Technical Translation:

A Case Study of the Automotive Industry

MICHAEL HERRIMAN

As major producers and exporters of automobiles, electrical and electronic goods and other consumer durables, Japanese companies have need to translate technical manuals into a large number of languages for use by consumers and repair technicians. This is not a trivial task, particularly when a corporation is manufacturing large numbers of products or many models of the same basic product. Many Japanese corporations have met the need satisfactorily and even elegantly, with well-produced (simple and clear) technical manuals. Others, which might be considered as leaders in their field have not done so well. Any current user of computer software will be aware of the deplorable state of documentation in technical and user manuals, these indeed being written in the native language of the products' writers. It may not be surprising then to find that technical translation is fraught with problems when writers in their own language cannot convey their instructions adequately. In this paper I will report on technical manuals translated out of Japanese, in the automotive industry, focusing on work in a particular company to indicate the difficulties involved in technical translation and the lack of clear protocols for the task.

Introduction

Globalization has meant that products which establish themselves as leaders in their field will be made available in most parts of the world. When these products are of the kind that require the user to manipulate the product in some way, or even more importantly, have the product repaired or subjected to routine maintenance, the matter of clarity of instructions becomes critical. Inadequate instructions for repair and maintenance of cars can lead to warranty and legal problems, and to more serious problems such as damage to the vehicle and injuries to people. In this paper I will consider the problems of translating technical manuals for automobiles, from Japanese into English. This process is critically important because for the producer in question, the English translation becomes the basis for translation into all other languages. The English translation then ought to be as close to perfect as can be reasonably effected. To achieve the high level required is not a simple matter at all, as I will make clear below.

There are, of course, many areas requiring technical skills in translation. Those, with which most would be familiar, are diplomacy, law, commerce, science and various technical areas. Ignoring the special case of diplomacy, accurate technical translations may be next most difficult to achieve.[1] Indeed it is an area where specialists would normally concentrate on or confine themselves to a

1. Diplomatic translating and interpreting depend on the subtlest acquaintance with shades of meaning in parts of the lexicon of several languages, such that ambiguity and indirectness are often the desired targets. Technical translation aims at the opposite.

particular area of technical expertise. Such areas include computing, electronics, medicine, the various fields of science, nano-technology and engineering. The subject of this paper is technical translation in the automotive industry, an area that has come to involve most of those topics last mentioned with the exception of medicine. This is particularly the case for two reasons. One is because most contemporary vehicles will be run by electronic and computational devices that in many systems and sub-systems have replaced mechanical ones, or are entirely new feedback devices that monitor the performance of the nearly all systems on the vehicle. The other reason is a consequence of the proliferation of what were once regarded as luxury options on the average car. One example that might serve to illustrate this is the system incorporated into the windscreen wiper of some luxury cars, which is designed to detect the intensity of rain falling on the windscreen and adjust the speed and force of the wiper blades to match it. Even more sophisticated systems exist which will prevent the vehicle from veering from a lane by correcting it's steering and warning the driver.

In addition to indicating the problems inherent in technical translation in the automotive industry, I will attempt to draw out some procedures that might ensure best practice in the field. The topic is interesting not only for the attempt to establish criteria for best practice; it also reveals linguistic and sociolinguistic factors, which intervene in what might at first be thought of as a simple mechanical process of translation. I will base the paper on experience in working with one company, which is subcontracted by a major automobile manufacturing company to produce the manuals in question. What will become apparent is the enormous complexity involved in producing an account of the workings of a car in a language not that of the original designer and assembler.

Background

Though we can think of six or seven major car producing companies in Japan, this global view serves little to reveal the real process of production. The typical car maker in Japan will in fact be an assembler of thousands of parts, many of which will be produced by subcontractors including multinational companies such as Bosch, Siemens, MacPherson, Goodyear (giants in their own field), major national corporations (Nippon Steel and Aichi Steel, for example), and smaller local companies which might produce just one small part of a system or mechanism for a car. Many of the subcontractors will be subsidiaries of the major clients. In other cases the major company will hold shares in the subcontractor. The important point is that the companies do not rely on just one subcontractor for one part. The real benefit to a car-maker is in the use of competition between the subcontractors, which allows the company to bargain on prices for parts, and seek constantly to lower the supply price and increase the quality of the product. This same squeezing situation applies to the production of technical manuals.

