THE BIBLE TRANSLATOR

QUARTERLY PUBLISHED BY THE UNITED BIBLE SOCIETIES

EDITOR
John J. Kijne

ASSISTANT EDITOR
David H. Wallington

EDITORIAL BOARD
Wilfred J. Bradnock
Fidel P. Galang
Åge Holter
Eugene A. Nida

VOL. 14, No. 2, APRIL 1963

MEASURING "NATURALNESS" IN A TRANSLATION

JOSEPH E. GRIMES

On the first reading this article may seem rather technical. However, we are sure that it will repay further study, since the procedures described here can lead to far-reaching improvements in the syntax and style of a translation. Moreover the following article in this issue demonstrates the practical use of these techniques, and each article sheds light on the other. Ed.

Translators of the Bible are generally aware that their translation ought to conform to the patterns of the language into which they are translating rather than to the patterns of the source language—English or whatever. Yet when it comes to evaluating their own work for such conformity, the only basis some have for judgment is their own feeling about the matter, and that is not always an objective guide. This paper outlines a way to determine rapidly whether a translation is reasonably similar in certain respects to an original composition in the receptor language (i.e., the language into which the translation is being made, also called the target language). The procedure consists of (1) counting the number of times selected features occur in a sample of the translation, (2) counting the number of times the same features occur in a matching sample of text material in the receptor language, and (3) evaluating whatever discrepancies there are between the two, using a simplified statistical table supplied for the purpose.

This procedure is slanted toward analyzing features of grammar and style rather than features of content. The Bible says things that have not been said before in the receptor language, else there would be no point in translating it. Some content words in the Bible can therefore be expected to have frequencies and collocations without parallel in native text. Because what is said is new, the grammatical framework in which it is presented must be so much the more lucid and natural. Any unnecessary difficulty imposed by the grammatical apparatus detracts from the impact of the message itself.

Basis for comparison

A sample taken from a translation is compared with a matching sample of original text material in the receptor language. The most useful text material for comparison consists of compositions written by persons who are recognized masters of good usage in the receptor language—native speakers, but not just any native speaker. In preliterate communities, transcriptions of magnetically recorded utterances of recognized storytellers or public opinion leaders are usable. (It should be borne in mind, however, that even in so-called "primitive" communities a written style that is different from oral style frequently emerges soon after the introduction of writing.) Documents taken down at dictation speed serve only for testing the naturalness of the simplest literacy materials; they rarely exhibit the variety expected in an adult document like the Bible. Receptor language texts should be chosen to match the translation as closely as possible in style—narrative with narrative, argument with argument—trying to use as a model the receptor language's best equivalent for the style of the scripture portion to be tested. Different styles present different statistical pictures.

A further requirement, besides that of the documents compared needing to be stylistically equivalent, is that they consist of sentences in natural order rather than of sentences taken from a file or compilation. The reason for this is that the statistical basis of the evaluation is valid only if the sentences we examine are selected in such a way that no special priority is given to any features we might want to examine; and the easiest way to make sure of this is simply to take the sentences in order as they come. This does not mean that we are restricted to a single document as a basis for comparison; if one text does not contain enough sentences for comparison, we add other documents to it, keeping the sentences of each in unbroken order, until we have enough.

The text material used for comparison must, of course, be an original composition in the receptor language. Its purpose would be vitiated if it were a translation of anything from another language into the receptor language.

Evaluating discrepancies

No feature we examine need occur exactly the same number of times in the translation as in the text sample. If, for example, we decide to count length of sentences, we might find that one hundred sentences of text include eight sentences of ten words each, while one hundred sentences of the translation include six sentences of ten words each. The discrepancy between eight and six in a sample of one hundred, as we shall see, is not great enough to convince us that the translation contains an "unnatural" number of ten-word sentences.

Yet there is a useful dividing line between "natural" and "unnatural" frequency.

This dividing line can be determined by a statistical principle known technically as the method of *confidence intervals*. Stated in non-technical terms, when we count the frequency with which a feature occurs in a sample of text, the figure we get serves to establish a range or interval. Within that range it is safe to assume that a discrepancy between text and translation is not significant. The range centers around the number of times the feature occurs in the text sample. If that feature occurs in the translation sample more often or less often than the limits of the confidence interval allow, chances are strong that it will strike readers either as unreasonably difficult or as childishly monotonous.

