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APPLYING LEVELS OF PROCESSING TO THE INVESTIGATION OF WRITTEN ENGLISH-ARABIC TRANSLATION ERRORS: THE CASE OF TRAINEE TRANSLATORS

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The problem of specifying the errors committed in the process of written translation is a moot point. In this paper, the levels-of-processing approach is proposed as a viable toolkit for tracking, specifying, and more importantly, analyzing those errors when translating from English into Arabic. The levels suggested are the lexico-semantic level, the co-textual level, and the contextual level. The paradigm in this research is to take the output, i.e. the translations, as evidence for the presence or absence of certain levels that directly or obliquely have a bearing on written translation errors, and to record the highly recurrent or operative and the least observable ones.

Key words: translation quality assessment, levels of processing, errors in translation.

1. Introduction

Errors committed in the process of written translating have been divided into several categories, but none touches upon the need to incorporate levels of processing as explicated by Craik and Lockhart (1972) into the framework of translation error detection and analysis. The paradigm in this research is to take the output, i.e. the translations, as evidence for the presence or absence of certain levels that directly or obliquely have an impact on translation from English into Arabic, and to record the highly recurrent or operative and the least observable ones through an experimental design that allows participants to translate a given text within tight time limits, and to divide their errors along the levels proposed.

2. A note on the levels of processing approach

The term 'levels of processing' was first coined by Craik and Lockhart in 1972, but later refined by Craik (2002) and shortly referred to as LOP. It simply means moving from the bottom levels of comprehending an utterance to the higher ones. Craik, however, used the term in a different sense and for a different function from the present intentions and purposes of the present experiment. He (2002) thought that dividing attention during reading or listening among different levels would improve recall, and usually referred to those levels under the

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umbrella term 'depth of processing'. His findings are thus confined to the problem of retention, but the division itself (into phonemic, graphemic and semantic levels of processing) can be adapted to suit the purposes of the present experiment.

Another approach to levels of processing is proposed by Sanford and Graesser (2005). They caution that their use of the term is not based on Craik's LOP. Rather, Sanford and Graesser prefer to discuss it in relation to the factors which affect the depth or extent of processing, especially the term 'underspecification'. They define 'underspecification' as a term which refers to the incomplete semantic analysis of meaning by the comprehender due to the shortage of information offered in an utterance or text. Sanford and Graesser (2005: 2) provide the following example:

Every kid is up a tree.

There are several meaning potentials here: it could mean that there is just one tree which all children climb; or there may be an indefinite number of trees and an indefinite number of children, each up a tree. Finally, the number of trees may be larger than the number of children. Sanford and Graesser believe that a full semantic interpretation would include all the above options, while an underspecified one would include some but not all of them. The context is what determines the choice.

What is important according to the above discussion is two points: first, it is necessary to divide written translation errors into different levels. An attempt at studying errors alone or while translating without such a division would result in a jumbled account which lacks the mechanisms for probing the effects of the semantic, syntactic or world knowledge levels. Second, the original levels of processing as suggested by Craik and Lockhart are not sufficient: the co-textual and contextual levels can be added to give more room for the complex processes involved in written translation. Therefore, the present experiment is divided into three levels: the lexico-semantic level, the co-textual level, and the contextual level (or macro-level).

3. Approaches to written translation errors : a recognized gap

Despite diverse approaches to and studies conducted on error-making in the course of translating written texts, there appears to be a clear gap in applying the notion of levels to English-Arabic translation. All these studies ignore the possibility of exploring errors in written translation through the notion of processing levels. The task in this paper is to examine its validity as a window on the translation process and translation quality assessment (henceforth TQA). The studies below are a host out of a legion.

Salient studies on TQA focus on finding, or more correctly, building up a number of criteria or standards by which a translation can be assessed objectively. These studies combine the prevailing trends in modern linguistics with a view to cultural considerations in both ST and TT. Chief among these studies are Darwish's proposals (1995, 1999, 2001) regarding a search of a formative approach to assessing the translator's competence and the translation's quality. Darwish couches his approach in pedagogical terms, maintaining, like Schäffner, that a translation cannot be located on a scale of 'right' and 'wrong':

> Barring mistranslations, errors of meaning, syntax, lexis, and so on, no translation strategy or approach should be deemed better than another except in terms of how effective it is in meeting the requirements of the translation product (Darwish 1995:5).

