adopts an emic perspective, only the spelling errors that are treated as trouble sources have been included, which excludes any ignored spelling errors. On the other hand, it may include corrections of errors that would not be perceived as such from a normative perspective, as well as errors that are ‘corrected’ but do not result in a formally correct spelling (5% of all corrected lexical objects), e.g. ‘popculture’ > ‘Popculture’ in extract 3, which is incorrectly segmented.

In order to highlight and contrast the specific features of each of the five categories listed above, the following aspects have been described and discussed, as far as possible in the same order under each respective heading:

- The frequency of the category
- The participation framework (including collaboration and the agency of the computer)
- The nature and length of the correction trajectory (including whether it appears to be preferred or dispreferred)
- The method of correction

**Self-initiated self-corrections**

Self-initiated self-correction (SISC) is by far the most frequent category of spelling corrections, at just under four fifths of all corrections. As the category label suggests, this means that there is very little collaboration involved in this type of correction either from the other pupil or from the computer software. On the rare occasion of there being any external input, either this is requested by the typist or the typist makes active choices from lists of alternatives provided by the computer. This puts the self as the central agent in all cases.

Therefore, apart from the rare cases which involve actively requesting or seeking help, the correction trajectory is generally short and tends to lack accompanying talk that is characteristic of collaboration, at least related to the correction process. Other rare exceptions of talk accompanying SISCs include comments of slight annoyance, e.g. ‘I can’t spell/write’, as well as sighs or even giggling, especially when there are other cases of spelling errors in quick succession. A more frequent sign of collaboration, on the other hand, is the dictating of the text to be typed by the other or the
voicing (mostly self-voicing) of the text being typed (cf. Mortensen 2013), but this is not part of the correction trajectory per se.

The very high frequency of this category and the fact that the correction trajectory is short and rarely involves anyone else but the pupil currently in charge of the keyboard (cf. Čekaitė 2009, 338) suggest that this is the preferred means of correcting spelling errors, even though the pupils are involved in a joint writing activity. Moreover, just under three quarters of SISCs are solved after the first attempt at correction.

As regards the embodied process of carrying out the corrections, it most frequently involves deleting letters (and sometimes words) back to and including the faulty character. Only rarely does the typist move the cursor directly to the faulty character; when s/he does so, it almost always involves revising a previously typed word in the text.

The following two extracts illustrate several of the above-mentioned features. Extract 1 is a straightforward example of the short correction trajectory typical of SISCs. In trying to typ e the nickname of the famous American whom they have chosen to write about, Chuck Norris, Adolf makes two errors in line 1, when he misses the initial capital as well as typing a ‘y’ instead of the keyboard’s adjacent key ‘u’. In doing so, he makes two common typographical errors. Before attempting to complete the word, he deletes back to before the first incorrect letter ‘c’ (line 2) and then retypes the whole word correctly (line 3). The correction is not accompanied by any verbal reaction by Adolf, which also typifies SICS. Although Adam is sitting watching the screen ( ), he makes no attempt to intervene either; there is in fact no observable reaction to the correction being made.

Extract 1

Participants: Adolf and Adam

1 Adolf: 输入 [typing with both hands]  输入 “chy

2 Adolf: 输入 “chy

3 Adolf: 输入 Chuck”

In extract 2 the language functions (spellcheck and grammar check) are not switched on, which means that when a word is completed and the space bar is pressed, no red underlining appears in order to indicate spelling errors. Here the adjacent key ‘q’ is pressed instead of ‘a’ in writing the word ‘that’ (line 1). Normally, if both the right language and the spellcheck function are activated, after pressing the space bar a red underline will appear as is in Figure 3.

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Instead Bruce corrects the word in the usual fashion by deleting characters back to before the incorrect one (line 2) and then re-typing the rest of the word (line 3). The talk in line 1 is a case of voicing what is being typed and not part of the correction sequence per se. Although Syd is also looking at the screen and has recently been active in the composing of the text, he does not noticeably react verbally or otherwise to the correction process.