The technical manuals for the automobile manufacturer in question are produced by three subcontractors, and in many cases the three will all do part of the work on one manual. This process may compound the translation problem as local cultures with their linguistic preferences could cause inconsistency in expression and terminology. The client is able to demand high standards from each producer as samples of their work are sent to outside evaluators who judge its quality on the basis of fifteen or so criteria. The subcontractors are then informed of their ranking, a process that drives the demand for higher standards.

The Task of Producing a Technical Manual

There are two manuals produced for each car, an owner's manual and a technical manual. The owner's manual is intended to describe the features of the car simply, so that the owner understands the function of all devices and switches and can drive the car safely. It is normally less than 100 pages in length and is non-technical. Owners are no longer expected to do any maintenance on their vehicle so the manual will contain no advice on repairs. Any malfunction, even replacement of light bulbs is intended to be handled by a qualified technician. Since nearly all malfunctions are now diagnosed by computers on board and read by hand held devices that attach to these, the days of the owner even opening the engine compartment for any reason, are passed. Nearly all repairs are done by special tools, that few owners would recognize or possess anyway.

The technical manual is an entirely different product. It is usually at least 1,500 pages in length in two or three volumes. It is made for just one model of the car, but is complicated by the fact that any model will usually have dozens of options: of engine sizes and kinds (petrol, diesel and hybrid), drive systems, power and servo systems (electronic, hydraulic and mechanical), seat features, etc. The manual will be divided into sections detailing the operation, maintenance and repair of each section (engine, brakes, drive train, gears, suspension, electronics, instrumentation etc.)[2]. A section usually has three parts, one explaining the purpose and operation of the system, another detailing the disassembly and diagnosis of faults, and finally a section on the reassembly of the parts of the system. A typical section of a manual (say the brakes) will require around 150 pages. The critical objective of the manual is to make the procedures unambiguous to the technician repairing the vehicle. As mentioned above, the diagnosis of nearly all faults is done by use of a hand held computer, which connects to the terminals of an electronic control unit, itself a computer that records any recurrent malfunctions of the system it controls.[3] Secondary diagnosis is done by measuring electrical resistance, voltage and impedance between terminals on the various computers. All systems' computers are connected to a multiplex control unit. Visual inspection is minimal as the hand held computer identifies the problem and instructs the technician in the steps necessary to disassemble the system and replace any faulty parts. To this extent, the latest top-of-the-line models are almost self-diagnosing. The main role for a technician is now in reading a hand-held device and disassembling and re-assembling parts or whole systems as instructed by the manual.

The Problem

So far it may be seen that the present day car is a complex machine perhaps more akin to a bank of computers than a mechanical device. Every new model has novel features, some perhaps common to other models, and some adaptations. The matter of accurately describing every system on a vehicle, and giving details regarding its maintenance, fault diagnosis and repair is therefore a complex one, even in the first language (in this case Japanese). The complexity is increasing year by

2. There are many other computer systems controlling less obvious features of a vehicle: some examples are the remote door locking system, fuel-flow adjustment system, yaw, steering and skid-control, and speed sensors, which are used to govern some of the systems just mentioned.
3. Most faults requiring repair are indicated first by the illumination of a symbol on the instrument panel. This alerts the driver to the problem even if it is not obvious in the way the car handles. For example, if the parking brake is left on, the skid control system sends information to the brake control which then monitors the whole braking system (to determine what is hindering the free drive of the wheel), and gives the driver an audible or illuminated signal of the problem. The system involves quite complex feedback loops.

year. The numbers of vehicle models produced each year further add to this complexity. There are many automobile producers in Japan, but three companies are regarded as the major ones. The two largest of these together produce more than 100 models each year. Though a model run may last for three years, the vehicle will be constantly improved upon. So it may be concluded that the production of repair manuals is a major part of a car company's responsibility. I will now describe the method and the problem areas for translating the repair manual into English.

A repair manual is usually produced in the following way. Engineers first write descriptions of the systems on the vehicle and their maintenance, repair etc. These are then read by trained writers who make any necessary refinements, concentrating on clarity and readability, in this case looking at the text from the perspective of the reader – the technician in the workshop. It is then checked and printed with appropriate illustrations of any key procedures, including indices and cross-references.[4] At this stage the manual may be presumed to be adequate for the local market. The next stage is the translation into English, which as mentioned earlier, becomes the basis for all subsequent translations (even Chinese).