Darwish further classifies the assessment process into information integrity, linguistic integrity, translation dexterity and fitness for purpose. He defines information integrity (Darwish 1995:11) in terms of accuracy, correctness, completeness and intention. Linguistic integrity ((Darwish 1995:12) is defined in terms of grammar, spelling, unity of sentence/ paragraph, cohesion and coherence. He defines translation dexterity ((Darwish 1995:13) in terms of strategies, comprehension, production, matchability, and approximation. As for fitness for purpose, Darwish (1995) classifies it into usability, satisfaction of specification, satisfaction of user information needs, readability, legibility, and cultural appropriateness. Darwish furnishes all criteria mentioned above with a scale ranging from 1 to 5. However, his definitions remain fuzzy and, in most cases, they lack assigned principled justifications. The reader is left to wonder: what is the exact meaning of 'matchability'? Or is readability not included in legibility?

Darwish builds upon the criteria given above in his paper in 1999 (revised in 2001), where he changes 'translation dexterity' into 'translation integrity'. Darwish (2001:9) lists 'translation variables': accuracy, precision, correctness, completeness and consistency.

Al Qinai (2000) adopts a line similar to that of Darwish and applies a number of parameters to the translation of a sports car advertisement published in Baker (1992). Al Qinai (2000:499) provides the following parameters: textual typology (province) and tenor, formal correspondence, coherence of thematic structure, cohesion, text-pragmatic (dynamic) equivalence, lexical properties (register) and grammatical/syntactic equivalence.

Waddington (2001) also tackles TQA in practical terms. He agrees with Campbell (1999) that there are three separate factors in translation evaluation,

based on test papers of 38 candidates who did English-Arabic translation (Campbell 1999:312): lexical coding of meaning, global target language competence, and lexical transfer competence.

Stansfield et al. (1992 in Waddington 2001: 312-313) carried out similar studies based on samples taken from FBI translators. The Stansfield team came to the conclusion that translation competence should be divided into two different skills – accuracy, which is the degree of precision with which the translator transfers the content from the SL to the TL, and expression, which is the quality of the translator's expression of this content in the TL. Their studies depend mainly on reading and listening comprehension tests as a validation of the two above-mentioned criteria. Waddington (2001:313), however, maintains that student translation can be assessed using four seminal methods. The first method analyses mistakes according to three headings: inappropriate renderings which affect the understanding of the source text; inappropriate renderings which affect expression in the target language; and inadequate renderings which affect the transmission of either the main function or secondary functions of the source text.

The second method is based on error analysis as well, but the assessor has to determine whether the mistakes are translation-specific or language-specific. If the mistake does not affect the transfer of meaning, then it is a language error (and is penalized with -1 point); if it does change meaning, then it is a translation error (and is penalized with -2 points). The third method is a holistic assessment. The following table illustrates the levels of mistakes in this method:

Negative effect on words in ST	***Penalty for negative effect***
On: 1-5 words	2
6-20 words	3
21-40 words	4
41-60 words	5
61-80 words	6
81-100 words	7
100+ words	8
The whole text	12

Table 1: Sansfiled et al's translation error penalty table

The final method combines error analyses in the second and third methods in a proportion of 70/30.

A very recent study by O'Brien (2013) sets out to review eleven translation quality evaluation models adopted by a number of companies. They "profiled their translatable content according to the parameters of utility, time and sentiment" (O'Brien 2013:1). O'Brien proposes a new model based on the communication channel, the content profile and the parameters of utility, time and sentiment to proceed towards a more dynamic quality evaluation model for translation. Her benchmarking exercise demonstrated that the preferred method for evaluating translation as a product in the translation industry is the error typology, with associated penalties and severity levels. However, O'Brien acknowledges the limitation that her model, while appropriate in some contexts, cannot serve some content types (i.e. text types), various communication channels (spoken and written) and new needs (of the translation market).

