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Does the MS Spell Checker Effectively Correct Non-Native English Writers' Errors? A Case Study of Saudi University Students

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Abstract

Those learning English as a second or foreign language use spell checkers to correct the mistakes and errors they may have made while typing texts on a computer. However, scholars have debated the effectiveness of such checkers, which were originally designed to fix the spelling mistakes of native speakers. An example of these checkers is the Microsoft (MS) Word program, which constitutes the focus of the current study. This study examined how MS Word treats misspellings made by Saudi learners of English as a foreign language. It specifically addressed three research questions: (1) which L2 spelling errors were successfully fixed by MS Word; (2) which L2 spelling errors were unsuccessfully fixed by MS Word; and (3) how did intermediate L2 learners respond to alternative corrections provided by MS Word. A screentracking software, Screencast-O-Matic, was used to monitor the MS Word spell checker?s treatment of misspelled words. It was also used to track learners? reactions to alternative corrections provided by MS Word in real time. The study analysed 401 errors made by25 female intermediate-level English learners at a Saudi university.

Index terms— MS word spell checker, errors, mistakes, treatment, corrections.

1 I. Introduction

ord-processing software is used for writing and editing documents on computers. It provides users with the necessary tools to check spelling, create letters and add graphics to produce an improved piece of writing (Beal, 2016). MS Word is one of the most well-known word-processing software programs and was initially launched in 1983. Its spell checker was first installed in 1995 and has, since then, been updated numerous times **??**Janssen, 2013).

As its name suggests, the MS Word spell checker was designed to correct English language users' mistakes by placing a wavy red line under misspelled words to indicate a spelling error (Writing Enhancement Software Review, 2013). After identifying an error, the spell checker typically provides possible alternatives to correct the misspelled word (Pedler, 2001). The spell checker helps correct performance misspellings and errors that involve a 'failure to utilize a known system correctly' in equal measure **??**Corder, 1975, p. 204). Misspellings were expected to result from inattention, fatigue or motor coordination problems (Rimrott, 2005). Performance errors were considered 'accidental, unsystematic, and self-corrigible' (p. 26). In fact, Corder (1967) suggested that performance errors should be called mistakes rather than errors (p. 167).

According to Heift and Rimrott (2005), spell checkers are commonly used among second language learners even though they were originally designed to correct accidental spelling mistakes made by native speakers. This popularity is attributed to second language learners' limited ability to correct misspelled words. However, Rimrott (2005) has argued that the MS Word spell checker is not necessarily effective for those learning English as a foreign language and reported that it is meant to correct a misspelled word that contained a minimal deviation from the

target word, such as single letter omission, addition, substitution and/or reversal. Most of the errors made by foreign learners of English, on the other hand, demonstrated a greater deviation from the correct word due to insufficient proficiency in the target language. Such spelling errors were considered competence errors, which are conceptualized as errors that involve 'misconceptions of target language forms and are due to a lack of linguistic knowledge on the part of the writer. They are systematic and/or non-self-corrigible and/or deliberate (in the sense that erroneous form is assumed to be correct)' **??**Rimrott, 2005, p. 26). Many scholars have emphasized the distinction between mistakes and errors where the latter term refers to 'the systematic errors of the learner from which we are able to reconstruct his knowledge of the language to date, i.e., his traditional competence' **??**Corder, 1967, p. 167).

In the context of spell checkers, errors and the corrections of those errors have additional classifications. An error could be a non-word error, which simply means a misspelled word that has no meaning **??**Chaudhuri & Samanta, 2013, p. 211) or a real word error, which is 'meaningful but not the intended word in the context of the sentence' (p. 211). Spell checkers can correct misspellings, but, in certain cases, W the intended correct word may not be on the list of alternatives provided through the checkers' software. In such cases, the spell checkers do not successfully correct a misspelling. Therefore, a successfully corrected error occurs 'when spell checker detects a misspelling and provides the intended target word in its list of correction alternatives' (Rimrott, 2005, p. 71). The operations that spell checkers apply to correct a misspelling are referred to as the edit distance, which is defined by Antonsen (2012) as 'the number of operations applied to the characters of a string: deletion, insertion, substitution, and transposition' (p. 3).

According to Kukich (1992), most misspellings committed by native speakers are successfully handled by spell checkers. However, this may not be the case for non-native speakers of English given the relatively larger number of mistakes and errors these subjects may commit. This justifies the conduct of this research, whose main objective is to assess the effectiveness of the MS Word spell checker for Saudi learners as nonnative speakers of English.

2 a) Research Objectives

Cowanetal. (2003, as cited in Rimrott, 2005) alluded to the importance of 'basing the selection of errors to be targeted for correction research on empirical data,' to obtain 'many examples of error types that can be built into the CALL program' (p. 455). Accordingly, the focus of this study is to observe the occurrence of spelling errors in L2 writing and meet the following objectives: 1) to enhance the understanding of the most commonly used spell checker, which is MS Word; 2) to deepen language instructors' understanding of learner interactions with or reactions to common spell checkers and 3) to add to the existing literature concerning L2 writing pedagogy as far as spell checkers are concerned.

3 b) Statement of the Problem

Microsoft Word is readily available, affordable and easy to use. One limitation, as previously indicated, is that the MS Word spell checker was designed to correct mistakes made by native speakers of English. Hieft and Rimrott (2005) predicted that spell checkers of word processors like MS Word would possibly be ineffective while fixing non-native misspellings. Furthermore, Al Jarf (2010) found that the spelling errors of Arab learners of English were both complex and systematic. Therefore, an assessment of the effectiveness of the most widely used spell checker, MS Word, is necessary. Equally as important is a full review of L2 learners' actual interactions with MS Word, which will allow researchers to fully understand the strengths learners have, the challenges learners face while using a word processing program and how to best gear research and instruction towards any identified areas of weakness.