Figure 3. How the spellcheck function in Word® usually displays a spelling error.
Participants: Bruce and Syd

1 Bruce: *was that*
   Bruce: *was 'thqt::*
   *key person involved in this scepticism was Bill Kaysing. He found some eventual evidence proving the moon landing never took place. One major proof was that]*

2 Bruce: *qt·*
3 Bruce: *[th]at

Other-initiated self-corrections

At just under 8% of spelling corrections, this category is (by a small margin) the second largest in the data. Of OISCs, only just over 34% of the corrections (12 out of 35) are simplex cases, i.e. constitute the only attempt at correcting the same object.

The main difference with this category is who initiates the need for correcting a perceived trouble source, i.e. not the pupil who is currently typing and producing the trouble source. Therefore there is always a separate initiation step by the other pupil, but it is still the producer of the trouble source who actually corrects the error (or produces a new trouble source). However, sometimes (in 6 out of 35 cases) it may be unclear whether the other pupil’s actions are initially triggered by a computer-initiated signal (e.g. a red underline). Yet what is significant in cases of other-initiated corrections is that there is a delay in initiating or carrying out any correction; this usually means the pupil typing has moved on to the next word or even further without displaying any detection of the trouble source before the other-initiation takes place. Therefore it seems more justified for the other to intervene. This delay in intervention also suggests that other-initiation is a dispreferred action.

When it comes to other-initiating corrections, there are three main methods: saying aloud the word containing the trouble source (often pronouncing it as it has been spelt, as in Extract 3), pointing at the word in question on the screen and/or explaining the error. As the high incidence of chaining for OISCs has already indicated, the success rate of such initiations in rectifying the trouble source in one attempt is the lowest for all five categories. Indeed, chaining often ensues, with a combination of the above-mentioned methods or even taking over the keyboard (thus making it an OIOC).

One further aspect of OISCs that extends the correction trajectory is that there is often a verbal response by the typist, either acknowledging or questioning the existence of a trouble source. Furthermore, to complete the correction trajectory in all simplex cases of other-initiated corrections but one (see OIOC below), the pupil typing carries out the final correction. This far less commonly involves deleting characters back to before the correctable one(s). Because of the delay in correction initiation, more text has often been typed, so to save having to delete and retype mostly correct text, the typist instead inserts the cursor at, or close to, the trouble spot in the incorrectly typed word. The delay in correction initiation appears in any case to interrupt the progressivity of the writing process, which may also contribute to it being less disruptive to move the cursor.

Extract 3 involves reading out loud the word with the trouble source, in this case ‘tuned’ (line 5), which should have been ‘turned’. When Sarah intervenes, Anna has already typed the next word ‘out’ (line 4) and she even continues to type ‘to’ while Sarah is initiating her correction. Anna responds both physically by looking up at the screen (†) and verbally by repeating her misspelt word accompanied...
by laughing (line 7), and thereby acknowledging Sarah’s correction initiation (line 5). The laughter and the repetition of the whole sentence so far (lines 7 and 10) also serve to display that this was simply a slip (typo) on her part rather than her not being able to spell ‘turned’. As is more common in other-initiated corrections where additional words have been typed after the offending spelling, Anna moves the cursor to the trouble spot in ‘tuned’ (ठ) and inserts the missing letter (line 12).

**Extract 3**

**Participants:** Anna and Sarah

1. Anna: Movies·
2. Anna: movies u::m (1.1)
3. Anna: t- a: ou::t=
4. Anna: tuned·out
5. Sarah: =tuned out
6. (1.6) 1

7. ((Anna looks up at screen))
8. Anna: $tuned \ [ou(hu)t\ uhuhu\]$ (1)
9. Sarah: $[uhuhuhuhhh\]$ (1)
10. Anna: $.hhh$ movies● tuned out (1)
11. Sarah: $[uhhu]s$
12. Anna [tu][ned]

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**Computer-initiated self-corrections**

There are slightly fewer corrections in this category than in the previous one (33 CISCs as opposed to 35 OISCs). Out of 33 cases only 9 are simplex cases, which are solved through one correction cycle. Moreover, it can be difficult at times to decide whether many of the correction trajectories are actually triggered by the software, i.e. whether red underlining etc. has been noticed by the typist. Since this is an unsolvable dilemma with the present data, for the sake of consistency at least, a decision has been made to include here all cases where the computer software has indicated that there is a trouble source and where subsequent spelling corrections are made.