It is clear from this short review that written translation errors have not been discussed within the framework of the levels of the processing approach. Most of the studies focus on how these errors can be fitted into a linguistically proper network such as errors of grammar, cohesion, coherence, etc. without giving any possibility of incorporating them into the paradigm of discrete levels that can be easily detected. The present paper will attempt such an incorporation.

4. Pilot experiment

4.1. An overview of the experimental design

The rationale of the present study is based on the idea of separating the envisaged levels of error-making in English-Arabic translation in order to pinpoint them as well as to figure out their potential causes while translating. The levels proposed are: lexico-semantic level, co-textual level and contextual level.

These levels are meant just as pointers of how an error occurs in written translation.

The present experimental design is based on two variables:

- The independent variable (i.e. the level of error)
- The dependent variable (i.e. the translation).

4.2. Instruments and procedures

4.2.1. Test preparation

The test was based on a text for ESL students available online: www.rong-chang.com/qa2/stories/story011.htm. The text was chosen because it narrates a simple story and has an overall Flesch-Kincaid Reading Ease readability score of

89.4[1]. The translation extract has a Flesch-Kincaid Reading Ease readability score of 90.0. It is also made up of 391 words, and the translation task contains 213 words. The extract for translation was taken from the middle of the text to make sure that the participants have well understood a reasonable proportion of the narrative. The instructions and the translation task were the same for the three groups. The instructions included the stipulation that the subjects should not start answering unless they are told to.

4.2.1.2. A note on the term 'trainee translators'

The term we use in this study refers to student translators who are being prepared to become professional translators. Their preparation usually follows the route of four years of studying translation for 12 hours or more in both directions (from Arabic to English and vice versa) plus some strategies to deal with linguistic and extralinguistic problems. They are called 'trainee' in the present study due to the fact that they were required to translate from English into their mother tongue Arabic.

4.2.2. Participants

4.2.2.1. Categorization

The subjects chosen are a group of fourth-year students at the English Department, Faculty of Education, Alexandria University. They were randomly chosen from 252 students, and were divided into three sub-groups according to the rates of errors committed on each level inside each group. Thus, for example, a group of the participants is considered a contextual processing group if the errors committed on the contextual level are the least among the other levels. This means that contextual processing is utilized to the full. Group 1 consisted of 28 participants; group 2 consisted of 26 participants, and group 3 consisted of 28 participants. The total number of subjects was 82 (N= 82).

- Group 1 is called the 'lexico-semantic group',
- Group 2 is called the 'co-textual group'.
- Group 3 is called the 'contextual group'.

4.2.2.2. Homogeneity

To ensure homogeneity among the groups in translation proficiency levels, their course marks were reviewed. They ranged from 6 to 7 out of 10. None of them used to get 1, 2 or 4, and thus they are all mediocre as student-translators.

[1] The more the score approximates 100, the easier the text is.

4.3. Time and environment

The subjects were encouraged to sit for the test by promising extra course marks. No cases of cheating were reported due to strict invigilation. Each group was isolated from the other at the time of the test.

4.4. Scoring

The scoring process was mainly based on plotting the errors committed along the three levels proposed. The integrity of scoring was achieved through coded subjects' translation attempts, which were distributed among five raters to ensure inter-rater reliability (i.e. the practice of allowing more than one rater to evaluate an answer). Each rater assigned a mark for the overall translation product after reviewing it. The marks ranged from 1 to 6. The raters were asked to provide their judgements based on the type of error detected. The raters were also asked to indicate the level(s) involved while evaluating the translation products:

1. The 'lexico-semantic level',
2. The 'co-textual level'.
3. The 'contextual level'.

Each score was reviewed by the five raters, and the average was calculated by dividing the sum of the scores by the number of the raters.

These errors were taken as initial evidence of the level of processing involved. Each error was then checked by the researcher against the other levels involved to ascertain that no overlap in judgement occurred.