4 c) Purpose of the Study

The types of misspellings produced by L2 learners are typically different from errors produced by native speakers (Al Jarf, 2010;Hovermale, 2010;Okada, 2005). Al Jarf (2010) reported that L2 learners of English made multiple-error misspellings. A large number of multiple-edit errors within non-native learner spellings was found to cause a low correction rate in MS Word 2003 (Rimrott, 2005). The current study evaluates the effectiveness of a more recent edition of the spell checker in MS Word 2013. This study's primary aim was to assess the effectiveness of the MS Word spell checker regarding its successful and failed alterations of L2 spelling errors made by Saudi intermediate-level learners of English at a Saudi university. In addition, it investigates Saudi learners' responses to MS Word lists of alternative corrections and uses this information to inform future research directions in word-processing design and enhance teaching practices of L2 writing using word processors.

5 a) Spelling Error Classification Systems

The spelling errors made by adult L2 learners have different patterns than those made by native speakers. Several studies investigated the kinds of errors made by learners of foreign languages and identified the processes involved in making spelling errors in English, the reasons for those errors, the spelling challenges foreign language learners (specifically Arabs) face and the placement of those errors (Emery (2005), for example, found that Arab learners made spelling errors due to vowels more often than consonants. She classified Arab learners' misspellings and

identified the sources of those errors. Spelling errors were collected from 640 papers written by the 32 trainees over a period of six months. In total, 545 errors were recorded. Errors were classified as a single error, a combination of errors or a complex error. She also identified two different types of spelling errors: errors that were clearly'n on-words' and those that were 'real word errors'. The results of the study demonstrated that most of the recorded spelling errors were vowelrelated, as they constituted 83% of the errors, while only 17% of the errors involved consonants. Emery (2005) attributed the kinds of errors committed by the Arab learners to their inadequate knowledge of English spelling conventions. A possible reason for this tendency has been identified as the irregular nature of the English spelling system.

To understand more complex errors, Al-Ta'ani **??**2006), on the other hand, studied spelling errors made by English composition students at the secondary level in the United Arab Emirates. The study sample consisted of 200 randomly selected students during the academic year 2003-2004. The findings of the study demonstrated that: a) vowels and silent letters were the most problematic areas; b) the most frequent errors occurred in the middle of misspelled words; c) very few errors were made in the area of derivations and d) morphemic errors, and inflections in particular, were the most predominant.

Al Jarf (2010) went on to discuss the spelling error processes mentioned in Emery's (2005) work, such as omission, substitution, addition and/or transposition, in her analysis of misspelled words by Saudi English learners. She analysed a large number of spelling errors found in handwritten essays, paragraphs, tests and texts that had been translated from Arabic to English. These texts had been written by female Saudi university students from different levels and majors. She reported that L2 English learners usually made multiple-edit misspellings, where, within a single word, there would be more than two errors. She classified spelling errors into three categories. The first was whole-word errors, which were substituted by an extraneous word or which deviated partially/completely from the target word, such as *Luteroture ~Literature. The second was faulty graphemes, where single or multiple errors were found within one word due to deletion, addition or substitution, such as *aspechely ~specially. The third was faulty phonemes, in which the misspelled word did not sound like the target word due to a consonant, vowel, syllable, prefix, suffix, grapheme, grapheme cluster deletion, substitution or addition, such as *rember or *member for remember. The same author reported that these spelling problems could be further classified into phonological and orthographic problems. The former are errors in which the misspelled word does not sound like the target word because the word, consonant, vowel, syllable, prefix, suffix, grapheme or grapheme cluster is not heard at all, misheard, added or reversed with another. The latter refer to instances in which the misspelled word sounds like the target word but the written form or grapheme used for the misspelled portion does not correspond to the target word or target grapheme.

To explain the reasons for these committed errors, Al Jarf (2010) claimed that English learners use spelling strategies or mental processes to represent spoken sounds in written symbols. The spelling strategies that these learners used while committing a misspelling can be classified into the categories of reversal, insertion, substitution and omission. Reversal strategy is when the learner reverses the order of two target words, two vowels, two consonants or a vowel and a consonant within the target word. Substitution is when the learner substitutes a word for another real word, invents a word, substitutes a vowel with one or more vowels, substitutes a consonant with one or more consonants or substitutes a syllable or a suffix for another. Al Jarf (2010) considered the morphological errors of deleting or adding a prefix and/or suffix to be a phonological error problem. She indicated that one of the reasons for committing errors in English spelling was the Arabic language itself, which has a one-to-one correspondence between phoneme and form. Arab learners generally misspell English words that have a non-phonetic spelling. Some English sounds do not exist in Arabic, such as /p/ and /v/. According to Smart and Altorfer (2003), Arabic speakers tend to transcribe these sounds as /b/ and /f/, respectively.

A study similar to Al Jarf's (2010) was conducted by Alhaisoni, Al-Zuoud and Gaudel (2015). They collected data from written samples of 122 male and female students enrolled in an intensive English language program during their preparatory year at the University of Hail in Saudi Arabia. The participants were asked to write a well-organized essay (150 to 300 words) on one of four familiar topics. Several procedures were used to analyse the data. Alhaisoni et al. (2015) identified intra-lingual errors within the English language-the target language of the participants. The onset of these error types was mainly accounted for through articulation and spelling anomalies inherent in English words themselves. In addition, participants had a habit of manipulating the standard pronunciations of words, which resulted in incorrect spellings. When they examined the sources of these errors in this study, it was assumed that such errors might be attributed to the participants' attempt to construct a word based on their knowledge of grapheme-phoneme relationships. For example, Alhaisoni et al. clarified that silent letters presented problems for the participants when guessing the accurate spelling of target words. For example, this can be seen in the spelling of country which phonetically calls for the omitting of the u as in *contry. Many learners chose to omit the silent vowel u while writing because it was not articulated.

