A Mixed-methods Study of Consistency in Translation Memories

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Abstract

Translation Memory (TM) has become widely-used since the early 1990s, its use based on several assumptions: that it saves time, provides cost savings, and maximises consistency. The purpose of this research is to develop a method for measuring consistency in TMs, and to use this method to interrogate English-to-German and English-to-Japanese TMs from the localisation industry in order to find out whether the use of TM tools does, in fact, promote consistency in translation.

The research uses an explanatory mixed-methods approach. In the quantitative phase, translation units are categorised based on whether the TM-based translation process had introduced consistency or inconsistency. The research found inconsistencies of letter case, spacing, and punctuation in source texts, and inconsistent terminology, formatting, and punctuation in target texts. In a follow-on qualitative phase, thirteen interviews were conducted with translators and others with experience of TMs who confirmed that the findings from the quantitative phase corresponded with their experiences.

Keywords: *Translation memory, localisation, consistency, quality, fuzzy matches, terminology, mixed methods*

1. Introduction

Language service providers (LSPs) are under increasing pressure to provide large quantities of localised content with a fast turnaround and at low cost. This has led to increased use of technology, particularly translation memory tools, throughout the localisation industry. The axioms behind the use of TM tools are that they reduce the cost of translation, save time, and minimise inconsistency. They allow the opportunity to leverage legacy translations and have been shown to increase the productivity of translators, thus saving time and cost (Somers 2003, p42). Costs are further reduced as translators are often paid based on TM match analyses, with full payment offered for translation from scratch, partial payment offered for editing fuzzy matches, and a small (or sometimes no) fee paid for reviewing 100% matches. In theory TM tools should aid the production of consistent translations as previously translated work is recycled. This research aims to discover whether this is true in practice.

While there has been some research on the introduction of errors (Rieche 2004; García 2008) and error propagation in TMs (Bowker 2005; Ribas López 2007), there appears to be little research on consistency in TMs. This research proposes to find a method of interrogating TMs for consistency, then to apply that method to measure and categorise inconsistencies in sample TMs in a case study.

This research uses a sequential explanatory mixed methods design, beginning with a quantitative study of TMs in the first phase, and following with a series of qualitative interviews in the second phase. The interviews are intended to explain and add richness to the quantitative results, demonstrating whether the findings from the first phase are applicable to TMs generally in the experience of translators and other TM users from the localisation industry. This paper will focus largely on the quantitative phase of the study. The intended outcomes of this research are to find a method of measuring inconsistency in TMs, to show what types of inconsistencies (if any) commonly occur in TMs, and to suggest methods of minimising inconsistency in translation using TM tools.

2. Methodology

We use a sequential, explanatory mixed methods design. Creswell and Plano Clark state that this design is appropriate to "when a researcher needs

qualitative data to explain significant results" (2007, p72). The follow-up explanations variant of this design is used in this study, in which the qualitative data are intended to expand upon the quantitative results. In the first, quantitative phase of the study, four sets of TM data collected from two large and world-renowned technology companies were measured for consistency. The data includes two English-to-German TMs and two English-to-Japanese TMs as detailed in section 2.2. In the second phase, qualitative interviews with translators and other translation professionals who work with TMs were conducted to explore their experiences of consistency issues in TM.

2.1 Quantitative phase

The quantitative phase of the study measures segment-level and sub-segment level inconsistency. Segment level inconsistencies are observed where two segments that one could reasonably expect to be formally identical differ from each other in some way. We view source segments as being formally different if their meanings differ, but use the term 'inconsistent source segments' to refer to cases where there are very minor formal differences between two source segments and such differences do not reflect any semantic differences between the segments in question. Such minor formal differences include differences in capitalisation, tags, punctuation, spaces, character formatting, and spelling (where a segment may be inconsistent with another segment simply because of a misspelling, inconsistent use of British or US English spelling, or a typographical error in one of the segments).

In the case of target segments, it appears reasonable to expect segments that are translations of 'the same' source segment (i.e. segments that are translations of different tokens of the same source type) to be formally identical, especially in a translation memory scenario where the goal is to reuse existing translations for already encountered source segments.

Where there are two different translations (and thus two different target segments) for a single source segment type, this is considered a target segment-level inconsistency. As there may be more than one inconsistency within these segments, each discrete inconsistency is counted and categorised. The differences between the target segments in question can be very minor formal differences (as defined above), but they can also be more substantial, in extreme cases even leading to semantic differences between the two segments.