4.5. Findings

4.5.1. Lexico-Semantic Group (LSG)

In this group, the focus is on the lexical semantics of certain parts of the text. All the scores are normal, and no anomalies were reported. The following table provides the mean scores in both reading and translation sections together with the standard deviations:

Variable	N	Mean	Standard deviation
Translation performance	28	3.9071	.4666

Table 2 : The means and standard deviations for translation scores

4.5.2. Co-textual Group (CG)

Unlike GPG, CPG scores in reading and translation are almost equal in percentage. This might shed light on the impact of co-textual processing on translation, an issue to be discussed later. The following table provides the mean scores in both reading and translation sections together with the standard deviations:

Variable	N	Mean	Standard deviation
Translation performance	26	3.8846	.3760

Table 3: The means and standard deviations for translation scores

4.5.3. Contextual Group (COG)

The following table provides the mean scores in the translation section together with the standard deviations:

Variable	N	Mean	Standard deviation
Translation performance	28	3.9607	.3928

Table 4: The means and standard deviations for translation scores

As a preliminary note, it appears that the highest mean of scores in the three groups is the contextual-processing group, i.e.3.9607 . However, this result needs to wait for verification through the ANOVA analysis below.

4.6. Statistical analysis

4.6.1. Statistical methods used

The present experimental design is based on two variables: the independent variable (i.e. the level of processing) and the dependent variable (i.e. the translation). Due to the number of treatments (i.e. four treatments) proposed, and the difference in the number of subjects in each group, the One-Way ANOVA analysis between and within groups is used.

After applying the One-Way ANOVA, the post hoc test of LSD (least significant difference) is used to compare the groups.

4.6.2. Statistical findings

The SPSS (version 11) was used to analyse the raw data. The results for One-Way ANOVA are as follows:

	Sum of squares	**df**	**Mean**	**Square Fisher F-value**

Between groups:	5.323	2	2.626	15.389
Within groups:	13.664	79	0.173	---
Total:	18.987	81		
Significance (*p*)				000

Table 5: One-way ANOVA analysis results

The above table gives the details of the results for the ANOVA analysis. The F-value is 15.389, which means that there is a significant difference among the groups, as by consulting relevant statistical tables, it appears that the degree of freedom (df) is significant at 2.70.

To corroborate the differences between groups, the LSD post hoc test was used. It applied a confidence level of 95%. The following table shows the results of the Scheffe test:

	Groups 1 & 2	Groups 1 & 3	Groups 2 & 3
Least significant difference (Scheffe)	0.3404	0.3404	0.3468

Table 6: Multiple comparisons among the four groups regarding the translation task

The table shows the mean differences and the significance rates among the groups. The mean difference between groups 1 (GG) and 2 (LSG) is 0.3404, which is significant, since it is closer to .000. Similarly, the mean difference between and 1 (LSG) and 3 (COG) is 0.3404. The mean difference between 2 (CG) AND 3 (COG) is 0.3468. These findings shed light on the fact that global context exerts a similar influence on the translation product, for the contextual processing group is significantly dissimilar to the co-textual processing group. Yet the similarity among the lexico-semantic group and the contextual group is due to the emphasis on the semantics of the source text when translating from L2 to L1.

5. Discussion of findings

5.1. Why certain items?

The items examined under each section below point to the most problematic ones. The rationale for choosing these 'lexicalized items' is based on their recurrence as errors committed by the participants. The error rates for each exceeds 85%, which renders them a veritable source of difficulty. The following table provides a list of the items discussed and their possible translations. The items are arranged in order of occurrence:

Problematic item	Possible Arabic translation(s)
Commuters	مسافرون
interstate	بين الولايات؛ مابين الولايات وبعضها البعض
they said	أخطروها؛ أخبروخا
A bell went off'	دق الجرس؛ سمعت صوت الجرس
billboard	لوحة إعلانات
flyers	ورقة إعلانية
pet	حيوان أليف
telephone pole	هاتف عام؛ تليفون عام
savings	مدخرات

Table 7: Problematic items with their possible Arabic translations

5.2. The LSG errors

The following table provides a summary of the rates of errors committed by the lexico-semantic level subjects across the four levels of processing in the course of translating:

Error level	Lexico-semantic level	Co-textual Level	Contextual level
LSG	14/84[2]	42/84	40/84
Percent.	16.67%	50%	47.62%