6 a) Efficacy of Spell Checkers in Word Processors

Several researchers have suggested that spell checkers in word processors used by L2 users should be adapted to the patterns of errors that characterize each native language (L1) using a study of the patterns of interference and influence from the L1 to the L2 (Bestgen & Granger, 2011;Hovermale, 2010; **??**itton, 1996;Mitton & Okada, 2007;Rimrott & Heift, 2005, 2008). Due to its wide and global use, the efficacy of MS Word's spell checker has been of interest to L2 researchers. Some studies have developed prototype spell checkers and compared their

performances with that of MS Word (e.g., **??**haudhuri The researchers concluded that the MS Word 2003 spell checker was much more successful at correcting performance rather than competence errors because, in the case of competence errors, the misspelled words deviated much more from the target words. This made it more difficult for the MS Word spell checker to correct them. In 2008, Heift and Rimrott replicated their study using the same taxonomy and found that only 62% of learners' misspellings were corrected. In addition, they found that the MS Word 2003 spell checker, independent of other factors, generally could not correct multiple-edit misspellings, although it was quite successful in correcting single-edit errors.

In a recent study, Lawley (2016) investigated whether a spell checker was effective at detecting errors and providing appropriate feedback especially regarding elementary-and intermediate-level learners of English at the Universidad Nacional de Educacion a Distancia (UNED) in Spain. In comparison to the widely used MS Word spell checker, the author considered the extent to which explanatory pedagogic feedback could be provided. The initial data for the prototype pedagogical spell checker (PPSC) was taken from a corpus of 160,000 words that consisted of compositions written by UNED students at elementary-and intermediate-levels. The students' compositions were passed through the MS Word spell checker to discover which words in the compositions were not in the spell checker's database. Certain spelling mistakes not detected by MS Word, such as to when too would have been correct, were not collected. The proper names of people and places were excluded.

A test was carried out to see the PPSC's responses to spelling mistakes in students' compositions. Its performance was compared to that of an experienced teacher on one hand and the MS Word spell checker on the other. To test the PPSC, Lawley used a new corpus of 20 compositions written by 20 Spanish-speaking UNED students of EFL at levels A2 (elementary), B1 (intermediate) and B2 (upper intermediate). The small corpus contained a total of 2,648 words. An experienced teacher detected a total of 35 spelling mistakes across the 20 compositions and, in each case, provided a suggested replacement word. The compositions were then analysed by the spell checker in MS Word. MS Word detected 31 of the 35 mistakes found by the teacher but failed to detect four words. In 18 of the 31 cases, the target words occupied the first position on the list of suggested alternatives. For six misspellings, the target words occupied lower positions on the list of suggested alternatives, and, for seven misspelled words, the target words did not appear on the list of suggested alternatives. For five errors, MS Word automatically corrected or allowed an alternative word (not necessarily the target word) to be incorporated with the click of a mouse.

The compositions were then analysed by the PPSC. In all 35 cases, the spelling mistakes detected by the teacher were also detected by the PPSC. In no (Heift & Rimrott, 2005) cases did the PPSC offer an inappropriate alternative word. The MS Word spell checker, on the other hand, was only instantly successful (target word in the first position) 58% of the time or in the 18 cases in which the target correction appeared in the first position on the list of suggested alternatives. The PPSC, however, detected all errors and never encouraged the user to replace them with incorrect words. It is important to note that, at this stage, the PPSC was not tested in practice on L2 learners.

During a group session, the 10 participants were asked two questions: how they normally detected spelling mistakes when writing in English and whether they would prefer to use the PPSC. All 10 participants said that they used MS Word's spell checker but would prefer to use the PPSC. They liked the way the PPSC drew their attention to the spelling patterns of English in same manner as, according to one participant, 'a good teacher should.' They also liked the fact that it detected some grammatical and lexical mistakes in their writing. Lawley (2016) concluded that the PPSC detected more L2 spelling mistakes than MS Word, and it did not offer incorrect alternatives. MS Word, on the other hand, was not intended as a teaching aid for L2 learners and instead works well for competent writers who have primarily made accidental spelling mistakes.

Chaudhuri and Samanta (2013) reported that, for errors occurring in two positions within a word, the spell checkers work well. However, the problem of realword errors is more complex. Some errors disturb the syntax and semantics of the entire sentence, which then requires a human being to detect them. An automatic syntactic or semantic analysis of a correct sentence was in itself a difficult task, and the analysis of an incorrect sentence was nearly impossible in most cases.

In a separate attempt to enhance generic spell checkers for non-native speakers, Sahrir (2015) developed a spell checker prototype to correct errors in the Arabic language made by non-Arabic speakers. The program was specifically designed to identify and correct morphological errors by using the MS Word program via a special font known as 'Modaqqeeq Sarfiy' (morphological checker). The research population was 24 students who were taking ARAB 2124 in the first semester of the 2013-2014 academic year. The researcher requested that each of the participants write a one-page article relating to computer-assisted language learning in the Arabic language. An analysis was then conducted to investigate the frequency and type of language errors found in their articles. The concept of using fonts to computationally make spelling corrections was adopted in the wording code of some of the spelling rules that appeared in Arabic books as well as in research and literature concerned with common spelling errors (such as The Methods of Operation for the Treatment of Spelling Errors by Rashid bin Mohammed al-Shalan). The first version of this prototype was found to be less successful in correcting errors. When asked about the prototype, the participants indicated some strengths and weaknesses. The results and findings indicated the obvious need for this spell checker prototype and its acceptance by users. Sahrir still concluded that the spell checker prototype required improvement.