To illustrate, in the count of length of sentences reported in Table 1 (a fictitious but not at all unrealistic example) a 100-sentence sample of text gives 3 ten-word sentences; a matching sample of translation gives 10 ten-word sentences. When we look up the number 3 in the "Sample Frequency" column of Table 2, we see that the corresponding confidence interval extends from 1 to 8. This means that if the translation has anywhere from 1 to 8 ten-word sentences, we will not quibble about it having too few or too many. But in Table 1 the translation frequency, 10 ten-word sentences, lies outside the confidence interval established by the text sample. This discrepancy (especially when taken together with the figures for sentences of nine, eleven, and twelve words in the translation, which are similarly outside the pale) gives us strong reason to question whether the translation is enough like a natural document in the receptor language to let it stand without vigorous blue-penciling, at least in regard to sentence length.

TABLE 1. FORM OF TABULATION

Item to be counted	Frequency in text		Frequency in translation	
1		(0)		(0)
2		(0)		(0)
3	||	(2)		(0)
4	||||	(5)	||	(2)
5	|||| ||||	(10)	|||| |	(6)
6	|||| |||| |||| ||||	(20)	|||| |||| ||	(12)
7	|||| |||| |||| |||| |||| ||||	(30)	|||| |||| |||| ||||	(20)
8	|||| |||| |||| ||||	(20)	|||| |||| |||| ||||	(20)
9	|||| ||||	(10)	|||| |||| |||| ||||	(20)
10	|||	(3)	|||| ||||	(10)
11		(0)	||||	(5)
12		(0)	||||	(5)

Item to be counted = number of words in sentence.

TABLE 2. CONFIDENCE INTERVALS

Sample frequency	Limits	Sample frequency	Limits
0	0— 4	51 to 55	43—63
1 to 5	1— 8	56 to 60	48—68
6 to 10	4—15	61 to 65	53—72
11 to 15	7—21	66 to 70	58—77
16 to 20	11—27	71 to 75	63—81
21 to 25	15—32	76 to 80	69—86
26 to 30	19—38	81 to 85	74—90
31 to 35	24—43	86 to 90	80—94
36 to 40	28—48	91 to 95	86—97
41 to 45	33—53	96 to 100	93—100
46 to 50	38—58		

Ninety-five per cent confidence intervals for the binomial distribution, taken at midpoints of ranges, for sample size of 100.[1]

It may be helpful to clarify here what is meant by "it is safe to assume that a discrepancy is not significant." When we venture on the basis of a hundred sentences to predict how any stylistically compatible document in the language ought to be put together, we are using a sampling technique, a sort of linguistic Gallup poll. Whatever the actual frequency of the feature we are counting may be in the language as a whole, our sampling techniques are set up in such a way that the actual frequency will fall within the confidence interval based on the sample, for a certain proportion of the samples we might possibly take. In this paper we have selected a *confidence level* of ninety-five per cent as appropriate to the kind of problem we are dealing with. This means that if we were to take a hundred different samples of text, the frequency counts that ninety-five of the samples would give us would fall within the confidence intervals we have fixed, while the frequency counts in five would fall outside them. Stated in another way, if the translation gives us a figure that lies outside the confidence interval or range established by the text sample, chances are 19 to 1 (i.e., 95 to 5) that the translation is not a good reflection of the way the language works, at least in regard to the feature being counted.

Sample size

Confidence intervals differ for different sizes of sample. As might be expected, the larger the sample, the more precise an estimate it will yield; but at the same time, the larger the sample, the more work it requires to process it. For our purposes we can be content with a statistical indicator that turns up glaring discrepancies but gives room

[1] More detailed tables, and tables for larger sample sizes, may be found in standard works on statistics.

for flexibility on fine points. A sample size of 100 gives a reasonable compromise between precise results and easy application.

What it is that we are going to count 100 of depends on what we want to know. The first group of instances in this paper will be analyzed on the basis of 100 consecutive sentences. The criterion for counting will be: out of 100 consecutive sentences, how many contain the feature we are interested in? Each row of Table 1, for example, was obtained by asking, for both the text sample and the translation sample, how many sentences out of a hundred are one-word sentences, how many are two-word sentences, three-word sentences, and so on. The second group of instances will be analyzed on the basis of 100 clauses: out of 100 consecutive clauses, how many contain the feature we are interested in? The third group of instances will be analyzed on the basis of 100 words: out of 100 words, how many contain each feature we are interested in?

We purposely leave "sentence" and "word" vague. Definitions of these units differ from language to language, and not every translator has gone deep enough into the workings of the receptor language to be able to say in a logically precise way what a word or sentence is in terms of the grammatical system of that language. The main requirement is that the translator be consistent—whatever he counts as a word or a sentence in his translation should be counted as a word or a sentence in the text sample and vice versa, whether the reasons he gives for counting them are well formulated or not. In other words, whatever the translator thinks ought to be written as a string of letters between spaces is for these purposes a "word," and whatever he thinks ought to be written as a string of words ending with a period (full stop) is for these purposes a "sentence," provided he is consistent. "Clause," as we shall see, demands more linguistic precision in its definition.