Table 8: LSG translation error scores across error levels

As the table shows, errors are at their utmost on the lexico-semantic level. Thus, 'commuters' is mistranslated only 8 times, being confined to either مركبات or مواصلات or the evasive أشخاص. Yet two other lexical items merit discussion here, i.e. 'suspiciously' and 'interstate'. The first is translated by two subjects as متحيراً. Although the semantic attributes of متحيراً do not neatly fit into the semantic frame

[2] The total of error scores is calculated by multiplying the number of errors committed for each level by the number of subjects.

of 'suspiciously', the connection can be easily established. The two subjects thus go backwards to the question posed by the officer about the nature of the missing being. The decision of choosing متحيراً is also based on what the two subjects might have concluded from the physical description of Clyde presented in the second paragraph of the text. Thus, the situation might be a telephone conversation between Mrs Brown and the officer in which she reports that Clyde is missing without specifying that it is just an animal, i.e. a cat. This imaginary situation 'resonates' in the choice of متحيراً. Moreover, this is augmented by activating the range of denotations relevant to 'suspiciously', where ارتياب is obliquely related to حيرة. The two subjects in question might have imagined how Mrs Brown has provided a physical description of Clyde as a human being, and they further imagined that the officer must have been confused.

The second lexical item is 'interstate'. Two translations are proposed, namely محطة القطار and الجهة الداخلية. The first is an attempt at the global context, but it lacks any justification either cognitively or semantically. The second is an equally wrong attempt but quite a complex decision. The choice of الداخلية is governed by 'inter-', where 'internal' is activated as well as the misinterpretation of 'inter-'. The subjects might have applied morphological misanalysis, thinking that 'interstate' can be broken down into 'inter-' +'state', and 'state' is translated into جهة to collocate with 'inter-' in Arabic. If 'state' is translated as حالة or ولاية (which is definitely more plausible), the result will be حالة داخلية or ولاية داخلية. The subjects ruled out the two because of their unnaturalness.

The highest rate of errors is at the co-textual level. This can be justified by overloading memory with keen processing at the level just below it, i.e. the lexico-semantic level. This overload results in errors that are due to either inattention or disregard to the co-textual cues. The co-referential error of أخبروها as a translation of 'they said' is rampant at all levels, but it is not a far-reaching problem of LSPG subjects. Similarly, the omission of 'A bell went off' or translating it into اندهش or انطلقت صرخة is semantically based. The use of اندهش underpins the rule of 'idiomatic expression cannot be translated by breaking them down into separate words'. The use of انطلقت صرخة, on the other hand, is a corollary of 'go off' as meaning 'explode' or 'scream' as a starting point for analysing 'A bell went off'.

Finally, at the contextual level, the rate of errors is very close to that of the co-textual level, i.e. 47.62%. Around 32.14% of the LSG subjects used either telegraphic translations or fused the two or three paragraphs into each other. The figure sheds light on the disregard to complex textual features on the part of lexico-semantic level subjects. This might again be attributed to overattention to

the lexical meaning at the expense of co-text and context. The contextual level also contains errors in mental imagery. The same errors of كبائن التليفون and المكالمات التليفونية are repeated, but new ones figure. Two subjects out of 28 committed the error of translating 'billboard' into مجلة حائط. The mistranslation is definitely due to absence of the item in their lexical access, or due to the 'associations [which] were always present' (Hall, 1996:116), where 'board' is mentally related to 'walls'. More notably, 14.28% of the subjects in this group mistranslated 'flyers' as عناوين, إعلان في جريدة, and the strange تشيعي سؤالك. The case of عناوين is again a sign of a missing concept, while إعلان في جريدة is 'translation by explicitation' (a term coined by Venuti, 2000:288). The use of explicitation results from inconfidence in إعلان alone, and the addition is again geared towards the semantics of the text. However, the strange تشيعي سؤالك is not as haphazard as it might first appear. The failure to find out the equivalent of 'flyers' through morphological analysis forces the student-translator to resort to the global context or context of situation, in which Mrs Brown asks and is being asked. This brings about سؤالك, and recourse is then made to 'flyers' again, possibly guided by the idiomatic expression 'air an opinion'. An amalgamation of the two steps leads to تشيعي سؤالك.