7 III. Learner Perceptions and

Interactions with the ms Word Spell Checker

Recently, research done in the context of the MS Word spell checker has placed an emphasis on L2 learners themselves rather than on their spelling errors alone. Godolakis (2014) evaluated the didactic use of spelling and grammar checkers in texts by Swedish learners of Spanish at an upper-secondary school. Four students participated in the study. The participants were given a series of pictures and then asked to describe a journey to Italy in detail using the pictures and with no time limit. They used a program that had no tools for detecting or correcting language errors. Then, they posted their original texts in MS Word 2010 and were asked to revise their texts using spelling and grammar checkers. Student performance was recorded using a special program called Screencast-O-Matic, which analysed the performance of MS Word 2010 and how the participants reacted to the feedback it provided. Godolakis adapted Rimrott and Heift's (2005) classification of errors. She classified the 91 spelling errors into those resulting from performance (50 errors) and those resulting from competence (41 errors). She found that the MS Word spell checker was successful at detecting and correcting 84% of the performance errors. As for competence errors, 39 out of 41 were detected (95%), but only 12 were corrected (29%). This means that 66% of the competence errors detected were left uncorrected.

Overall, MS Word detected 88 of the 91 errors (96.7%) but only corrected 54 errors (59.3%). Upon reviewing how participants arrived at corrections, the study found that they chose from the lists provided by the MS Word spell checker in 78 cases (88.6%). In 50 of those cases (64.1%), participants chose the correct word from the list provided. In 47 of the same cases (60.3%), the target word was found in the first position on the list. In 28 of the cases (35.9%), the participants chose an incorrect word from the list provided by the MS Word spell checker. In 19 of those 28 cases (67.9%), they chose the first word on the list. In general, and in 66 of the cases (84.6%), the participants chose the first word on the list provided. This indicated a general tendency among participants to choose the first word provided by the MS Word spell checker.

The study highlighted the beneficial role played by the MS Word spelling tool, which increased in Year 2019

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efficacy when its user's proficiency increased. This increase occurred when it came to both errors detected and how to make use of the feedback provided. Therefore, the proficiency levels of the learners seemed to affect the success of the MS Word spell checker, as more proficient users made fewer mistakes. The participants were asked to evaluate the MS Word spell checker using a Likert scale. The results demonstrated that participants generally trusted the ability of the spell checker. However, the study did not reveal how participants interacted with the MS Word spell checker in cases where it failed to correct their errors.

Few studies have touched upon the effectiveness of spell checkers apart from MS Word, and even fewer have evaluated these spell checkers in their handling of misspellings by L2 learners. These studies (Holmes & de Moras, 1997; Burston, 1998; Antonsen, 2012) demonstrated short comings in the ability of generic spell checkers to help non-native writers. However, the studies did not distinguish between different groups of language learners. Learner variables, such as learner proficiency in the target language, were not considered.

Although many programs were designed to fix non-native misspellings, very few of them were tested empirically to evaluate their treatment of L2 misspellings. Rimrott **??**2005) reported that an analysis and classification of errors was crucial to the evaluation and design of CALL programs, as has been emphasized by several researchers in the field (e.g., **??**estgen MS word is a software program that is widely used by Saudi learners; therefore, it is relevant to assess its efficacy. To this end, the current work attempts to answer the following three questions:

1-What are the L2 misspellings that the MS Word spell checker successfully corrects? 2-What are the L2 misspellings that the MS Word spell checker fails to correct? 3-How do typical L2 learners interact with MS Word as they attempt to overcome misspellings?

IV. Methodology a) Subjects Twenty-five female Saudi university students majoring in English in their senior year of a BA program participated in this study. Quota sampling was used to choose the participants; that is, participants were selected from a sample based on pre-specified characteristics, so the total population had the same distribution of characteristics assumed to exist in the population being studied (Babbie, 2007). The level of English proficiency in the sample was, in general, intermediate.

8 b) Instruments

The materials used in this study were a background questionnaire (Appendix A), versions 2013 and 2010 of MS Word, one essay typed by the participants (Appendix B), the Screencast-O-Matic program and an exit questionnaire (Appendix C). The background questionnaire was adapted from one given by Montrul (2012). It was originally designed to record the English-language background of Hispanic learners of English. An adaptation was used in this study to record participant level of exposure to English and the extent of their current communication abilities while using the English language. The questionnaire consisted of sections on family history, linguistic history, education and current level of linguistic proficiency. Essays were typed into MS Word 2010, the version installed in the university computer lab at the time the study was conducted. The prompt asked for a 400-word essay. The topics were provided by the researcher, were familiar to the participants and were somewhat controversial to motivate participants to write longer essays. Screencast-O-Matic (2014) was used to capture the writing process on the screen in real time. It is a oneclick screen-capture recording software that operates on Windows or Mac computers. Godolakis (2014) used the same program to evaluate the effectiveness of grammar

and spell checkers. The exit questionnaire was designed by the researcher to compare their participants' beliefs about their interactions with the MS Word spell checker with their actual real-time practices. It consisted of seven questions about the spell checker itself.

9 c) Procedure

The participants began by filling in the background questionnaire, which required five to ten minutes to complete. They then received instructions to type a 400-word essay. Each participant's writing session was captured by the program Screen cast-O-Matic. When they finished, the participants were asked to fill in the exit questionnaire. The researcher was present in the lab to ensure that participants were not making use of external aids, such as paper drafts or dictionary apps on their phones. The participants were instructed to produce a well-written essay, which would necessitate the use of the spell checker while writing. They were made aware that their writing sessions were being recorded and observed. They typed their essays directly onto Microsoft Word 2010 without draft paper. Each participant had two hours to write the essay.

10 d) Data Analysis

To answer the first two research questions, the researcher observed the recorded writing sessions of participants to identify types of misspellings and to tally their frequencies. Repetitions of the same error were counted as one error. Each essay was opened in MS Word 2013 to explore the spelling correction options offered by the latest available version of the program. To answer the third research question on learner interactions with the MS Word spell checker, the recorded sessions were observed a second time to note participant responses to suggestions provided by MS Word 2010 for every misspelling.