Table 2 in this paper is based on a sample size of 100. Should the reader wish to work with a larger sample size, say 250 or 1,000, he will find similar tables or graphs at the same confidence level in any standard text on statistics.

Sentence level features

Two properties of sentences are especially easy to investigate for natural frequency of usage: length of sentences and usage of syntactic markers such as particles or clitics. These, furthermore, are properties on which translators seem especially prone to awkwardness.

Sentence length

It is tempting to try to translate one Greek sentence by one sentence in the receptor language. Very few languages, however, provide the same sort of apparatus of linkages and subordinators that enables Greek to keep cast and plot untangled from beginning to end

in a long sentence. Participial subordination, relative clause patterns of various kinds, case agreement, and other grammatical tools with which the Greeks built their ingenious rhetorical structures are matched in some other languages by such diverse devices as, for example, inferential subordination, repetition of key elements, arrangement of sentences in the temporal order in which events took place, and pronominal systems that focus on the relationships of the participants to the total event. In some languages the most common sentence length is around five words, while in Greek the most common sentence length is much longer. Furthermore, Greek-speaking readers could assimilate a large number of long sentences, whereas speakers of some other languages get lost in a tangle of words if they are presented with more than one really long sentence every two or three chapters (though "long" means "over 25 words" to an Otomi and "over 50 words" to a Cuicatec). The problem for the translator is to determine what pattern of sentence lengths is actually used in the receptor language, and to conform his translation to that, not to the Greek patterns or to some ideal, usually oversimplified pattern of his own concoction.

Table 1 illustrates a tabular form that is convenient for tallying sentence length. The number of words in each of 100 consecutive sentences is counted, for both text and translation, and the results tallied in the appropriate row and column. In this case the "items to be counted" are one-word sentences, two-word sentences, and so forth. In other cases the "items to be counted" will be phrased differently, but the same form of tabulation can be used.

A quick examination of Table 1 leads one to wonder whether the translation is not overloaded with long sentences, as compared with the text sample. Table 2 confirms this. If, for example, we examine the number of nine-word sentences in Table 1, we find a text figure of 10 out of a hundred and a translation figure of 20 out of a hundred. Looking up 10, the text figure, in the "Sample Frequency" column of Table 2, we get a range or confidence interval of 4 to 15. The translation figure, 20, falls outside this range, and so leads us to suspect that there are too many nine-word sentences. The translation figures for sentences of ten, eleven, and twelve words also fall outside the intervals established by text frequency figures for each of them; this adds weight to our suspicion. A translation that corresponded to text in the way Table 1 shows would need to be recast in order to make the sentence lengths come out with a frequency distribution more like that of the text sample, in order to provide a version that would enlighten rather than tire out.

Syntactic markers

Sentences are related to one another in many languages by syntactic markers; occasionally these markers serve no other purpose than to

show where the joints between sentences come. In English, words like *furthermore, however,* and on occasion even *and* or *but* help tie sentences together into a coherent sequence. In Greek, on the other hand, rather than show relationships between sentences, markers like *kai* and *de* sometimes function as nothing more than the equivalent of our period—double space—capital letter convention for separating sentences typographically. [2] Other languages, rather than putting sentence markers at the beginning of sentences like Greek, put them at the end, or at some definable point in the middle. In Sirionó of Bolivia, for example, there is a group of enclitics, each of which has a particular place in the sentence where it must appear, regardless of how the main sentence constituents (subject, object, predicate, with their modifiers) are arranged. The past tense marker *-da* always goes with the last word in the sentence, while *-ke,* another kind of past indicator, goes on the last word of the first sentence constituent, and must always be matched by a *-da* at the end of the sentence. This makes possible sentences like *my brother-KE meat found-DA* 'my brother found meat' and *meat-KE my brother found-DA* 'it was meat that my brother found'. [3]

In order to make sure that one is employing the sentence-level syntactic markers of a language in a way that accords with good usage, a table analogous to Table 1 can be made up in which the "item to be counted" column contains a list of the various syntactic markers, and the question posed for counting both the text sample and the translation sample is: out of 100 sentences, how many contain Marker A? Marker B? Marker C? The number of times each marker occurs in the text sample is the number to look up in the "Sample Frequency" column of Table 2; a corresponding number for the translation that lies outside the limits given for that text frequency indicates awkward usage.