It can be concluded at this point that lexico-semantic and contextual levels of are the most widely used levels while translating.

5.3. The CG errors

The following table provides a summary of the rates of errors committed by the co-textual level subjects across the four levels in the course of translating:

Error Level	Lexico-semantic Level	Co-textual Level	Contextual Level
CPG	4/78	38/78	31/78
Percent.	5.13%	48.72%	39.74%

Table 9 : CG translation error scores across error levels

The table shows the rates of errors on all error levels. Thus, on the lexico-semantic level, most of the errors are located, i.e. 94.87%. The two remaining levels are somewhat similar, i.e. 51.28% and 60.26%, respectively.

The CPG subjects have almost made the same mistakes on the graphological level as the GPG and LSPG subjects. They have deleted 'commuters' out of unfamiliarity, or mistranslated it as وسائل نقل, المارة , or تحضيرات. For وسائل نقل,

the subjects are again guided by the distant context 'no one moves'; but for المارة, they decided to generalize and prevaricate. The case of تحضيرات is seemingly unjustifiable; it might simply be a slot-filler, which supports Campbell's view (1999) about the translator's insistence on 'persistent capitulating'. What is noticeable on this level is the translation of 'flyers' as حشرات and ملاحظات by two of the CPG subjects. The use of حشرات is rooted in morphological misanalysis and lexical confusion: if حشرات were correct, it should be 'flies' (ذباب؟) or 'insects', so where is the function of the derivational morpheme '-er'? The case of ملاحظات can be explained in the light of defective TL production or LTM storage. The subjects might have a poor command of Arabic; thus, they did not find an equivalent but they already know the semantic constituents of 'flyers' because they used a component of what is traditionally found on 'flyers', namely ملاحظات. The error can be attributed to storing 'flyer' in LTM and mental lexicon without inserting an Arabic equivalent.

On the lexico-semantic level, the CPG subjects have committed a few errors. For instance, 'pet' is translated intoقطك and 'interstate' into الطريق السريع . These two errors are committed by other groups too, and the majority of the CPG subjects managed to translate 97% of the text correctly.

On the co-textual level, the subjects committed the rampant error of failing to resolve the anaphora of 'they said' and partly of 'A bell went off'. However, the magnitude of the co-reference error should be amplified, since the subjects are supposed to have answered a specific question on the co-referent of 'they' in the reading section of the test. Around 84.62% answered that question correctly. The reason for that discrepancy is twofold. First, the CPG subjects might have failed to see the connection between the reading questions and the translation task, since they devote much of their effort to the lexico-semantic features of the text. Second, reading comprehension proficiency does not always guarantee proficiency in translation.

On the contextual level, the CPG subjects committed the same errors, i.e. 'billboard', which was translated as حائط سداد, and 'telephone pole', which was translated as كابينة تليفون. However, these two errors were not as common as they were for the other groups. The translation of 'billboard' as حائط سداد scored 3.85% only, and the translation of 'telephone pole' as كابينة تليفون scored 34.61%. The reason behind the decrease might be the transition from the co-textual to the contextual level of errors. A cline can be envisaged on which errors increase and decrease in the light of what might be termed as 'error-level proximity':

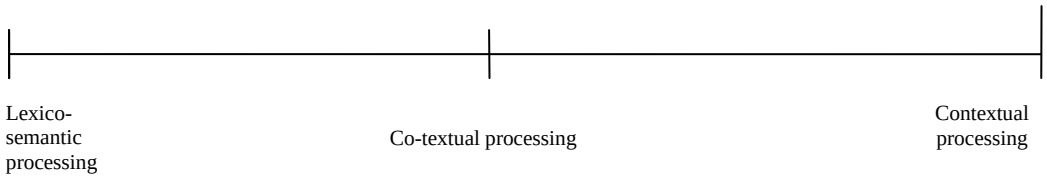

Figure 1: An envisaged cline of 'error-level proximity'

The cline is guided by Halliday's 'vector' of stratification (2001). This stratification means that each of the phonetic, lexico-grammatical, semantic and contextual levels of language coding becomes accessible to users of language through the stratum above it.