Misspelled words were operationalized as errors that constituted non-words and had no meaning. To answer the first research question on systematically made L2 misspellings, spelling errors in the data were classified into performance and competence errors. Performance errors were unsystematic, accidental and self-corrected, while competence errors were systematic and not self-corrected due to a lack of appropriate linguistic knowledge on the target language. These were classified into phonological, morphological and orthographic errors (Heift & Rimrott, 2005). Morphological errors occurred when the subject used the wrong inflection or derivation of a word (e.g., *pearsonly ~personally). Phonological misspellings were errors that could be attributed to the learner's pronunciation or an ambiguous grapheme-phoneme correspondence (Thome, 1987). Orthographical errors occurred when the misspelled word sounded like the written target word, but the written form or grapheme used for the misspelled part did not correspond to the target word or the target grapheme (Al Jarf, 2010).

11 V. Results and Implications a) Spelling Errors MS Word Succeeded in Correcting

The first research question asked: What spelling errors made by Saudi learners of English did the Microsoft Word 2013spell checker succeed in correcting? Participants made a total of 401 spelling errors. Sixteen (3.9%) of these errors were undetected by the MS Word 2013 spell checker because they were real English words, such as *car ~care, *their ~there and *hem ~him.

Of the 385 remaining spelling errors, the MS Word 2013 spell checker corrected 305 misspelled words, which means that the spell checker was 79.2% effective in correcting L2 misspellings. Specifically, the MS Word 2013 spell checker succeeded in correcting 63 performance misspellings (20.7%) and 242 competence misspellings (79.3%). Of the 63 performance errors, seven resulted from addition, 10 from substitution, 39 from omission and seven from transposition, which makes omission the most successfully corrected performance error in the dataset. Such errors contained a single error that could be corrected by learners. Of the 242 competence errors, 10 were morphological, 98 were phonological and 134 were orthographical.

12 c) Performance Errors Not Corrected by MS Word

Only five of the errors MS Word 2013 failed to correct were performance errors. Two errors were due to substitution and three were due to omission. The substitution errors Eith and Giid contained single errors. Such errors could be due to fast typing. In the case of Eith, the W key is next to the E key on the keyboard. The same is true for Giid. The MS Word 2013 spell checker failed to correct these errors because they began with capital letters, which was observed while the participants were typing. The omission error paer contained a single error; arranments and knowledable had a deviation of two letters, g and e. These errors were all missing an essential consonant. They were classified as performance errors because the errors were self-corrigible (i.e., the learners could correct them by themselves).

13 d) Competence Errors Not Corrected by MS Word

Seventy-five of the 317 competence errors were not corrected by the MS Word 2013 spell checker. Of these, four were morphological (5.3%), 34 were phonological (45.3%) and 37 were orthographical (49.3%). These errors resulted from multi-edit misspellings, which may have negatively affected the effectiveness of MS Word 2013 in correcting them. Table 5 shows the distribution of competence errors that the MS Word spell checker failed to

correct across error types. . The addition of the vowel a in the root *pearsonly may have caused the failure of the MS Word 2013 spell checker to provide the target word in the suggested list of alternative words. The MS Word spell checker treated this error as two words: pears only and pear sonly. On the other hand, *wrihn was deficiently inflected. The participant missed the i and g of -ing. If the word had been inflected correctly as *wrihing, the MS Word 2013 spell checker would have provided the target word on the suggested list of alternatives.

The MS Word 2013 spell checker failed to correct 34 phonological misspellings (45.3%). The nonphonetic and arbitrary nature of English spelling (Ibrahim, 1978) may have resulted in these errors, such as *inkurge ~encourage and *inqurge ~encourage. The participants were attempting to imitate the sounds of the target words, but they could not distinguish between the vowel sounds /e/ and /i/ in the initial position. In the case of encourage, the phoneme /k/ had a different representation orthographically. It could be represented as k, q, c or ck. This led participants to represent the sound /k/ in encourage with a k as in *inkurge, or with a q as in *inqurge. The MS Word 2013 spell checker attempted to correct these errors by considering the first syllable of the misspelled words in with the second syllable and then with third syllable and so forth, suggesting words for*inkurge such as ink urge, incurve, inure and injure. For misspellings to be successfully corrected by the MS Word 2013 spell checker, learners could make no more than one error in each syllable or, in multisyllabic words, two errors in one syllable. MS Word 2013 could then suggest lists of correctly spelled alternatives that contained the target word.

14 iii. Orthographical Errors Not Corrected by MS Word

The MS Word 2013 spell checker failed to correct 37 orthographical misspellings (49.3%). Instances of orthographical errors included *takecair ~take care, *exllent ~excellent and *oneparatory ~one preparatory. In the first case, there was an incorrect word division, an addition of the vowel i and a deletion of the silent vowel e. In the case of *exllent, there was a deletion of the first part of the second syllable ce. The MS Word 2013 spell checker considered the first syllable of the misspelled words ex with the second syllable and then with the third syllable and so forth, suggesting words such as explant, exeunt, eluent and explants. TheMS Word 2013 spell checker treated *takecair as two separatewords: take and air.Air was closer than care in correcting *takecair. However, when the misspelled word was split into two words, take and *cair, theMS Word 2013 spell checker provided a suggested list that contained the target word, care, and the incorrect suggestion, air.

15 e) Determinants of the MS Word Spell Checker's Successes and Failures

A holistic assessment of the MS Word 2013 spell checker's performance showed that certain factors affected its efficacy. The first factor was the type of the error. Performance errors of adding, deleting, substituting or/and transporting certain letters could cause failure. For example, in the case of *paer~paper, omitting the letter p made it difficult for the MS Word spell checker to provide a suggested list containing the target word because MS Word could only recognize *paer as pear, pare, pair, pier or peer. The same was true for *safeing~saving in which substituting the letter v for f caused the MS Word spell checker to recognize the misspelled word as seeing, staffing, sifting, sailing or snafuing but not as saving.TheMS Word spell checker also failed to provide suggested lists for words such as *enkowlige~knowledge and *sernerval~several due to the addition of the letter e in the first case and the transposition of the letter v in the second.

The second factor in determining the success of the MS Word 2013 spell checker was capitalization.