	Source Text	Target Text
Category 1	Callouts window	Fenster "Callouts"
inconsistent source-> inconsistent target	Callouts Window	Callouts-Fenster
Category 2	Plane, perspective	Ebenen, perspektivische
inconsistent source-> consistent target	Planes, perspective	Ebenen, perspektivische
Category 3	Camera button	Kameraknopf
consistent source-> inconsistent target	Camera button	Kamera- Schaltfläche
Category 4	text background	Texthintergrund
consistent source-> consistent target	text background	Texthintergrund

Table 1. Example of TU Categories

At segment level, the following four categories are possible:

1. inconsistent source segments are translated as inconsistent target segments
2. inconsistent source segments are translated as consistent target segments
3. consistent source segments are translated as inconsistent target segments
4. consistent source segments are translated as

consistent target segments

The current study is primarily interested in categories 1 and 3, but also in the possibility of consistency being introduced during the process of computer-assisted translation (category 2). Category 4 may be seen as the ideal in specialised translation, whereby the TM has provided the best possible leverage and thus saved the maximum possible amount of time and money. An example of each category from our TM data is given in Table 1.

Inconsistent segments are counted by identifying the number of types n. The number of segment-level inconsistencies is the type count minus one (n-1). Thus in the case of a single source segment (type) that has 4 tokens, if there are 3 separate translations (3 types; one of which appears twice), then the number of target segment inconsistencies is 2 (or 3-1). We give a special status (of 'master' or 'reference' segment) to one of the target segments, and treat the other two segments as inconsistent with that reference segment. The reference segment is the one which appears first in our sorted list, and which a translator could have, but did not reuse in unchanged form. For example, the following four translations for 'Click an empty part of the drawing area.' appear in the TM data:

a. Klicken Sie auf der freien Zeichenfläche.
b. Klicken Sie auf einen freien Bereich der Zeichenfläche.
c. Klicken Sie auf einen freien Bereich der Zeichenfläche.
d. Klicken Sie auf einen beliebigen freien Bereich auf der Zeichenfläche.

Although there are four tokens, there are only three types: a, b, and d. If we assign the status of reference segment to segment a, the segments that are inconsistent with the reference segment are b (repeated for c) and d: thus we count two inconsistencies. When we have three types n=3, and since our count is of type (n - 1), we count two inconsistencies.

At segment-level, source or target segments are either consistent or formally differ and are thus inconsistent. However, there may be more than one inconsistency within these segments. For this reason we also count and categorise sub-segment inconsistencies found within inconsistent target text segments (those found in categories 1 and 3 above).

These inconsistencies are categorised mostly per part of speech aside from those with inconsistent punctuation or where word order has been changed. If there are more than three inconsistencies within a target segment, we consider that segment to have been wholly retranslated. These categorised inconsistencies may be further subcategorised; for example nominal inconsistencies that differ lexically, or in number (singular/plural). Other typical sub-segment inconsistency categories are verb, space, punctuation, preposition (for German), and postposition (for Japanese).

These subsegment-level inconsistencies are counted in the same way as segment-level inconsistencies: we identify the number of types n, assign one the status of master or reference segment, then count the types that are inconsistent with the part-of-speech or word order in the reference segment. Thus the count is n minus the reference segment (n-1). Again, the reference segment is the one which appears first chronologically, and which a translator could have reused, but chose to edit in some way.

2.2 Research data

The data used in the first phase of this study is four sets of TM corpora obtained from two companies who gave permission for their data to be used. All four TMs were presented in the TMX format, parsed using a Python script, copied into the LibreOffice Calc spreadsheet tool and categorised as per section 2.1.

TM A is an English-to-German TM containing 22,691 TUs of aligned segments of which 188 contain only numbers, dates, or punctuation symbols. The remaining 22,503 TUs were categorised as per the typology in section 2.1. TM B is an English-to-Japanese TM from the same project as TM A, containing 18,799 TUs. After removing those segments that contain only numbers, dates, or punctuation symbols, 18,650 TUs remained to be categorised. TM C is an English-to-German TM containing 301,583 TUs. After removing those that contain only numbers, dates, or punctuation symbols, 293,924 TUs remained. TM D is an English-to-Japanese TM containing 298,700 TUs from the same project as TM C. After removing the TUs that contain only numbers, dates, or punctuation symbols, 292,258 TUs were left.