The co-textual level was thus not given much attention by the three groups thus far. The reason is explained by Morris, Beghtol and Hirst (2003 in Morris, 2004:7), according to whom the identification of the related words is easier than locating them in a linguistic context. Hunt (1996:243) also blames the deficiency on the linguistic context itself:

> …The local context surrounding the unknown word may be of little or no assistance if it lacks redundancy and other clues for inferring a word's meaning. The difficulty of correctly inferring from context increases when information in the immediate context is lacking…[M]any studies used unnaturally context rich sentences or passages.

It can be concluded at this point that the CPG subjects utilized the semantics of the ST almost to the full, being similar to LSG subjects. However, they superseded them in this respect, and made cautious transitions into the contextual level rather than the loops or jumps made by the LSG subjects.

5.4. The COG errors

The following table provides a summary of the rates of errors committed by the contextual level subjects across the four levels of errors in the course of translating:

Error level	Lexico-semantic level	Co-textual level	Contextual level
COPG	13/84	23/84	23/84
Percent	15.48%	27.38%	27.38%

Table 10: COG translation error scores across error levels

The table shows that the error load is evenly divided among the lexico-semantic, the co-textual, and the contextual levels of errors in translation. The co-textual level regains its importance in this group, being equal in the load to the contextual level, although the lexico-semantic level still holds sway. In a sense, the COG scores provide a balanced treatment of erring, not present LSG and CG, respectively.

On the lexico-semantic level, the COG subjects committed the errors of translating 'pet' as قطتك, 'interstate' as الطريق, and 'flyers' as حشرات. The errors are due to global context conjectures, generalization and morphological misanalysis, respectively. However, the rates of these errors prove that they are not serious ones. The translation of 'pet' as قطتك was provided by 14.29% of the subjects, while the translation of 'interstate' as الطريق was provided by 7.14% only. Least of all is the translation of 'flyers' as حشرات, which was provided by 3.57%. These rates show that the errors cannot be taken as indications of rampant cases.

On the co-textual level, there were various types of errors. The subjects misinterpreted the co-referent of 'they said', using the well-established أجابوها or the prevaricating هؤلاء المسؤولين. Some of them used مكتب الاستعلامات (which is a good solution), but relied heavily on the global context by using أجابها المحقق. Most noticeable of all are cohesion errors, which did not appear in other groups. They were committed by 17.86% of the subjects; they are confined to loss of logical connectors like فـ, لأن, and ثم. Few of them, moreover, omitted 'A bell went off', with 75% translating it correctly. The student-translator's ability to manage co-text serves two purposes. First, it provides plausible solutions to textual

ambiguities. Second, it gives room for checking lexical errors (i.e. the exclusion of حاسبات as inappropriate above) and translating smaller ST segments into larger units.

On the contextual level, the COG subjects committed the smallest number of errors compared to other groups. The errors are again scattered through the sub-levels of coherence, macrostructures and mental imagery. Only 14.26% committed coherence errors, which are confined to the inability to preserve the logical flow of ideas. Macro-structural errors are committed by a similar number of subjects, i.e. 14.29%. They were confined to ignoring larger textual segments, i.e. paragraphing.

Mental imagery errors amount to 57.14%, however, and are not confined to translating 'telephone pole' as كابينة تليفون. There were other errors like translating 'billboard' as حائط مستأجر orقائمة ضرائب, translating 'savings' as حافظة مدخراتها, and the deletion of 'flyers'. The case of حائط مستأجر is quite complex. The mental image of 'board' as حائط is grounded in what Mandahl and Jensen (1996:99) term 'declarative knowledge'. This type of knowledge is based on mental representation, and '[b]cause [its] structure is apparent the learner is able to operate on this knowledge by transforming it, comparing it to other events and using it as a means of problem solving' (in Jensen and Mandahl, 1996:99). Thus, 'board' is transformed into an object which is flat and can be placed on the ground or on the wall. The latter option is selected, since a picture of Clyde will be hung up in the street. At this point, the concept of 'board' is replaced by 'wall', which is in turn translated as حائط. The qualifying adjective مستأجر is added by making a movement to the end of the text, where the idea of paying money figures clear. But the case of قائمة ضرائب is not as quite complex: the choice of قائمة might have followed the same line of 'board', but most probably it is based on morphological misanalysis, where 'billboard' is broken down into 'bill' and 'board', then 'bill' is semantically compared to 'bill of fare', which instantiates قائمة. This means that 'board' is deleted. The actual problem lies in الضرائب. It might have come from the lexical item 'fare' in 'bill of fare', which is most probably stored as أجرة or ضريبة. Finally, the case of حافظة مدخراتها is one of caution: the student-translator might have thought that مدخراتها alone is insufficient as an equivalent. Yet the addition of حافظة is no more than a semantic analysis of the verb 'save' and its related parts of speech, namely 'safe'.