Capitalizing the first letter of the misspelled word may have affected its efficacy. The MS Word spell checker could not provide suggested lists that contained the target words for misspellings, such as in the case of *Eith~With and *Giid~Good, due to the capitalization of the first letters. One possible reason for this failure was that the MS Word spell checker treated these misspelled words as proper nouns, as all alternative suggestions began with capital letters such as Edith, Eighth, Either, Keith and Leith for *Eith and Gide, Gild, Gird, Grid and Giada for *Giid. However, when the letter was lowercase, the MS Word spell checker provided suggested lists that contained the target words with and good.

16 f) Participant Interaction with Misspelled Words While Using MS Word 2013

The third research questions asked: How did intermediate-level Saudi learners of English respond to the alternative corrections provided by the spell checker? Observations of the recorded sessions of participants using MS Word 2010 revealed that the participants had six reactions when misspelled words were flagged. the most predominant tendency was for the participants to select a word from the suggested list of alternatives. Faced with a misspelled word, 24 out of 25 participants (96%) used the suggested list provided by MS Word 2010 to view whether the target word was listed. They chose the target word correctly 61% of the time.

Second, participants sought assistance from the Internet. When participants could not correct the spelling of a word by themselves or were doubtful of the suggestions given by the MS Word 2010 spell checker, they resorted to a search engine such as Google to check the spelling or meaning of a word 16.4% of the time. Participants used Google Translate and online dictionaries, such as the Oxford and Merriam-Webster, as well as online thesauruses.

One participant used Google Translate to correct the spellings and check the meanings of all the words in her essay. Another participant used studies in the form of PDF documents and articles published online to copy and paste certain words into her essay she was unable to spell, such as imitates, assessment and intimidated. The same participant used the King Saud Library online to gain access to articles and studies related to her essay topic. Third, when participants saw a misspelled word with a wavy line underneath, they changed the places of letters, substituted letters with others or added/deleted letters until the MS Word 2010 spell checker corrected the word or provided a suggested list of alternatives. Participants used this technique 13.6% of the time. Fourth, participants chose incorrectly from the suggested list of alternatives 6.0% of the time, even though, in some cases, the target words were available in the suggested list of alternatives (e.g., palace instead of place, proses instead of process and spurted instead of supported). Fifth, participants replaced a misspelled word with a synonym or a word similar to the intended word 1.5% of the time (e.g., replacing *exlent ~excellent with very good and *sernerval ~with some). Sixth, participants rechecked words selected from the suggested list. They rechecked the spelling of chosen words, collocations or their suitability within the context through one final quick reading in which they moved the arrow over the words 0.9% of the time. Frequencies of learner interactions with the MS Word 2010 spell checker are listed in Table 6. Results from the exit questionnaire confirmed that all participants were familiar with MS Word and used it for typing documents. In addition, participant perceptions on their interactions with the MS Word spell checker partially agreed with their real-time performance. The exit questionnaire shows that 60% of the sample reported that they used the spell checker to select the target word, 32% reported that they tried to correct misspelled words themselves and 8% reported that they did both. This was in line with the real-time observations of these participants using the spell checker in MS Word in 362 attempts (61.5%) and trying to correct misspelled words in 72 attempts (13.6%). Thirty-six percent reported they trusted the efficacy of MS Word spell checker to flag their spelling errors, while 64% reported no such trust. This suggests a learner awareness of the limitations of the MS Word spell checker. However, perceptions did not always match performance. When participants were asked about rechecking the spelling of words corrected by the spell checker, 64% percent reported that they did recheck or sometimes rechecked misspelled words once the MS Year 2019

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Word spell checker had offered an alternative and 36% reported that they did not. In actuality, an attempt to recheck a corrected word occurred only five times out of 530 attempts or in 0.9% of the cases.

In addition, the exit questionnaire asked participants about spelling aids when the MS Word spell checker failed to provide corrections. Results showed that 68% of the participants reported seeking assistance from Google, 12% reported replacing the word, 8% reported using a dictionary and 4% reported that they would not seek further help. Results from real-time observations confirmed participant perceptions. Google was used in 87 attempts (16.4%), word replacement occurred in eight attempts (1.5%) and only one participant left three misspelled words without correction.

17 VI. Discussion

This study confirmed the findings of previous researchers regarding the complex and systematic nature of L2 spelling errors. Just as Emery (2005), Al-Ta'ani (2006), Al Jarf (2010), Alhaisoni et al. (2015) and Heift and Rimrott (2005) observed, misspellings made by L2 learners in this study contained single and multiple errors and significant deviations from target words. The current dataset contained spelling problems like those identified by Emery (2005) and Al Jarf (2010). There were comparable sources of errors and strategies employed by learners, such as the occurrence of substitutions, additions, omissions and the transposition of letters to represent target words. There were also problems of interference from the L1 and problematic applications of L2 rules. The current dataset also fits Heift and Rimrott's (2005) observation that most L2 misspellings were errors, not mistakes. Participants in this study made more competence errors (n = 317) than performance errors (n = 68).

The study was premised on the fact that the MS Word spell checker was designed to address spelling errors made by native speakers of English. Rimrott (2005) stated that multiple-edit errors caused the MS Word 2003 spell checker to have a low correction rate, which prompted researchers to express concern that the spell-checking feature in word processors like MS Word would be ineffective in fixing non-native misspellings (Bestgen & Granger, 2011;Heift & Rimrott, 2005). However, in this study, the MS Word 2013 spell checker was found to be 79.2% effective at providing intermediate second language learners with their target spelling. The success rate of this was 52.2% in Heift and Rimrott's 2005 work and 62% in Heift and Rimrott's 2008 work. Heift and Rimrott (2005) found that the MS Word 2003 spell checker had a 31.4% rate of uncorrected misspellings and a 16.4% rate of undetected misspellings. However, the current study found that MS Word 2013 demonstrated a better performance and had a reduced rate of 20.8% uncorrected misspellings and 3.8% undetected misspellings. These findings suggest that the MS Word spell checker improved in later versions at addressing L2 misspellings. For example, Godolakis (2014) in her more recent assessment of MS Word 2010, found that the program was 85% effective regarding performance errors and 29% effective regarding competence errors in a sample of only four L2 learners. In this study, with a sample of 25 L2 learners, MS Word 2013 was found to be 92.6% effective regarding performance errors, correcting 63 out of 68 errors, and 76.3% effective regarding competence errors, correcting 242 out of 317 errors.