In some cases a Japanese native speaker will take the engineers' text straight to English, and in others, the finished text in Japanese will be translated into English by Japanese native speakers or by English speakers of various skill levels. A native speaker of English will likely sample those texts translated by Japanese speakers. The focus of the check will be on spelling, grammar, clarity of expression, accuracy of part-names and readability in English.[5] Two possible further checks may occur, but given the immensity of the task, they are not always included. One should be the reading of the text by an English speaking person with editorial or linguistic skills. A final reading should ideally be done by an English native-speaking engineer or technician. The steps described here represent the only means of ensuring that the manual will be free of errors of both content and expression. It will be obvious that the time and labor devoted to such a series of steps is costly and hence might come to be regarded as unrealistic.

The situation is ameliorated by the fact that the manuals for new models incorporate much detail from the superceded models and also from models with similar systems. This benefit can be offset by the incorporation of undetected errors in the earlier texts. Other factors complicate the task however. The main one stems from the fact that the subcontractor is usually only producing a third or so part of the manual and that several writers may be doing the translations from the Japanese language.[6] Hence consistency becomes a major problem.

The important part of a new manual is the description and incorporation of new features of the model. There is usually a special section of the company involved in the writing of descriptions of the new features. This becomes an important task, as will be seen when component-or part-names are discussed below. I will now describe in more detail the complexity of the production process by looking at the problems and conflicts involved in producing a manual. It should be said at this point that there are many intercultural problems involved in producing translations of manuals. Some have to do with preferences for naming, some with inter-textuality and some with proprietary attitudes of

4. The production process is mostly done on computers using hyper-text marking systems.
5. Errors in spelling and grammar are regarded as cardinal errors by the subcontractor, although to a native speaker of English, clarity, brevity and accuracy might be more the desired target.
6. As previously mentioned, the client usually splits the production of a manual between several contractors. This also leads to inconsistencies because of local cultural preferences for expressions, even though the meanings may be equivalent (for example, does one *check, inspect, measure* or *read* voltage on a voltage meter?).

the client.[7]

The Main Areas of Difficulty

The areas of difficulty can be divided into two. The first, in order of importance, involve technical aspects of the car (descriptions of parts and part names, descriptions of processes of diagnosis, disassembly, repair and replacement). The other difficulty involves an area that can be called comprehensibility and readability. The two areas cannot always be separated: for example, a part name may be confused by linguistic problems.[8] Major technical problems arise both in descriptions of parts and processes. Car-parts made by sub-contractors are given proprietary names by their manufacturers. When assembled in a car the name may be changed to suit the naming protocols of the car company. A replacement part made by another manufacturer may be then given a different name. In most countries of the world, anti-monopolistic legislation exists preventing car-makers from specifying the need for proprietary replacement parts. This leads to the possibility of some parts having at least four names, only one being a generic name. The complication that results from this when translation into another language is required, can only be imagined. Modification to systems as well as the introduction of novel sub-systems requires the supplementation of the names or invention of new names. The situation is further complicated by the fact that different car-makers may use different names for the same or similar parts.

Another problem with part names occurs because a part name is normally made up of many elements attached to what is called the base word. The base word describes the part in general, but more definition is usually required to isolate the part according to its function, location on the vehicle or on a system of which it is a part, and orientation when in this position. Because there may also be several parts performing the basic function, parts are often numbered. It is not unusual to have part names with 6 or more elements. One example is the part named as *front disk brake bush dust boot No. 1*.[9] There are no current conventions for positioning of the elements of such terms, though in English a logical sequencing would treat the term *dust boot* as the base word (though it ought to be hyphenated) and all other parts (comprising three or four groups) as adjectival.[10] Hence a rough following of protocols for adjective placement in English can be applied. Notice though that there is some latitude in the choice of position for "No.1" in this case. It cannot head the term as a whole as that position would imply that reference is to the number one front disk brake. Another option would be to place it before the base word. The critical point is that most parts' names originate in English nomenclature and when translated into Japanese in the original texts and then translated back into English, serious inconsistencies arise. Most pointed examples of this can be seen in the terms for