Unlike the cases of computer-initiated computer-correction (see below), the last step of CISCs involves an active choice by the typist, i.e. whether or not to act on the correction initiation. Since no other person is involved (unlike other-initiated corrections), it is less of a face-threatening act to disregard what the computer signals, though potentially the typist could be held to account by the other pupil for disregarding a computer-initiated underline. Ignoring (or not noticing) underlining is frequent in the data, but it occurs mostly when the language settings are wrongly configured. All in all, this suggests that agency of the self is almost as significant for this category as the first (SISC).

Just as with the self-initiated self-corrections, it would potentially be possible to request help from the other pupil in cases of uncertainty, but since these cases are not simplex ones in the data and
require more than one correction cycle to effectuate a satisfactory correction, they are not discussed here.

As in the case of SISCs, CISCs generally have a short correction trajectory with no – or rarely minimal – accompanying talk (related to the corrections). However, here steps 2 and 3 of the cycle are clearly separate; the computer first indicates a trouble source and then the typist carries out a correction to rectify the problem.

In Word® and PowerPoint®, the correction initiation appears as a red underline when the space bar has been pressed. However, for this to work as it is intended, the software must be configured properly. This was far from always the case in this data, since the laptops were used for many different subjects in the school, most taught through the medium of Swedish. This meant that sometimes Swedish was switched on, sometimes English was switched on and sometimes the spelling and grammar check functions were simply switched off. Occasionally the pupils changed the settings themselves, but more often than not they tried to cope with the current settings. As one might imagine, if the settings were not correct, problems tended to ensue. Very occasionally, it is therefore the spellcheck function that gives rise to unnecessary corrections, but when this happens most often the problem is resolved.

In addition to the red underlining, Word® and PowerPoint® have an additional aid whereby a right click anywhere in the underlined word results in (a) possible suggestion(s), as shown in Figure 4.

Figure 4. How the spellcheck function in Word® displays an alternative spelling.

Nevertheless, in this study, only very rarely does the typist make use of this help feature (7 out of 439 cases). Instead, as with SISCs, correction most commonly entails deleting back to before the faulty character and then retyping the word. Since the red underline does not indicate exactly which letter(s) is (are) incorrectly spelt, this requires the typist to pinpoint the exact problem. All the same, by adopting a trial-and-error approach, it is possible to test alternative spellings by deleting, retyping and then pressing the space bar to see whether the red underline disappears. Although using this spellcheck as a diagnostic tool is also documented in another study (Čekaitė 2009, 326), it was only very rarely done in this data-set.

The fourth extract is a case involving PowerPoint®, where the language is not set to English. Nevertheless, this pair display no awareness of the configuration problem, so the red underlining plays a role in initiating corrections. The focus here is on the correction made to ‘popculture’, which is subject to no further correction beyond this extract, even though the final spelling of ‘Popculture’ is not correct from a normative viewpoint. The main issue here is that Pamela has first written the heading for this PowerPoint® slide mainly with lower-case letters: ‘MJ changing the popculture’. Red underlining then appears under the words ‘changing’ and ‘popculture’ (line 1), which triggers Pamela’s capitalisation of all the words in lines 2, 3 and 5 (including the incorrect capitalisation of ‘the’). Previous to Extract 4, Angelina has already explicitly approved of the wording in the heading, so in lines 3 and 4 she is simply reading it out loud. When Pamela replaces the lower-case ‘c’ and ‘p’, the red underline erroneously appears again under ‘Changing’ ( ), but initially it only reappears under the capitalised ‘P’ in ‘Popculture’ ( ). Despite this underlining (which subsequently reappears under the whole word) and the fact that the unnoticed word-segmentation problem remains (i.e. ‘Popculture’ instead of ‘Pop Culture’), no further correction attempts are made. This extract therefore illustrates how computer-initiated corrections are reliant on pupils’ spelling skills to pinpoint the exact nature of the problem, or even decide whether there is a problem in the first place (which there no longer is, despite the red underline under ‘Changing’).
Extract 4