For TMs C and D, a sample of 50,000 TUs was studied. In order to confirm homogeneity between the sample and the full TM corpus in each case, a chi square test was carried out using Excel. The test was

based on comparative measurements of corpus statistics as measured using Wordsmith Wordlist software and comparative measurement of the frequency of category 3 inconsistencies. The corpus statistics used were types (distinct words), standardised type-token ratio, and mean word length (in characters). The chi square test found no significant difference between the sample and the full TM.

2.3 Qualitative phase

The second phase of this research is a series of qualitative interviews with translators and others in the localisation industry with experience of using TM tools. Calls for potential interviewees were circulated via email and Twitter, and translators were approached at several industry events. Details of interviewees may be seen in Table 2. These were in the form of face-to-face personal interviews or, where this was not possible, telephone interviews, seeking opinions on results and conclusions reached in the quantitative phase of the study. The interviews were recorded, transcribed to a LibreOffice document, and coded using NVivo qualitative analysis software. As is typical when coding with Nvivo, emergent themes were gathered as free or open codes (or nodes, to use the Nvivo terminology). These open codes were then sorted into a hierarchy of branching "tree nodes" to reflect the "structure of the data" (Bazeley 2007, p100).

3 Quantitative results by category

	Job Title	First Language
Interviewee A	Translator	Brazilian Portuguese
Interviewee B	Translator	German
Interviewee C	Translator	Spanish
Interviewee D	Translator	French
Interviewee E	Translator	Brazilian Portuguese
Interviewee F	QA Specialist	English
Interviewee G	QA Specialist	Spanish
Interviewee H	Language Technology Consultant	English
Interviewee I	Project Manager	German
Interviewee J	Project Manager	Japanese
Interviewee K	Chief Operating Officer	Spanish
Interviewee L	Workflow Manager	French
Interviewee M	Software Localisation Engineer	Spanish

Table 2. Interviewees from Qualitative Phase

3.1 Category 1 TUs (Inconsistent ST segments with inconsistent TT segments)

3.1.1 Category 1: Inconsistent source text segments

Table 3 shows the most commonly-occurring types of category 1 ST inconsistency (actual number of inconsistencies in parentheses).

Category 1 TUs contain minor inconsistencies (as specified in our typology in section 2.1) in the source segment and other kinds of inconsistencies in the aligned target segment. The number of category 1 TUs found in our four sets of TM data differed, but in all four TMs the most prevalent category of source text (ST) inconsistency was in letter case or capitalisation of words. None of the TT segments aligned with ST segments that contain inconsistencies in letter case themselves contain instances of inconsistent letter case; rather the TT segments in question evince other kinds of inconsistencies, as in example 1 (with differences highlighted in bold) from TM C:

	TM A	TM B	TM C	TM D
Letter case	34% (60)	37% (13)	66% (314)	72% (753)
Punctuation	28% (48)	8% (3)	13% (60)	7% (73)
Tags	24% (42)	29% (10)	10% (46)	13% (137)
Typo	2% (4)	3% (1)	4% (17)	1% (11)
Space	11% (20)	23% (8)	8% (37)	7% (68)
Word Order	0	0	0% (1)	0
Total Segments	370	65	995	1980
Total Subsegment Inconsistencies	174	35	475	1042

Table 3. Inconsistencies found in Category 1 Source Text Segments

1.1s (SHIFT+right-click the drawing area.)	1.1t (Klicken Sie bei gedrückter UMSCHALTTASTE mit der rechten Maustaste in den Zeichenbereich.)
1.2s (**Shift**+right-click the drawing area.)	1.2t (Klicken Sie bei gedrückter UMSCHALTTASTE mit der rechten Maustaste in den **Zeichnungsbereich**.)

Example 1

In both TT segments the ST word 'shift' has been translated as 'Umschalttaste' (shift key) and capitalised. This would suggest that a TM match was used despite the change of case in the second ST segment (1.2s). However, the German translation of 'drawing area' was changed from 'Zeichenbereich' to 'Zeichnungsbereich'. According to the metadata, segment 1.1t was created on December 22nd 2006 and last changed two years later on December 7th 2008. Segment 1.2t was created by a different translator on January 15th 2009 and last changed one year later on January 18th 2010.