One translator, working in a language in which sentences frequently begin with a particle *ta* 'and' to indicate a shift in focus, had apparently been overawed by warnings he had heard against trying to match Greek *kai* (which in many cases is rendered into English as 'and') with a receptor language word meaning 'and'. *Ta* is not used in the same places that Greek has *kai,* but as it may be translated 'and' the translator felt it would be safer to stay away from it. A count, however, showed that a hundred sentences of text included 28 beginning with *ta,* while a similar quantity of translation included only two. When this discrepancy was pointed out the translator was glad to reinstate *ta* in places where he had felt it should go but had refrained from putting it because it was semantically suspect.

---

[2] It will be remembered that ancient manuscripts were written without punctuation. Ed.

[3] Perry N. Priest, Anne M. Priest, and Joseph E. Grimes, "Simultaneous orderings in Siriono (Guarani)," International Journal of American Linguistics 27.335-344 (1961).

Clause level features

Length

In many languages some sentences consist of a single clause, some of more than one clause. Generally speaking, a clause can be recognized as a group of words focused on a verb, or as a verbless group of words that has the same characteristics as a verbal clause (like the mock Indian *Me friend!* of some Wild West films). An *independent* clause can constitute a complete sentence, or it can be the main clause of a sentence: *The man turned the corner. The man saw me.* A *dependent* clause is attributive to another clause as a whole: *As the man turned the corner, (he saw me.)* An *included* clause is a constituent part of another clause: *Who steals my purse (steals trash),* or a modifier of a constituent in another clause: *(The man) who saw me (turned the corner.)* Each language has its own clause configurations and markers (*who, as, why,* for example in English), and it is worth the translator's while to familiarize himself with the structural features in order to be able to manipulate them adequately. Once he has gone into clause patterns enough to hazard a guess about what a clause is, he can begin to look for frequency distributions.[4] A count can be made, for example, of 100 consecutive clauses in order to determine how many of them are independent, how many are dependent, and how many are included within other clauses.

Order of constituents

Another application of this approach is in pegging the relative frequency with which different constituent arrangements occur in languages where constituents such as subject, verb, and object may occur in more than one order. Such different orderings, when they are possible, are not "free" combinations that speakers of the language toss about willy-nilly; they signal either differences of grammatical construction or differences of emphasis. Generally speaking, the rare combinations are the most striking, and the most frequent the most prosaic. The possible clause formations employing subject (S), verb (V), and object (O) are V, SV, VS, OV, VO, SVO, OVS, VSO, VOS, SOV, OSV. The frequency of each of these combinations in 100 independent clauses of text can be compared with its frequency in 100 independent clauses of translation; likewise for 100 dependent clauses and 100 included clauses. Here each kind of clause is best counted separately because each kind of clause may have its own order restrictions. Patterns that include other kinds of clause constituents such as locatives, temporals, complements, indirect objects, referentials, or manner indicators, can be counted in the same way.

[4] Criteria for recognizing clauses vary from one language to another. An introduction to clause analysis is found in Benjamin Elson and Velma Pickett, *An introduction to morphology and syntax,* Santa Ana, California: Summer Institute of Linguistics, 1962.

Clause types

Most languages have some sort of difference in pattern for intransitive and transitive clauses. Equational clauses (like *Me friend!* of mock Indian, or *eta kniga* 'this is a book' of Russian) and stative clauses (like 'corn tall' in Huichol, where 'tall' is a verb) are fairly common as well. Once the clause types of a language are known, the relative frequency of each in a group of 100 clauses of translation can be tested in the way already outlined against 100 clauses of text.

Verb and noun phrases

A clause can contain a string of two or more verbs in some languages: Spanish *pudo haber estado queriendo andar cantando* 'he might have been wanting to go along singing' is a perfectly natural single phrase in which the form (infinitive, participle, or gerund) of each verb depends upon the class of the verb that precedes it, and the whole thing is interchangeable as far as grammar is concerned with *cantó* 'he sang'. In order to make sure one is using these resources of language, 100 transitive and 100 intransitive clauses of text and translation should be checked for length of verb strings. In this case "items to be counted" will be clauses built around a single verb, clauses built around a two-verb string, a three-verb string, and so forth. Noun phrases can be evaluated in the same way as verb phrases; *all twenty-six fine old Italian love songs performed yesterday evening* is a good English noun phrase, but there are languages that balk at more than two or three modifiers for a noun. Noun phrases will therefore be counted in terms of the number of clauses out of 100 that contain no nouns or pronouns, that contain only pronouns (in addition to the verb), that contain no noun-like constituent larger than a single noun, that contain a two-word noun phrase, a three-word phrase, and so on.