Participants: Pamela and Angelina

1

2 Pamela: eC[hanging]
3 Angelina: ° (em jee) changing de
   Pamela: tT[he]
4 Angelina: pop culture°
5 Pamela: pP[opculture]

Computer-initiated computer-corrections

There are 19 computer-initiated computer-corrections (CICCs) compared to 33 computer-initiated self-corrections. Put another way, only a third of all the computer-initiated corrections are actually completed by the spellchecker. Out of the 19 cases of CICCs, the majority (13) are simplex cases.

Unlike CISCs, CICCs do not require the typist to make any active choices in the final step of carrying out the correction itself; here the computer plays an agentive role in the correction process. However, as the figures above suggest, the computer is far less likely to be agentive in the final step (in about only half of the cases).

The correction trajectories of the CICC category tend to be the shortest, even shorter than SISCs, largely because steps 2 (initiation) and 3 (correction) are always conflated and activated when the typist pushes the space bar. In most cases the ‘correction’ is correct, but very occasionally it is wrong and therefore gives rise to chaining. The only significant delay is where the pupil typing stops momentarily to check what has just been changed, but most frequently the typing continues at the same pace, no doubt sometimes without the typist even noticing, especially if his/her focus is on the keyboard.

Over half (eight) of the cases of CICCs concern errors in capitalisation: pressing the shift key too long, resulting in two capitals in a row (e.g. ‘The’, ‘UNited’), or no capital letter at the beginning of a new sentence or for proper nouns (e.g. ‘december’, ‘o’kelley’). This capitalisation correction function works whether the language setting is correct or not, whereas the correction of misspellings understandably does not. However, the data shows that when the language is set to English, it seems that the correction function is mainly restricted to frequent unambiguously misspelt words with an edit distance of one character, e.g. ‘teh’ > ‘the’, which no doubt also contributes to the relatively low frequency of this category.

Extract 5 includes two examples of CICCs, the first of which involves faulty capitalisation at the beginning of a sentence (‘on’ in line 9) and the second of which involves the faulty spelling of ‘the’ (line 13). In fact, the second example is the second correction of a faulty spelling, i.e. it has been subject to chaining. As in many cases of collaborative writing, the typing is preceded here by a verbal suggestion of what to write in line 1. After a delay, during which a negotiation of who is to resume typing takes place (lines 2–6), Bruce types ‘on’ in lower-case letters (line 9). On pressing the space bar, the spellcheck software immediately replaces the lower-case ‘o’ with a capital and Bruce proceeds to type the next word ‘the’. However, he first omits the ‘h’, so he deletes the ‘e’ and after checking what he has typed (line 12), he retypes the word. However, this time he reverses the ‘h’ and the ‘e’ (line 13). Thus the first attempt at correcting the error, a self-initiated self-correction, fails. This occasions a chained correction, which this time is computer-initiated and computer-corrected as soon
as Bruce hits the space bar (line 13 ●). The reversal of two letters constitutes an edit distance of one in a very frequent word, which Word® is able to correct successfully.