We found a high number of inconsistent placing of the space character in TM D. These spaces were initially noticed by automatically comparing the ST segment and the following, seemingly identical, ST segment, as 54 of the 68 space inconsistencies were at the end of the segment following a full stop. Again, the aligned target text (TT) segments contain other kinds of inconsistencies, as in the following example:

The ST segment contains a space inconsistency,

2.1s {1}lsp{2} file.	2.1t {1}lsp{2} ファイルから自動的にロードされます。
2.2s {1}lsp{2} file. [Contains extra space]	2.2t {1}lsp{2} ファイルは変更しないでください。

Example 2

while the aligned TT segments differ by particle (は 'wa' and から 'kara'), 2.1t has the additional adjective automatic or 自動的 'jidouteki', and the verbs differ semantically and in form. These TT segments also provide examples of explicitation in Japanese TT, a phenomenon that appears throughout TMs B and D. The translation of an ST noun has become a sentence in the Japanese TT, containing detail not present in the ST. Thus we have 'It will be automatically loaded from the lsp file.' in segment 2.1t and 'Please do not change the lsp file.' in segment 2.2t.

3.1.2 Category 1: Inconsistent TT segments

In Table 4, the number of subsegment inconsistencies may be seen to be larger than that in Table 3. This is because a segment may contain up to three subsegment inconsistencies before we consider it completely retranslated. Among category 1 TUs we found a large proportion of noun inconsistencies, comprising between 35% and 48% of the total number. For example, in TM C there were 323 noun inconsistencies of which 12 showed influence of the source language in one instance but not in another, and 87 contained inconsistencies of capitalisation or case, as per the following example:

Example 3 also displays a phenomenon that accounts for the high prevalence of preposition inconsistencies in TM C. We found 138 preposition inconsistencies in category 1, just over 19% of the total. 126 of these preposition inconsistencies (and thus 18% of the total) are secondary changes as required by the change of noun, thus we see an alternation between the phrases 'in der Befehlszeile' (in the command line) and 'an der Eingabeaufforderung' (at the command prompt).

	TM A	TM B	TM C	TM D
Noun	35% (84)	45% (15)	44% (323)	48% (616)
Punctuation	1% (3)	15% (5)	8% (57)	10% (129)
Tags	2% (5)	21% (7)	0% (2)	11% (147)
Verb	19% (45)	9% (3)	9% (66)	6% (75)
Space	3% (6)	0	5% (38)	11% (141)
Word Order	17% (41)	3% (1)	11% (81)	0% (3)
Preposition	5% (12)	N/A	19% (138)	N/A
Particle	N/A	3% (1)	N/A	3% (42)
Completely rewritten (Not added to total)	12	5	9	12
Total Segments	370	65	995	1980
Total Subsegment Inconsistencies	240	33	730	1291

Table 4: Inconsistencies Found in Category 1 Target Text Segments

3.2 Category 2 TUs (Inconsistent ST segments with consistent TT segments)

Category 2 TUs contain ST inconsistency and thus introduce consistency in the TT. The majority of these ST inconsistencies in all TMs analysed were inconsistent letter case. Example 4 from TM C is typical of this ST inconsistency.

3.1s At the Command prompt, enter subtract.	3.1t Geben Sie in der Befehlszeile differenz ein.
3.2s At the command prompt, enter subtract.	3.2t Geben Sie **an der Eingabeaufforderung DIFFERENZ** ein.

Example 3

Although capitalisation of the first letter of a German language noun means introduced consistency would be expected in example 4, there are instances of the same TM, containing a ST space inconsistency similar to those found in all four sets of TM data, we see a German noun in lower case:

	TM A	TM B	TM C	TM D
Letter case	44% (140)	49% (219)	46% (480)	45% (505)
Space	30% (95)	21% (96)	28% (287)	22% (247)
Punctuation	21% (67)	1% (4)	9% (89)	14% (153)
Inconsistent word (Noun)	3% (11) (3 noun)	22% (98) (86 noun)	14% (146) (70 noun)	17% (194) (77 noun)
Typo	1% (2)	0% (1)	2% (19)	2% (21)
Word Order	0% (1)	0% (1)	0% (4)	0
Total Segments	613	914	2077	1801
Total Subsegment Inconsistencies	316	450	1043	1123

Table 5: Inconsistencies Found in Category 2 Segments

Inconsistent punctuation usually has to do with the presence or absence of commas or full stops in the ST which may or may not be retained in the TT. Example 6, from TM D, contains a punctuation inconsistency,