7. By inter-textual conflicts I am referring to the lack of sensitivity of the Japanese native speakers and the client to the conventions of English print. The matter will be discussed below.
8. An example is the confusion between the words valve and bulb (as in light bulb). In Katakana the terms are written identically because they are pronounced identically in Japanese. Since both can occur in the context of describing an electrical circuit, a major misunderstanding may occur when translating into English from Japanese.
9. A more problematic compound is the *front suspension lower arm assembly front installation bolt head.* The need for hyphenation is apparent here.
10. The grammatical categories to describe the other three or four parts are not at all clear. *Front* refers to the front brake of the vehicle, *disk brake* refers to the type of brake, *bush* is in turn a base word used adjectivally. The numbering of the part is a convention for distinguishing between several parts with the same function, but with a non-optional positioning. The complexity increases when describing parts that have locational adjectives denoting their position in relation to the car itself and the assembly of which they are a part (upper/lower, left/right/center, inner/outer).

what in English would be called the engine compartment and the instrument panel (the main gauges on the panel that indicate speed, engine revolutions, fuel level, engine temperature, oil pressure etc.). The loan words for these evolve as *encopar* (engine-compartment) and *impan* respectively. Yet when translated back into English the client requires the terms *engine room* and *combination meter* to be used. These problems are cultural, technical and linguistic, and cannot be treated as one exclusive of the others.

Most of the problems of part names could be clarified if not completely resolved by adoption of the conventions of the SAE (the Society of Automotive Engineers). This North American society has established standards for all aspects of engineering, those referring to surface vehicles being applicable to automotive engineering. The SAE has clear protocols for part naming and these are closely followed in North America. However, the Japanese car-makers in general have adopted proprietorial attitudes to part names, i.e., the companies prefer to use their own terms for parts, a practice that leads to much difficulty for translators.[11] The SAE has also adopted many useful abbreviations for part names, these either acronyms or short hand renderings, always capitalized. These have been used by the Japanese manufacturers, but lately there has been a decision to dispense with them. This may in part result from the proliferation of parts resulting from the rapid increase in complexity of all systems. The SAE has published a Translation Quality Metric, which attempts to standardize the conventions of translation such that translations can be measured objectively. This will be referred to later.

A consequence of the intransigent approach of the Japanese car companies to part naming is an increasing difficulty for translators, since cars are becoming more complex with each new model. Technicians used to one part name will often find that the same basic part on a new version of the vehicle has an entirely different name even though it incorporates only minor changes.[12]

Comprehensibility and Readability

There has been much recent interest, in applied linguistics, in the idea of readability. It appears to be a consequence of renewed interest in discourse studies. Though a somewhat clumsy term, it refers to the accessibility of texts as a whole. It often referred to as the degree to which a text is reader-friendly. In the translation of repair manuals from Japanese it becomes a very important issue. It has been pointed out to me that in most automobile service centers in North America, the majority of technicians will be persons for whom English is not the first language. For this reason the English translation of Japanese technical manuals must be of the highest possible level of readability and simplicity. To achieve the best standards requires consistency at every level from layout and formatting to sentence structure and terminology. In these respects, the English language manuals produced in Japan will be found wanting because of inter-textual problems. Put simply, most manuals adopt Japanese language conventions that hinder the English reader's understanding.

The problem begins with layout. In English text, the conventions of layout are different to those of Japanese text. Spatial separation may be more important than it is in Japanese text. The use of space to direct the eye is more cardinal in English, presumably because of the dominant left-to-right bias of text. Japanese text by contrast can be read left-to-right or top-to-bottom (in which case it is

11. For example, the term *combination meter*, referred to above, will be quite misleading when translated from English into other languages. Its English usage refers generally to a single gauge from which several different measures can be read.
12. This has been reported to me by a leading auto technician.

read right-to-left). Japanese text favors a general harmonious and balanced spread of text across a page, whereas the position of sections of text in English clearly denote their order of importance so that indenting, spacing, italicizing etc. play a signal role in comprehension of the writer's intent, to a much greater extent than it does in Japanese. The translator who is English speaking will pay more attention to layout than will the Japanese translator into English. It is a convention well accepted in English technical writing that changes in the message ought to be denoted by use of italics or by other means (boxed, indented or printed in a different font). For example, if the message of the text changes from directions for repair procedures to a caution related to a possible danger if the procedure is not followed exactly, the caution ought to be signaled by italicizing (or boxing) so that any subsequent caution will be identified at sight as requiring a different cognitive response from the reader.