It can be concluded at this point that error-making while translating the ST is the most balanced at the contextual level: it portions out the processing load between the co-textual level and the contextual level. Although it heavily relies on the lexico-semantic level, the addition of the co-textual level solves many

ambiguities and provides a measure of double-checking and back-tracking, all of which improves the quality of the translation product.

6. Conclusions

The following conclusions can be drawn on the basis of the analysis of the findings. First, there are statistically significant differences among the GG, LSG, CG and COG. These differences are significant at 0.05%. They also shed light on the effect of processing level on the quality of the translation product. Second, the most prominent level of processing in written translation error-making is the lexico-semantic one; it permeates all groups amounting to 84.55%. Next to it is the contextual level, which has errors at an average of 60.74%. The third one is the co-textual level, which amounts to 56.30%. Third, achieving a high-quality translation depends on the utilization of supratextual clues. This is clear through the means of the translation scores across the four groups: the LSG scored 3.91; the CG scored 3.88; and the COG scored 3.96. The COG has scored the highest in the translation task. Fourth, student-translators usually rely on what is outside the text: they try to maximize the use of mental imagery and their knowledge of related situations. This is why the COG provides a balanced division of translation errors.

However, the study has a number of limitations. The sample is restricted to 28 participants. This can be enlarged to include more students operating from Arabic into English, using a different text. By comparing their performance in both directions, more fruitful results can be obtained as to the cognitive processes involved in processing in the two directions.

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Appendix 1

The translation task has been italicized and set in boldface in the body of the text.

The owner of a missing cat is asking for help. "My baby has been missing for over a month now, and I want him back so badly," said Mrs. Brown, a 56-year-old woman. Mrs. Brown lives by herself in a trailer park near Clovis. She said that Clyde, her 7-year-old cat, didn't come home for dinner more than a month ago. The next morning he didn't appear for breakfast either. After Clyde missed an extra-special lunch, she called the police.

When the policeman asked her to describe Clyde, she told him that Clyde had beautiful green eyes, had all his teeth but was missing half of his left ear, and was seven years old and completely white. She then told the officer that Clyde was about a foot high.

A bell went off. "Is Clyde your child or your pet?" the officer suspiciously asked. "Well, he's my cat, of course," Mrs. Brown replied. "Lady, you're supposed to report missing PERSONS, not missing CATS," said the irritated policeman. "Well, who can I report this to?" she asked. "You can't. You have to ask around your neighborhood or put up flyers," replied the officer.

Mrs. Brown figured that a billboard would work a lot better than an 8"x11" piece of paper on a telephone pole. There was an empty billboard at the end of her street just off the interstate highway. The billboard had a phone number on it. She called that number, and they told her they could blow up a picture of Clyde (from Mrs. Brown's family album) and put it on the billboard for all to see.

"But how can people see it when they whiz by on the interstate?" she asked. "Oh, don't worry, ma'am, they only whiz by between 2 a.m. and 5:30 a.m. The rest of the day, the interstate is so full of commuters that no one moves." They told her it would cost only $3,000 a month. So she took most of the money out of her savings account and rented the billboard for a month.

The month has passed, but Clyde has not appeared. Because she has almost no money in savings, Mrs. Brown called the local newspaper to see if anyone could help her rent the billboard for just one more month. She is waiting but, so far, no one has stepped forward.