4.1s Action Macro	4t Aktionsmakro
4.2s **action macro**	4t Aktionsmakro

Example 4

ST letter case being retained in the TT in all of these TMs (roman lettering is sometimes used in the Japanese TT), particularly if the ST segment is in upper case. This means we have a mix of transposed ST punctuation or formatting and native TT formatting in TT segments. In example 5 from the but also contains an example of a section that has been marked out in the TT, followed by a comment by the translator, explaining that he chose the term 塗

5.1s {1}securityoptions {2}	5t {1}sicherheitsoptionen{2}
5.2s {1}securityoptions{2}	5t {1}sicherheitsoptionen{2}

Example 5

り潰し色 'nuritsubushiiro' for filling in colours. This comment was subsequently propagated within the TM.

There are a number of reasons why ST inconsistencies may be ignored by a translator who chooses instead to accept a fuzzy match. Foremost among these in Japanese is the presence of plurals in the ST. In our study of English to German TMs, plurals did not register in our categories, as we considered that the ST had formally changed and thus accepted that the TT would be inconsistent. However, as there is no distinction between singular and plural in Japanese – numbers are given explicitly or are implicit in context – we can expect to see plural and singular nouns translated consistently in the Japanese TT, and this is indeed the case. Of 76 cases of inconsistent nouns in the ST segments of category two TUs in TM B, 42 differ in number: singular in one case, plural in another, as in example 7.

6.1s {1} If None (Color) is selected as the Map Type then the color needs to be selected.	6t {1} [マップの種類]として[###塗り潰し色]を選択した場合は、色を選択する必要があります。■3-(B037)「なし」という選択肢はなく、「塗り潰し色」という選択肢が表示されるので、このようにしました。(Koizumi 06/11/21)
6.2s {1} If None (Color)) is selected as the Map Type then the color needs to be selected.	6t {1} [マップの種類]として[###塗り潰し色]を選択した場合は、色を選択する必要があります。■3-(B037)「なし」という選択肢はなく、「塗り潰し色」という選択肢が表示されるので、このようにしました。(Koizumi 06/11/21)

Example 6

7.1s Dimension	7t 寸法
7.2s Dimensions	7t 寸法

Example 7

3.3 Category 3 TUs (Consistent ST segments with inconsistent TT segments)

Category 3 contains TUs with inconsistent TT segments, where inconsistency has been introduced in the TM data. Again, the most prevalent category of TT inconsistency was noun inconsistency, as may be seen in Table 6. In TM A we found 81 inconsistently translated nouns (47% of the inconsistencies) of which 18 showed influence of the English source language in one instance as in example 8.

This alternation between 'Border' and 'Rand' occurred three times in the TT and was one of several patterns that emerged within the data.

The Japanese TT in TM B again showed detail being added in translation that was not in the ST. We found ten inconsistencies that were translations of the word 'selecting', as shown in example 9.

In example 9, it is taken as the reference translation as it appeared first in the TM data. Each TT segment contains the noun 選択 (*sentaku*) meaning 'selection' but most involve further explicitation, adding the particle の to make the genitive case. 9.1t is エレメントの選択 or 'selection of elements'. Segment 9.2t is コールアウトエレメントの選択 or 'selection of callout elements'. While this explicitation may make the TT segments clear and understandable, it has a negative effect on leverage. It may be in this case that the first translation contained added detail that was not appropriate for the subsequent translations or that the translators felt that more detail was necessary in the context of the finished document.

After noun inconsistencies, the next most prevalent category in TM B is verb inconsistencies. Of the 40 verb inconsistencies, 18 of them contained another repeated pattern, alternating between using the verb 拘束する (*kousoku suru*) meaning 'to bind or restrict' in one case, and the verb 関連付ける (*kanren*

	TM A	TM B	TM C	TM D
Noun	47% (81)	38% (49)	49% (282)	35% (365)
Verb	20% (34)	31% (40)	5% (30)	6% (59)
Punctuation	7% (12)	6% (8)	8% (44)	18% (183)
Space	1% (1)	1% (1)	11% (61)	27% (272)
Explicitation	1% (1)	5% (6)	1% (3)	3% (32)
Word Order	3% (5)	3% (4)	3% (17)	2% (16)
Preposition	4% (7)	N/A	20% (112)	N/A
Particle	N/A	12% (15)	N/A	6% (57)
Completely rewritten (Not added to total)	3	7	9	35
Total Segments	390	239	826	1713
Total Subsegment Inconsistencies	174	129	570	1035