Extract 5

Participants: Bruce (B) and Syd (S)

1  Syd:  ● on december twenty-th:b:ir::d
2  (3.1) (S looks at B and points twice with his hand)
3  Bruce: ● *mm:::* *(with creaky soft voice)*
4  Syd: ● you should write *(S points again with hand)*
5  (3.3)
6  Bruce: ● .hhh hmm:: ((B leans forward))
7  (5.5)
8  Syd:  ● $ahh::$
9  (1.8)
10 Bruce: ● “ya: yeah”
11  (4.4)
12 Bruce: ● [t]e ((deletes ‘e’))
13  (6.5) (B leans forward to look at screen) >dec:em:ber< on
14  (7.0)
15 Bruce: ● [t]eh·
16  ● tekeh:●
17  ● As a member of the Gemini Program, a mission involving the American austronauts to orbit the Earth, Neil was one of the eighteen qualified for the Lunar Landing Project. On the| Other-initiated other-corrections

This final category, other-initiated other-correction (OIOC), is the rarest in the data, with only four cases in all. This is perhaps not surprising, since it involves not simply initiating correction, but also taking over the keyboard from the other pupil and thereby posing a potential face-threat. Consequently, OIOCs mostly occur after repeated corrections, i.e. chaining with 4–7 corrections. Even in the single simplex case, there are in fact repeated (albeit ambiguous) attempts at initiating correction with no immediate uptake (cf. Extract 6). Both the frequency and the fact that OIOCs only occur after repeated initiation or correction attempts suggest that this is the most dispreferred correction format.

The points at which OIOCs occur are characterised by a high degree of cooperation; in fact, all four cases arise in the active co-composition of a text. Moreover, all the cases are limited to the two pairs who display the greatest degree of collaboration in the writing process. The single simplex case takes place when there is ‘unfinished business’, i.e. before the pair move on to a new episode. This affects the progressivity of the writing process, yet since there is no appropriate uptake of correction initiation on the part of the typist, intervention may in fact shorten the correction process. After the correction is made, in all cases an acknowledgement is also provided by the originator of the trouble source.

As to the nature of the trouble source, all of the cases – both simplex and chained – are characterised and confounded either by the software not detecting a spelling error (cf. extract 6), or by indicating an error where there is none.

In Extract 6, the spelling checker is not switched on, so no red underline appears when Syd misspells ‘experienced’ in line 1. Bruce is following what Syd is typing and raises a finger when he detects the error (●). However, there is no uptake by Syd, who continues to type, and Bruce postpones any further correction initiation at this point, not least because a new trouble source arises (lines 5–10): the substitution of ‘dad’ with ‘father’. Nevertheless, when Syd goes to check something in Wikipedia (lines 11–12 ●), Bruce makes a second attempt to initiate a correction, by saying ‘wait’ and then pointing at the screen (●). Syd does not respond immediately, so Bruce quickly slips his hand under Syd’s (●), returns to the Word® document and deletes the extra erroneous ‘i’. The correction trajectory then ends with Syd’s acknowledgement of the original error with an aligning news receipt token (‘oh yeah’) and apology in line 14.
Extract 6

Participants: Bruce (B) and Syd (S)

1. Syd: he (.9) exp: (.5) <purrience::> (.5) his first (.7) flight
   Bruce:  

2. (1.5)

3. Syd:  
   4. together (1.2) "w' his:° (.4) dad
   5. Syd:  
   6. (5)

7. Bruce: >father< (.2)
   8. (2.4)

9. Syd:  
   10. dad

11. Syd:  

12. Bruce: .hhh  
   Syd:  

13. (S checks something in the Wikipedia entry)

((B raises his finger))

((B points at screen))

Syd:  

((S checks Wikipedia entry briefly for 1.5, but B takes over the keyboard  & returns to Word® document))
Discussion and conclusions

The focus of this study has been to examine the process of making spelling corrections as they are carried out in real time while doing computer-assisted project work. This includes establishing how the triadic ecology of two pupils and the computer affects the spelling correction process, as well as evaluating the nature of the contribution made by the spellchecker and collaboration with the pupil who is not typing.