Issues of layout extend to use of diagrams and their spatial relation to text. A comparison of American and Japanese versions of a repair manual for the same vehicle reveal very pointed differences in all aspects of layout. In the Japanese version, both diagrams and print will share a single column page width. Diagrams will appear on the left side of the pages and the text will begin either against the diagram on the right side, or in the lack of a diagram, immediately at the left margin. This gives the appearance of cramped space, even though the intention is to not waste space. In the American version, a two-column structure is used: the left-hand column is reserved for the text and the right column for the accompanying diagram. The reader's eye moves naturally from the instruction to the right, so as to confirm the procedure via the diagram (if necessary). Space is utilized more freely, probably for the reason to be mentioned below.

Formatting conventions are also different. Although formatting is to some extent related to layout, it should be considered subsequently to decisions on layout. Best practice in English technical writing advises minimal use of subsections, whereas in Japanese technical writing the tendency is to group a section of a procedure under two or three levels of text, which is not always strictly controlled by indenting. A major problem related to formatting is the use of headings as instructional devices that are subsequently amplified by the more explicit instruction at the sub-level.

In the typical American manual, the repair of a particular section is signaled by a main heading.[13] This is followed by a numbered list of the steps to be taken by the technician. Each step is a single instruction. By comparison the Japanese manual uses the main heading, and then groups the procedures into numbered sub-headed sections, which are further broken into alphabetically indicated lists of the procedures for that sub-section. In many cases the sub-heading is redundant as the instructions that follow repeat the instruction implied by the heading. As an example, the following is a typical heading and instruction:

29. INSTALL FRONT DISK BRAKE CYLINDER SUB-ASSEMBLY
(a) Install the disk brake cylinder with the 2 bolts
Torque: 34.3Nm (350kgf cm, 25ft lbf)

This example is taken directly from a manual translated out of the original Japanese. The American version refers to the procedure in just one step. To the English reader, the heading is redundant and

13. Repair manuals for American machines have always been models of clarity of expression and detail. The reason for this is that upon entry into WW1, the first war fought with machinery, there was a sudden need for repair personnel and most of those recruited had only a basic level of literacy. Hence manuals were written to be comprehensible at the reading level of a 13-year old.

moreover cognitively surprising in its telegraphic phrasing. A more appropriate heading would be "Installation of the front disk-brake cylinder" and it would be less redundant since it signals an operation rather than a direction (by use of the nominalized form as opposed to the imperative verb form of the example). My interpretation of the redundancy is that it may stem from the so-called "topic prominence" of Japanese, where the topic is announced and then the action related to it described. In the American version, the reference at this stage is just to the brake cylinder (omitting the *front disk* qualifier since the technician would be aware that he is working on the front brakes and that they are disk brakes). The reason for this seeming redundancy is that reference here is to a part name and the convention favored by the client is to always use the full part name.

The example serves to draw attention to several other points as well. Notice that the definite article is missing in the heading and that no hyphen appears between *disk* and *brake.* These are deliberate conventions mandated by the client. The non-use of hyphens is said to lead to cleaner text. I believe this decision misunderstands the morphological role of hyphenation. Yet the clutter caused by redundancy is overlooked. The direct instruction that follows the heading refers to "*the two bolts*". The use of the definite article here is interpreted by the English reader as anaphoric; it implies an identification of the bolts in the previous sentence or two. Yet the only reference to the bolts appears some pages earlier when the disassembly of the cylinder is described. The use of *install* is also questionable since the term usually implies the initial setting up of an apparatus ("I installed an air-conditioner in my bedroom"). Re-install (or reinstall) would be better, but better still would be, "Re-attach the brake cylinder to the main body of the brake using its two bolts" as a simple numbered instruction.

As can be seen above, textual matters are difficult to separate from linguistic ones. As might be expected in any translation task, equivalence of meaning is difficult to achieve. In technical translation the problem is a major one. A colleague and I compared the use of procedural verbs in a Japanese-produced English text and an American text for the same vehicle.[14] It was clear that the American manual used approximately twice the number of verbs to describe procedures for diagnosing, disassembling, repairing, testing and reassembling. By this means a clearer understanding of the action to be undertaken is given. As a translation issue, it is quite critical. This is because as mentioned already, the English translation out of the Japanese original text is the basis for subsequent translation into all other languages.