Table 6: Inconsistencies Found in Category 3 Segments

8s All lines that have been converted using the {1}Create surface borders{2} function can be recognized easily since they are drawn with the {3}Border{4} pen.	8.1t Alle Linien, die mit der Funktion {1}Flächenränder anlegen{2} konvertiert wurden, können Sie leicht erkennen, da sie mit dem Stift mit der Bezeichnung {3}Border{4} gezeichnet werden.
8s All lines that have been converted using the {1}Create surface borders{2} function can be recognized easily since they are drawn with the {3}Border{4} pen.	8.2t Alle Linien, die mit der Funktion {1} Flächenränder anlegen{2} konvertiert wurden, können Sie leicht erkennen, da sie mit dem Stift mit der Bezeichnung {3}**Rand**{4} gezeichnet werden.

Example 8

tsukeru) meaning 'to relate' in another.

In example 10 segment 10.1t translates as 'bind ISO elements to XML elements using object information', segment 10.2t as 'relate ISO elements to XML elements using object information'. Looking through the metadata, each verb choice is not attributable to a single user ID, but the translations using **拘束する** were all saved to the TM at the same time on April 22nd 2009. Two uses of **関連付ける** were also saved then, but all others were dated from the 7th of May in 2009. At that stage, one would presume, the TM tool used must have suggested the previously translated TT segment as a 100% match.

The other Japanese data, TM D, also contain a repeated pattern, alternating between the borrowed English word レイヤ and the native Japanese word **画層** 'gasou' 41 times as per example 11.

TM D contains a large number of punctuation inconsistencies. Many of these (23) are marked out

9s Selecting	9.1t エレメントの選択
9s Selecting	9.2t コールアウトエレメントの選択
9s Selecting	9.3t アセンブリの選択
9s Selecting	9.4t 多角形の選択
9s Selecting	9.5t 線の選択
9s Selecting	9.6t 楕円の選択
9s Selecting	9.7t 選択
9s Selecting	9.8t 長方形の選択
9s Selecting	9.9t ベジエ曲線の選択
9s Selecting	9.10t めねじの選択
9s Selecting	9.11t おねじの選択

Example 9

10s Binding ISO Elements to XML Elements using Object Info	10.1t オブジェクト情報を使用して ISO エレメントを XML エレメントに拘束する
10s Binding ISO Elements to XML Elements using Object Info	10.2t オブジェクト情報を使用して ISO エレメントを XML エレメントに関連付ける

Example 10

11s A new layer group filter can be nested only under another group filter.	11.1t 新しいレイヤグループ フィルタは、他のグループ フィルタに対してのみネストできます。
11s A new layer group filter can be nested only under another group filter.	11.2t 新しい画層グループ フィルタは、他のグループ フィルタに対してのみネストできます。

Example 11

12s Accesses Dimensioning mode	12.1t 寸法記入モードにします
12s Accesses Dimensioning mode	12.2t 寸法記入モードにします。

Example 12

13s Annotative objects may have multiple {1}scale representations{2}.	13.1t 異尺度対応オブジェクトには複数の{1}尺度表現{2}がある場合があります。
13s Annotative objects may have multiple {1}scale representations{2}.	13.2t 異尺度対応オブジェクトには、複数の{1}尺度表現{2}を持つものもあります。

Example 13

using the # symbol, others have inconsistently placed quotation marks, and many show indecision as to whether or not to retain ST formatting for commas or full stops as in example 12.

The high rate of preposition inconsistency in TM C is again a secondary effect of noun inconsistency as shown previously in example 3. The inconsistencies of particle in Japanese are also often secondary to a change in verb or verb form from active to passive or, as in example 13, required by verb choice with the 表現 (scale representation) taking the particle 'ga' when the verb 'aru' (to exist) is used, and the direct object particle 'wo' with 'motsu' (to hold).

3.4 Category 4 TUs (Consistent ST segments with consistent TT segments)

These TUs are those that we consider to have been translated consistently. By looking at the number of repeated TUs that fall into this category, we can see the overall rate of introduced TT inconsistency within a TM as per table 7.