The general format of making corrections follows the three-step trajectory found in conversational repair: 1) the emergence of a trouble source (determined retroactively); 2) the initiation of a correction; and 3) its effectuation. Nevertheless, there are some contrastive differences. Apart from the ever-present normative orientation to errors and correctness, there is an additional agent to the self and other in steps 2 and 3, viz. the computer software. Steps 2 and 3 are always conflated in cases of computer-initiated computer-correction, which can also occur in self-initiated self-corrections. Furthermore, step 3 typically comprises two steps: deleting characters back to and including the trouble source and then retyping the word(s). In cases of other-initiated corrections (or rarely occurring other-suggested corrections initiated by the typist), there is often a further step comprising feedback or an evaluation of the correction by the pupil who has not typed the correction, which has also been observed in Čekaitė’s study (2009, 337).

The findings also suggest that there are normative preference structures in the spelling correction process. Despite there being an additional potential agent compared to conversational repair, i.e. the spellchecker software, as we find in ordinary conversation, self-initiation and self-correction is the preferred format (cf. Schegloff, Jefferson, and Sacks 1977). Conversely, other-initiation and, most notably, other-correction constitute the most dispreferred formats. The support for this conclusion is based on the general frequencies of correction participation formats (see figure 2), but also on the trajectories of the different participation permutations, whereby correction initiation is typically delayed in cases of intervention by the other pupil (and more often subject to further complications and ‘chaining’ [Musk 2014]). Most corrections are made before a whole word is typed, i.e. before the other pupil has time to react, though any socially determined delay could also allow an opportunity for the typist to self-correct first. Intervention by the computer software, on the other hand, is not contingent on any preference structures underpinned by social norms; instead it is determined by other independent factors, such as the pressing of the space bar after a word (which in itself constitutes a delay) and whether the language setting is correctly configured or turned on. These factors also skew the potential correction preference towards self-correction, as well as reduce the affordances for collaboration between pupils.

Continuing on the theme of collaboration, the vast majority of spelling corrections (four out of five) were carried out by the pupil in charge of the laptop without intervention from either the computer software or the other pupil. This does not mean that there was no collaboration going on between pupils during these corrections; there was frequent voicing or dictating of what was being
typed, but this was more related to the composition process than correction *per se*. As already mentioned, the timing of potential corrections allows self-corrections and computer-corrections to occur first. Indeed, besides matters of epistemics (whether the other pupil knows a particular spelling), other-initiation/correction undoubtedly entails issues of face management too (cf. the giggling in lines 7–11 of extract 3, the apology in line 14 of extract 6 and the rarity of the other pupil taking over the keyboard). Intervention by the other pupil did occur, but only in less than 1 out of 10 cases, overwhelmingly in initiating correction rather than taking over the keyboard. This corroborates Čekaitė’s findings that the final step is usually ‘the prerogative, right, and responsibility’ of the pupil in charge of the computer (2009, 337). However, all (albeit rare) cases of other-correction occur in sequences characterised by a high degree of co-operation, where both pupils are active in co-composing the text. Moreover, despite the structural preference favouring self-correction, not needing to focus on typing potentially frees the other pupil to monitor the text-in-the-making and spot spelling errors that have escaped the typist’s attention (whether or not they have been flagged by the spellchecker), thereby improving the final textual product.

Intervention by the computer software was a little more common than other-intervention (11% vs 9% of corrections, respectively), but with only a third of all the computer-initiated corrections actually being completed by the software. This difference can largely be explained by delimitations of the correction function of the spellchecker, i.e. mainly capitalisation (e.g. after a full stop) and some clear-cut misspellings with an edit distance of one character. Despite the relatively low frequency of computer intervention, as with other-intervention the spellchecker’s flagging of misspellings catches many errors the typist has missed and therefore affords additional opportunities first for self-correction and then for other-initiation/correction.