Most technical manuals for complex machinery contain warnings about the danger that might result from improper procedures or lack of attention to details, especially hazardous ones. In the manuals in question, three advisory levels are employed: Hint, Notice and Caution. The advice that follows each of these often does not always convey the intention signaled by the term. There should be no need of a hint. If something ought to be done in a certain way it should be stated at the outset and not mentioned after the instruction is given, as happens in the manuals. The term *Notice* in English suggests visual attention to a situation. In the manuals however, a typical notice is such as the following "Use a torque wrench with a fulcrum length of 300mm." Again the "notice" coming after the instruction is inappropriate. Presuming that the technician is proceeding step by step, he or she has been previously told to tighten bolts using a wrench with a deep socket. The notice comes 3 lines below the instruction. The notice would be redundant were the instruction simply to state: "Use a torque wrench with a fulcrum … of 300mm and a deep socket to tighten…". The term *Take note* would be much more appropriate in any case. In American manuals the word *Note* is used. In a

14. Many international car makers share models, giving them different names in different countries. Hence we can compare manuals produced in each country for the same basic car.

similar misleading vein, the cautions would be better stated as warnings. I mentioned previously the importance of signaling advisory messages in a format different from that of procedural steps. Best practice suggests using italics or boxes. In this format the technician will more readily notice the advice even if it appears after the procedures.

Literal translations out of Japanese also intrude on understanding, or at least, act as distractors. Some are amusing as well as misleading, "There is a possibility that cutting tips of the metal saw would jump around, therefore cover it with clothes or something". Others are less comprehensible, "Do not remove the radio bracket for not causing the ill-fitted condition". The literal problem is exemplified well by: "If the battery of the original transmitter is consumed…". A more patent mark of a literal translation is the following: "Make sure that no dust nor fingerprint is not on the sheet surface". The repeated negation of the Japanese form makes English comprehension exceedingly difficult.

The above problems involve not only translational matters, but grammatical ones as well. Word equivalences and shades of meaning are subtle and open-ended problems in translation. Putting the original language into the target language involves another set of skills that are amenable to direct learning, even if subtle. These are the comprehension of deep grammatical problems involved in the treatment of determiners (mainly definite and indefinite articles), prepositions and subjunctive clauses. "Deep grammar" has come to refer to cognitive associations brought about by fine grammatical distinctions in a language. These aspects of grammar are usually not subject to a native speaker's ordinary awareness. In most cases we cannot adequately define the rules for selection of one rather than another form. For example, though we think of (and teach) use of the definite article as governed by prior reference, it is far more complex and difficult to delimit. Why is it that we would not say, "The ship is a relaxing form of traveling" while we would be quite happy with "The telephone is a good form of communication". The reason is partly explained by recognizing that the proper treatment of "the" is as a quantifier (Montague, 1974). The relation of "the" to classes of objects and abstract objects is also puzzling. The use of the definite article must be treated absolutely consistently. The tendency to drop it in telegraphic phrases is not wise and its use in situations without prior reference can be confusing to a native speaker. Similar problems attach to prepositions and verb-preposition compounds. Many translation problems are deep grammar problems of this kind, puzzling to the non-native speaker and difficult for the native speaker to explain or justify.

Sentence structure must also be applied consistently. Most manuals adopt the imperative form for procedural instructions, but when the instructions are contingent on additional considerations or states of affairs, there must be consistency in placement of the main clause in relation to the conditional clause(s). The following will serve as examples of the decision to be made:

> *If the brake pedal feels spongy, repeat the bleeding procedures.*
> *Repeat the bleeding procedures if the break pedal feels spongy.*

While most English speakers might prefer the latter as the canonical form, consideration of the fact that the repair technician is following serial procedures, dictates a preference for the former. This is because the technician is working within a procedure—consequence model. The same form is advisable for "when-clauses". Yet whatever the choice, consistency is paramount.

A decision must also be made regarding instructions such as the following:

> 12. *Install a transparent hose over the end of a bleeder valve. Submerge the other end of the hose in a transparent container filled with brake fluid.*

In such cases each sentence should be given a separate number, as in:

12. *Install a transparent hose over the end of a bleeder valve.*
13. *Submerge the other end of the hose in a transparent container filled with brake fluid,*

or might be joined, as in:

12. *Install a transparent hose over the end of a bleeder valve and submerge the other end of the hose in a transparent container filled with brake fluid.*

This form preserves the sequential or related nature of the procedure although the prominence of the second imperative is diminished.