As for the failure of MS Word 2013 to correctly address L2 misspellings, in this study, the program failed to

correct five performance errors. Heift and Rimrott (2005) found that the MS Word 2003 spell checker failed to correct 10 performance errors in single-error words. In addition, in this study, the MS Word 2013 spell checker failed to correct 75 competence errors of which none were lexical, four were morphological, 34 were phonological and 37 were orthographical. Heift and Rimrott (2005) found that MS Word 2003 failed to correct 116 competence errors of which 77 were lexical, 16 were morphological, 21 were phonological and two were orthographical. The discrepancy in numbers of lexical and orthographical errors was due to the modification made to the classification of errors in this study. Participants in this study did not make lexical errors, such as blending two distinct words. This could be attributed to the learners' intermediate level of proficiency. Rimrott (2005) found that intermediate level learners made fewer lexical errors than beginners. However, no such errors were found by Al Jarf (2010) who worked with the similar sample of Saudi learners of English.

Phonological errors could have resulted from inter-language transfer. Al Jarf (2010) explained that there is a one-to-one correspondence between phonemes (spoken sounds) and graphemes (written symbols) in the Arabic language, in which each consonant and each vowel has only one sound. English has no one-to-one correspondence between the sound and written form; therefore, spelling words as they sound can cause words to deviate from their target spelling. This makes it difficult for the MS Word spell checker to successfully correct them (Heift & Rimrott, 2005). The high number of orthographical errors, on the other hand, could be explained by the learners' ignorance of the correct spellings of words (e.g., *caunnuty ~community, *acuring ~acquiring and *acquestion ~a question). Al Jarf (2010) noted that ignorance of spelling rules could be a source of errors. Such errors cause deviations from the target spelling and therefore make it difficult for the MS Word spell checker to successfully correct the misspellings. Heift and Rimrott (2005) and Bestgen and Granger (2011) found that the MS Word spell checker encountered more difficulties correcting misspelled words with multiple errors. This was confirmed in the findings of this study in which most of the errors that the MS Word spell checker failed to correct were multi-edit competence errors.

Concerning the learners' interactions with the MS Word 2010 spell checker when an error occurred, Al Jarf (2010) reported that her students tended to transfer, substitute, delete or add letters as a strategy to represent the target words while writing. The participants in this study used the same strategies to correct errors while using MS Word 2010 but only 13.6 % of the time. They primarily relied on the MS Word spell checker; they selected the target word from the list of alternatives 61.5% of the time and they seldom (6% of the time) made the wrong choice. This tendency to benefit from the MS Word spell checker was also found by Godolakis (2014) who reported that participants chose the target word from the suggested list provided by MS Word 2010 64% of the time yet chose incorrect words from the suggested lists of alternatives 35.9% of the time.

Most participants in this study were selective in their interactions with the MS Word spell checker. They did not blindly choose from the list of alternatives. More importantly, they distinguished correct suggestions from incorrect ones. Participants made wrong choices from the suggested list in limited cases. This could be explained through the order of the words on the suggested list. Antonsen (2012) explained that, for L2 writers, the order in which the words appeared on the suggestion list seemed to influence the selection of one word over another. This matched the findings of Godolakis (2014), which suggested that learners trusted the spell checker but were aware of its limitations. However, Godolakis explained that, in the 50 cases during which the student chose the target word, 47 had the target word in the first position on the list provided by MS Word. In 28 cases, the students chose an incorrect word from the list provided by MS Word, and in 19 cases, the students chose the first word on the list. This highlights a general tendency among L2 learners to choose the first word provided by MS Word. The wavy red line marked by MS Word was still found to urge participants to correct their spelling errors even when the spell checker failed to correct them.

Data analysis also revealed possible factors that affected the performance of the MS Word spell checker while correcting L2 misspellings. One of the factors was a capitalization of the first letter. The MS Word spell checker treated these misspelled words as proper nouns, as all alternative suggestions began with capital letters. This could be the reason Flor and Futagi (2012) designed the system ConSpell to ignore capitalized words, such as Riyadh, and/or words in all uppercase, such as LONDON.

Chaudhuriand Samanta (2013) reported that, for errors occurring in two places within a word, generic spell checkers worked well. This study did not confirm such results in all cases. The results of this study showed that the MS Word spell checker corrected 17 out of 28 misspelled words with multiple instances of C+V errors. In short, for errors occurring in two places in a word, generic spell checkers may not always work well.

18 VII. Limitations

Despite its relevance within the context in which it was carried out, this study involved several constraints that prevented its results from being generalized. First, the number of participants was limited to 25 female students. A larger number of university students would have yielded more reliable insights into the efficacy of the MS word spell checker, especially if a group of male students had been able to communicate their perceptions on the issue.

Second, writing competency is not only measured through the fixing of spelling errors committed by language learners. It may also be assessed through the extent to which these learners join words and sentences clearly and use appropriate functions to express meaning. MS Word also fixes structural problems such as these, but the scope of the current study could not cover all types of errors. These errors may be the focus of future studies.