As mentioned above, correcting spellings (especially self-correction) typically entailed deleting letters or characters (and sometimes words) back to and including the correctable character(s) and then re-typing them. Even when the spellcheck function indicated an error with a red underline, pupils only very rarely right-clicked on the word to reveal potential alternative spellings. This either means that the typist most frequently spotted and solved the problem without (needing) any further help from the spellchecker or that the typist was unfamiliar with the right-click function (used by only two of the pupils). In the case of the former, the typical correction trajectory can probably be explained by recourse to epistemics (whether the typist can identify the error) and progressivity of the typing process; it interrupts the flow of typing more to move the cursor in the text (by means of the touch pad) or to right-click and make a selection from the suggested spelling alternatives than to carry on pressing keys on the keyboard. In terms of epistemics, right-clicking tends to be reserved for true cases of spelling difficulties, commonly made manifest by the chaining of unsuccessful correction attempts.¹³

One main exception to the usual pattern of deleting and retyping occurred in cases of other-initiation. The typical delay in the other pupil initiating correction means that more text has invariably been typed beyond the perceived spelling error, and therefore the cursor is often moved to the trouble spot in the previously typed word. Here the typing flow has already been interrupted to attend to the other pupil’s actions, so moving the cursor may not significantly affect progressivity any further. Moving the cursor also avoids having to delete, remember and retype more text than necessary. The other main exception is in cases of computer-initiated computer-correction where the computer’s agentive role is activated upon pressing the spacebar after typing a word. Then the software initiates and corrects the ‘error’ in one fell swoop. This invariably results in correct spellings, but it depends on the language setting being correctly configured, which is not always the case. Indeed, one of the realities of the Swedish school setting is that the laptops used for English are also used for a range of school subjects mainly taught through the medium of Swedish. In the current data pupils only rarely change the language setting to English, which is a prerequisite for the language tools to function satisfactorily in the first place.

Despite the primary focus being on the process of correction, a brief mention could be made of the resultant written *product*. It was noted earlier that out of all the corrections made, only 5% of corrected objects (15 spellings) were normatively incorrect. Of these, the vast majority arise from self-initiated self-correction (11 cases) and therefore evade further screening. Otherwise, the triadic ecology of spelling correction affords two more opportunities to detect the spelling errors that slip the typist’s attention: first by the spellchecker and then by the other pupil. This undoubtedly also affects
the quality of the final spellings. Given the under-specified nature of the spellchecker’s underlinings (Čekaitė 2009, 319), the high accuracy rate of the corrections suggests a high level of spelling ability among these pupils, which in turn has implications for the generalisability of these findings.

Disclosure statement

No potential conflict of interest was reported by the author.

Notes on contributor

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References


http://llt.msu.edu/vol12num1/smith/


http://llt.msu.edu/issues/october2012/smith.pdf


### Appendix 1. Transcription Conventions

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(.5)</td>
<td>Pauses in speech of tenths of a second</td>
</tr>
<tr>
<td>(.)</td>
<td>Pause in speech of less than 0.2 seconds</td>
</tr>
<tr>
<td>yeah=</td>
<td>Equal sign: latching between utterances</td>
</tr>
<tr>
<td>=yeah</td>
<td></td>
</tr>
<tr>
<td>ryeah</td>
<td>Opening square brackets between adjacent lines: overlapping talk or other activity (between different participants)</td>
</tr>
<tr>
<td>mm</td>
<td></td>
</tr>
<tr>
<td>lis-</td>
<td>Dash: cut-off word</td>
</tr>
<tr>
<td>o:::h</td>
<td>Colon: prolonged previous sound</td>
</tr>
<tr>
<td>(swap)</td>
<td>Words in single brackets: uncertain words</td>
</tr>
<tr>
<td>(xx)</td>
<td>Crosses in single brackets: unclear fragment; each cross corresponds to one syllable</td>
</tr>
<tr>
<td>men vänta</td>
<td>Words in italics: code-switching</td>
</tr>
<tr>
<td>but wait</td>
<td>Words in grey italics: translation of code-switched line above</td>
</tr>
<tr>
<td>((slaps desk))</td>
<td>Double brackets: comments on contextual or other features, e.g., non-verbal activities</td>
</tr>
<tr>
<td>really</td>
<td>Underlining: focal stress (marked on stressed syllable)</td>
</tr>
<tr>
<td>AND</td>
<td>Capitals: noticeably louder than surrounding speech</td>
</tr>
</tbody>
</table>
"crap"  Encompassing degree signs: noticeably quieter than surrounding speech
$h$  Encompassing dollar signs: smiley or chuckling voice
"no"  Encompassing asterisks: particular voice quality
(("creaky voice"))  Double brackets + asterisk: description of voice quality
>yes sure<  Encompassing more than/less than signs: faster speech
;sure  Upward-pointing arrow: rising intonation in the following syllable
●  Talking head: line of talk
□  Computer icon: line involving the computer screen
①  Numbered disc: point at which a snapshot (or description) of action/screen shot is shown below
people  Bold: typed text appearing on the computer screen
people·that  Bold centred dot: typed space appearing on the computer screen
←  Return arrow: pushing the return key