4. Qualitative results summarised

Various causes of TM inconsistencies were suggested in the qualitative phase of the study. The influence of clients may have a bearing at several stages of the translation process, such as in deciding on whether to standardise source text, whether to use terminological resources, whether or not to edit 100% matches, and whether to specify in a style guide what format to use in target text. Translator choice, particularly when TMs are shared, or when inexperienced translators are involved, was another suggested cause of inconsistency. Interviewees also felt that the TM tool may not prevent the introduction of inconsistency, citing problems with inappropriate segmentation, tag or formatting issues, insufficient integration of terminology, and a lack of integrated QA checks.

Interviewees felt that the focus of clients is usually on time and cost savings, as a result of which much of the ST that they receive is hurriedly written and ambiguous or inconsistent. This was always seen as negative. All but one of the interviewees said that they had seen many instances of ST inconsistencies as found in categories 1 and 2. They said that educating their customers about the effect of inconsistent ST on the translation process is one way in which they attempt to minimise inconsistency. Interviewee F, a QA specialist, said: “If they (clients) can't control their source text, then we can't be expected to control the target text for them”.

Ambiguous ST segments may be translated in different ways for different contexts and thus 100% matches proposed by the TM tool may not be accurate in each instance. The interviewees would like “maximum consistency” (interviewee K) yet have problems with clients’ assumptions that all 100% matches can be automatically accepted. Eight interviewees said that 100% matches may be erroneous, a point previously made by Reinke (2004). Several interviewees (particularly non-translators) felt that some TT inconsistency may be necessary. F said that, for him, it is more important for a translation to be “accurate and natural and fluent than it is for the resulting translation unit to be recyclable infinitely in all other documents”, adding that this loss of leverage is “a sacrifice we have to make”.

The interviewees felt that explicitation, such as in example 9, may be required depending on the context. Becher has suggested that where there is

	TM A	TM B	TM C	TM D
Category 3 TUs	390	239	826	1713
Category 4 TUs	6674	4263	18343	25541
Total TUs with repeated ST segments	7064	4502	19169	27254
Percentage of TUs with introduced inconsistency	5.5%	5.3%	4.3%	6.3%

Table 7: Introduced Inconsistency in all TMs

explicitation there will always be a reason, not least to "minimise the risk of misunderstanding" (2011, p215/216). The interviewees agreed that there were occasions where this risk of misunderstanding made explicitation, such as that found in the English to Japanese TMs, necessary. They also said that languages with gender often require changes or additions due to "gender agreement issues" (M). Accordingly, explicitation was not always seen as negative.

5. Conclusion

The TMs in this study contain inconsistencies in the source text (category 1), introduced consistency in some of the corresponding target text (category 2), and introduced inconsistency in target text segments (category 3). In the ST, these inconsistencies (such as those of letter case and punctuation) were not found to make any semantic change, and resulted in lost leverage, with an associated cost to the client. A lower match value also leaves an opportunity for the translator to edit the TT. TT inconsistencies may be further propagated, again with an associated impact on time and cost.

Each TM corpus in this study shows a large proportion of introduced noun or term inconsistency in category 3. Many noun inconsistencies demonstrate influence from the source language, and different translation decisions have been propagated throughout the TM, such as the alternation between レイヤ 'laya' and 画層 'gasou' [layer] from TM D (example 11), or between the alternated whole phrases 'in der Befehlszeile' [in the command line] and 'an der Eingabeaufforderung' [at the command prompt] in TM C (example 3). The interviewees in the qualitative phase agreed that these inconsistencies are common in their experience of TM. Term inconsistencies are often propagated as terms from different times or different departments may be contained in one TM. Interviewees also said that an inexperienced translator may easily upload a new version onto the TM "and there's nothing that stops it". F (QA specialist) said that he sees this regularly and suggested that it may be the result of translators working independently without adequate terminological guidance. Interviewees also said that, in Japanese, the current trend for phonetic translation means that TMs often contain inconsistencies between kanji and katakana terms.

In each of the TM corpora there appears to be a lack of clarity as to whether ST punctuation and formatting should be replicated or replaced by that native to the TT, leaving a combination of both in the TM data. This may have been further confused by inconsistent letter case in the ST segments. The interviewees suggested rigid adherence to a style guide as a way of minimising these inconsistencies. While they felt that more could be done within the TM tool environment to minimise inconsistency, they highlighted the importance of ST standardisation, terminology management, TM maintenance and the use of bespoke, targeted TMs as methods of minimising TT inconsistency.

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