19 VIII. Conclusion

This study assessed misspellings made by 25 intermediate-level Arab learners of English. It highlighted features that aided and impeded the MS Word 2013 spell checker, which was found to be 79.2% effective in correcting misspellings by L2 learners. Uncorrected misspellings were largely due to multiple-edit errors in single syllables, which MS Word 2013 could not address. Performance errors were lower than competence errors in number and frequency due to the intermediate proficiency of the sample. Performance errors were mostly the result of substitution and omission. Most competence errors were phonological and orthographical errors, which were also the most challenging for the MS Word spell checker. They occurred because participants relied on their ears when typing (James &Klein, 1994). Arabic and English, to some extent, differ in phonology. The discrepancy between the written form and the sound of a word in English, as well as the arbitrary nature of English spelling, led participants to make more phonological and orthographical errors. The MS Word 2013 spell checker dealt with such errors either by failing to provide a suggested list or by suggesting a list that did not contain the target word.

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Although the MS Word 2013 spell checker was mostly effective, certain factors were observed to cause its failure. This study found that the type of error, capitalization of the initial letter of the misspelled word and the number and position of errors in single syllables hindered the MS Word 2013 spell checker's ability to correct misspelled words. MS Word attempted to correct misspellings by considering the first syllable of the misspelled word with the second syllable and then with third syllable and so forth. In some cases of multiedit misspellings, the MS Word spell checker detected the misspelled word but failed to provide suggested alternatives.

This study focused on L2 learners' real-time responses to the MS Word spell checker's treatment of errors, especially alternative corrections offered by the program. Therefore, in addition to the field of second language writing and computer-assisted language learning (CALL), results of this work would provide insightful input to programmers of word processors, such as MS Word, to better accommodate a primary group of users, second language learners of English.

The current MS Word 2013 spell checker is effective in correcting 79.2% of learners' misspellings. Participants found the target word on lists of alternatives 61.5% of the time. This is reassuring, as learners could focus more on content and writing style rather than only on spelling. Furthermore, the wavy red line that appears under words in MS Word documents whenever a misspelling occurs alerts L2 learners to correct errors when needed.

The results of this study prompt several computational and pedagogical suggestions. The MS Word spell checker is not a learning tool, as stated by Helfrich and Music (2000). However, MS Word could be used to help learners improve their knowledge of English spellings. Most academic and professional work requires the skilled use of word processors. With little empirical analysis of popular spell checkers and their effectiveness regarding errors made by L2 learners, practical guidance in L2 writing classes may be lacking essential guidelines on how to best incorporate language assistance from word processors.

21 Appendices

Appendix A: Background Questionnaire Note: This information will be kept confidential. Your name and contact information will be replaced with a numerical code after data collection. [1] [2]

1

& Samanta, 2013; Flor

Figure 1: Table 1 :

2

Figure 2: Table 2 :

[1] © 2019 Global Journals

[2] Does the MS spell checker effectively correct non-native English writers' errors? A case study of Saudi University students

3

Figure 3: Table 3

3

	Performance errors					Competer-rors
Addition	Substitution	Omission	Transposition	Morphological		Phonol
7	10	39	7	10		98

b) Spelling Errors MS Word Failed to Correct
The second research question asked: Which spelling errors made by Saudi learners of English did the MS Word 2013 spell checker fail to correct? As previously indicated, 305 errors were successfully altered by MS Word 2013. This means that MS Word 2013 failed to correct 80 of the total 385 misspellings (20.8%). For 59 of those errors (15.3 %), the M 2013 spell checker provided a list of alternativ target word was not on the list. Twenty-one n words (5.5 %) received no suggested alternativ were only marked by the MS Word 2013 spell as spelling errors. Table 4 below shows the dis of detected errors.

Figure 4: Table 3 :

4

Target Word	Frequency	Percent
On list of alternatives	305	79.2
Not on list of alternatives	59	15.3
No list of alternatives provided	21	5.5
Total number of detected errors	385	100

Figure 5: Table 4 :

5

Morphological	Phonological	Orthographical
4	34	37

i. Morphological Errors Not Corrected by MS Word
The MS Word 2013 spell checker failed to correct four morphological errors (5.3%). The errors *pearsonly ~personally and *wrihn ~writing were the result of incorrect derivation and/or inflection of words. For example, *pearsonly missed the adjectival infix al that is derived from personal
ii. Phonological Errors Not Corrected by MS Word

Figure 6: Table 5 :

6

Learner Interaction	Frequency	Percent
Chose the target word from the suggested list	326	61.5%
Sought assistance from the Internet	87	16.4%
Changed letters until Word recognized the misspelling	72	13.6%
Chose incorrectly from the suggested list	32	6.0%
Replaced the target word with another	8	1.5%
Rechecked the corrected words	5	0.9%
Total	530	100%

Figure 7: Table 6 :

Name: _____ Level: _____

English	Elementary school	Elementary school	Arabic	Both	It depends on with whom I talk

[Note: U 1. Where are your parents/caregivers from? U 4. What is your parents' highest level of education? (Circle one for each)]

Figure 8:

Appendix B: Essay Instructions 53. What would you like to improve about your English language ability? Instructions

.1 ?

Write a 400-word essay about ONE of the three topics listed below using Microsoft word. -Include an introduction with a clear thesis sentence -Support your thesis sentence with three main ideas: Facts, opinions, or reasons. Be sure to include examples. -Write each main idea in a separate paragraph.

.2 ?

Topics to choose from are:

.3 ———————————————————————————————————————

———————————————————

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What languages did you hear in your home from birth to 5 years old? (Circle all those that apply) 8. What languages did your parents/caregivers use mostly when speaking to you? 9, English Other. (What languages did you use mostly when speaking to your parents/caregivers?. 10. Do you have siblings? to you? Arabic 14. Where there other caregivers in the house (baby-sitter/ other family member. specify) _____)

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[. . . . .] *Yes No How many?*, ...

[Yes No you with or against the Preparatory Year? Does it help build skills, or is it a waste of time and effort? 2. Do you prefer t
'Yes No you with or against the Preparatory Year? Does it help build skills, or is it a waste of time and effort? 2. Do you prefer to be taught English courses by native speakers of English or by non-natives?'. *Why? 3. Do you depend on computers or books and notes when you study or do your assignments? Why? References Références Referencias*,