Notes

1 These typically comprise: character deletions (or omissions), insertions (or additions), substitutions and reversals (or transpositions).

2 Jefferson (1987) argues for a distinction between exposed and embedded repairs, the latter of which does not constitute repair in the regular sense (cf. Schegloff 2000: 209). Unlike exposed repair, embedded repair does not involve a discontinuation in the ‘interactional business’ of the prior talk, but instead deals covertly and en passant with the trouble source.

3 A full key to transcription conventions can be found in the appendix.

4 I have only included cases where corrections are completed, i.e. where corrections are actually carried out.

5 Even though the case could be argued that this is a grammatical correction, it may not be since the keys ‘s’ and ‘d’ are adjacent on the keyboard, which frequently gives rise to typographical errors.

6 Almost all studies of spellcheckers include grammar corrections too, which are then frequently subdivided into spelling, grammar, lexical errors etc. according to etic principles. From an emic perspective it is difficult to draw a distinction between spelling and grammar errors, since the pupils rarely do so (see also previous footnote). Often what could be categorised as a grammar error is treated as a spelling error, but wherever a correction is treated as a grammatical one (e.g. the subject-verb agreement error ‘was’ > ‘were’ accompanied by the reasoning ‘cause there are two reasons’), it has been excluded.

7 In CA the preference/dispreference distinction does not refer to an individual’s psychological motives, but rather to the structural features of responses; a preferred response is the default one insofar as it is produced with no delay and without any mitigation (Hutchby and Wooffitt 2008, 46–7; Pomerantz 1984). In the case of repair, the ‘opportunities for self-initiation come before opportunities for other-initiation’, which also skews the distribution of repair in favour of self-repair since this allows for a successful repair outcome within the same turn, i.e. ‘before the [delayed] position for other-initiation’ (Schegloff, Jefferson, and Sacks 1977, 376).

8 Note also that the spellcheck has not marked the misspelling of ‘involved’ in the line above, where the ‘v’ and the ‘l’ have been reversed (see ① in Extract 2).
There are basically two ways in which ‘real’ problems in spelling are displayed: either the final spelling is incorrect (etically determined) as in extract 4, or there is a longer correction trajectory because the typist resorts to external resources, e.g. asking the other pupil, right-clicking to check software-generated suggestions or checking the original source.

Though in such cases, the correction will (also) belong to another category, either OISC or (very rarely) OIOC.

Both ‘Changing’ and ‘The’, on the other hand, are subject to further correction (chaining); ‘Changing’ is incorrectly re-spelt before being revised to ‘Changed’, whereas ‘The’ is correctly deleted.

Although this paper focuses on simplex rather than chained corrections, this example has been included here since it occurs in quick succession after a simplex CICC.

The focus on simplex cases of spelling correction for reasons of space means that this finding has not been shown in this study, though it is probably also pertinent to understanding the low frequency of right-clicking.