It might be said that there are three categories of grammatical problems in technical translation. The obvious one is concordance, where the incorrect verb form is used, or the subject and verb are not in agreement, as well as other morphological errors (incorrect affixing, for example). Less prominent is the syntactic type. These are errors such as assigning the source term the wrong part of speech in the target, using an incorrect phrase structure (e.g., using a relative clause when a verb phrase is needed), or simply violating linear order in word placement. The other kind comprises deep grammar errors where the protocols of use are not clear or indeed cannot be adequately explained by a native speaker, or in other cases, where the explanation does not make sense to the non-native speaker because of interference from the first language. A good example of this is the use of the disjunctive *or* in the following sentence:

*Do not use a metal **or** graphite tool when lifting the cable.*

If taken literally from the Japanese it would have been translated into English as:

*Do not use a metal **and** graphite tool when lifting the cable.*

and would have been acceptable and unambiguous to the Japanese speaker. The English reader will likely read this literally as a tool of compound composition, but be hard-pressed to explain the reason for its ambiguity, even though the sense is clear to him.

Spelling options present another problem, though one less distracting. The preference for North American variants might be argued for on the basis of the extent to which the SAE have attempted to provide objective criteria and canons for technical translation. Of the class that is important, i.e., part names and technical procedures, there are not many variants. The common ones are such as: tyre/tire, gauge/gage. Related to these are terminological variants such as roof/hood, trunk/boot, auto/car. In cases where the English version is to be further translated, the American variant is to be preferred. Other spelling variants, such as doubling consonants or not, should probably follow American conventions in an age when the major part of English text produced is North American.

Punctuation presents a more serious problem for the translator, as the example of the hyphen in noun compounds mentioned above indicates. English is going through a process of eliminating some forms of punctuation, both for reasons of appearance and convention.[15] The period (full-stop) following abbreviations is an example where custom is dictating minimal usage. In tables for example, period marks (such as in *34.3Nm. (350kgf.cm., 25ft.lbf.)*) clutter the text and are probably wisely dispensed with, as they now are in salutations. Here is the example minus stops: *34.3Nm (350kgf cm, 25ft lbf)*. Commas should be used only for their logical sense and not as a means of imitating pauses in speech. The resolution of the punctuation problem is not clear, but consistency should be the cardinal consideration.

15. Some linguists are predicting the disappearance of the apostrophe for the possessive case, particularly since it is so often confused with the contracted copula (e.g., it's).

A further area of misunderstanding in Japanese-to-English translation is in the use of expressions to denote further possible instances, objects and classes of things already mentioned. The terms *et cetera* (or its abbreviation), *or similar*, *something else* or any vague or non-specified reference should be strictly avoided. Other forms of expression to be avoided are references to the person of the reader, such as: "Do not allow the fluid to get on your skin". The preferred expression would be: "The fluid must not make contact with skin tissue". Avoid the use of passive structures such as "Where possible passive structures should be avoided". Capitals should be used sparingly and never for emphasis. If used, they should be used consistently. Capitals are appropriate for words denoting positions on a switch, for example: "Turn the switch to ON". But "Turn the switch ON", is not acceptable. The use of capitals as abbreviations is discussed above. SAE agreed-to abbreviations only should be used.

Taking all the problems described above we may begin to understand the difficulties in technical translation. The clearest perspective comes from focusing on readability. Reading is not a passive act in which the reader takes text serially, word by word and line by line.[16] The reader comes rather with expectations about what the text is going to say and how it will be said. These expectations extend to formatting, layout, font (and its characteristics such as kerning and leading), as well as to grammatical conventions appropriate to the topic, and consistency of terminology and structure. When this complex processing of text is interrupted by any of the problems discussed above, comprehension is suspended. Translating is not therefore just a matter of finding grammatical and semantic equivalences between the words and phrases of the source language and the target. It depends instead on finding the format and expression that will suit the expectations of the reader. Hence a matter as small as a misplaced comma may intrude upon the complex cognitive process involved in reading. When reading translated works we may gain the impression that this point is not always understood by the non-native-speaking translator, no matter what the language is. This is understandable because the issues involved are inter-lingual, inter-textual and even inter-cultural. It is for this reason that nearly all the best translation is done by speakers of the target language. This point is probably not understood by the client (the company commissioning the manuals) when it makes decisions on stylistic, linguistic and terminological canons that often run counter to accepted conventions.

Conclusion

Technical translation is a difficult and time-consuming task involving at least four persons, two of whom should have been technically trained in one or both languages, and the other two, trained in editing in the target language or in applied linguistics. In the situations described above, where manuals of 1,500 pages have had to be produced, upwards of twelve or more writers may have been involved in doing one manual. The stylistic and expressional inconsistencies that might arise in such a situation can well be understood. Recently however, several software packages have been developed which greatly aid in attaining consistency of style, expression and terminology. These work by relating sentences, phrases and words to all of these elements previously encountered and prompting the writer's attention to inconsistencies perceived in sections of text as they are entered. An example of such a program is SDLX2005. This program incorporates a number of useful features of text and word checking, which probably surpass the capacity of all but the most talented editors

16. The discovery that the eyes do not move from word to word in normal reading confirms this claim. Readers allow their focus to shift back and forth, up and down in the act of reading. This is not apparent to the reader, yet computer-aided eye movement tracking shows it clearly.

to accomplish. The program checks terminology against a terminology file to make sure that the expression is used consistently. It checks translations against source documents to make sure that translations are consistent. Such consistency is most important in technical documents, as was emphasized above. It also checks for characters, which do not exist in the target language, and for other expressions, such as dots, hyphens and spaces, to ensure that these are used consistently in the appropriate places. Such programs may be regarded as equivalent to expert systems in third-generation computing, as they build up glossaries and can be said to "learn" from their experience. Their great advantage is that they don't "forget". Smaller professional companies, and individuals in the translation business mainly use them. We can predict that the standard of technical translation will improve as these systems improve. By contrast, it will be a long time before software programs gain the inter-lingual, inter-textual and even inter-cultural knowledge appropriate to translating directly from the source language without human intervention or judgment.

The other improvement in technical translation will come from the guidelines and recommended practice publications of the SAE. This body is currently attempting to establish objective measures for assessing the quality of translation on a level equivalent to that of any other manufactured product. It proposes to develop a system for tagging errors in translating and assigning weightings to errors types such that an overall metric can be established. The metric will not consider errors of style however. One problem with its protocols would be the decision as to whether an error is syntactical or stylistic, the boundary here being imprecise. Other publications of the SAE have contributed to technical translation by establishing protocols for such things as part naming and use of abbreviations for part-names.

In this paper I have tried to show that the task of technical translation is a complex one that involves much more than finding equivalences in a target language for words and strings in the source language. From the situations reported here, it can be seen that successful technical translation requires attention to all aspects of the presentation of text on paper. The target of a translated text should be meeting the expectations of the reader, who will have brought to the reading a set of expectations and presumptions that extend from cultural to content to stylistic and formatting preferences. The focus of the final draft must be on readability, so in addition to participation of a native speaking technician, it is advisable to employ the services of a skilled native speaking editor or an applied linguist. In my experience, the ideal situation for the checking of the final draft would involve a conference of a skilled and experienced technician with proficiency in English, and an English language editor or applied linguist. Such a procedure would require devoting more time than is usually given to the task however. For the translation process itself, the present level of sophistication of translation software renders it inadequate to the task. It will remain for many years a job to be accomplished in at least four stages, however costly that might be. The alternative will be an inadequate translation.

References

Alred, G. J., Brusaw, C. T. & Oliu, W. E. (2003). *Handbook of Technical Writing* (7th Edition). New York: St. Martin's Press.

Haydon, L. M. (1995). *The Complete Guide to Writing and Producing Technical Manuals*. New York: John Wiley & Sons, Inc.

Montague, R. (1974). *Formal Philosophy: Selected Papers of Richard Montague* (Edited with an introduction by Richmond Thomason). New Haven: Yale University Press.

Pringle, A. S. & O'Keefe, S. O. (2003). *Technical Writing 101: A Real-World Guide to Planning and Writing Technical*

Documentation (2nd Edition). Research Triangle Park, NC: Scriptorum Press.
Society of Automotive Engineers (SAE). (2001). Surface Vehicle Recommended Practice. Warrendale PA: SAE.