Word level features

Nominalized verbs

The Indo-European languages, including English and Greek, are notable among languages of the world for the freedom with which they use nouns to refer to actions and attitudes, such as *war, peace, love, joy, Communism,* and *fatigue*. Probably most Indo-European-speaking translators need to examine their work to see if they have carried over their native preference for nominalizations to the receptor language. In this case we would count the first 100 nouns in text and translation, skipping over verbs and other parts of speech, and would tally how many of the 100 nouns were derived from other parts of speech. A further breakdown could be made for each nominalizing pattern, so that for English, for example, we would list how many nouns out of 100 were built on the pattern of *writer,* how many on the pattern of *farming,* of *sameness,* of *servitude,* of *preparation,* and so

forth. As in the cases already discussed, evaluation of the discrepancy between text and translation is made by means of Table 2.

In one language examined it proves grammatically possible to form a noun from almost any verb. If such a nominalized form is presented to any speaker of the language he understands its meaning and can discuss it intelligently. In practice, however, relatively few of the nouns that get uttered are derived from verbs in this way. About the only nominalizations in everyday use are those derived from verbs that refer to the technology of agriculture. Most other verbal notions are expressed directly as verbs. Some of the earlier attempts at Bible translation relied heavily on novel nominalizations, as at that time the translator was not aware of the frequency distributions of nouns derived from verbs; but readers were unhappy with the translation. Statistical analysis showed its effect to be similar to that achieved by a character of Cervantes' who composed an entire novel using only proparoxytonic words, then wondered why no publisher wanted it. When the nouns in this instance were rephrased as verbs, reader reaction improved.

Developmental verbs

There is a widespread type of verbal formation that sounds at first like a good equivalent for the passive of the translator's native language. On careful study, however, it turns out that this "passive" never permits statement of who performed the action, so that one can say "James was hit with a stick" but not "James was hit by Bill." In Indo-European passives, including Greek, it is possible to specify the performer, but in translating into languages that have the form under discussion it is necessary to transform the Greek passive into an active —"Bill hit James"—in order not to lose the information about who performed the action. The so-called "passive" actually turns out to be a developmental that signifies that the subject changes his state into the state mentioned and out of some other state. With this type of semantics, what we might want to translate as "he was hit" turns out to mean something more like "he got into a state of having been hit," and is formally parallel to "he turned red." The frequency with which such passive-like developmental formations are used is usually either far less than that of Greek passives, or else (in languages where an actorless, impersonal form is the preferred mode of speaking) far greater than that of Greek. We would count the number of developmentals in the first 100 verbs we encountered in text, then count the developmentals in 100 verbs in translation, and evaluate by Table 2.

Loan words

Every language known makes use of words borrowed from other languages or dialects. Loan words fall into three major categories:

those that have a function in the grammar (like Spanish *para* 'in order that', taken into many Middle American languages to make possible a distinction in earlier constructions that meant both "in order that" and "because"), those that denote content items that are warp and woof of every speaker's linguistic background (like English *measure,* which happens to be from French), and those that are the specialized property of a few (like *dénouement,* also from French, but restricted to contexts of literary criticism and the like). The translator need have no qualms about employing words of the first and second categories with plausible frequency; words of the third category should be approached with considerable caution.

Herdan's criterion is useful for recognizing loan words that have become part of the grammatical system of a language.[5] We first divide several thousand words of text into approximately equal parts. The length of a part should be somewhere between 100 and 500 words, and natural division points should be used if possible. It will turn out that some words occur in every part, some in every part but one, some in every part but two; while at the other end of the scale some words occur in only two parts or in one part. The count of those words that occur in all *n* parts is usually slightly higher than the count of those that occur in (*n*-1) parts. This downward trend of the count of words that occur in *n*, (*n*-1), (*n*-2), . . . parts continues until it reaches a minimum at, let us say, (*n*-*a*) parts; from there it climbs sharply upward and reaches a maximum on words that occur in only one part. Any loan word that occurs in enough parts of the text that it is counted at or before the minimum point is likely to be an essential element in good usage and should be used in the translation. Loan words that occur infrequently enough that they are past the minimum need to be evaluated separately to see whether they belong to the second category (part of the working vocabulary of every speaker of the language) or the third (highly specialized).

Loan words may be largely limited to certain semantic categories. Loan words to denote proper names, locations, and recent cultural innovations are common enough, though some peoples characteristically make up their own terms for new items. Besides, some languages tend to restrict loan words to names of visible objects and actions. or to verbs denoting visible actions. In a stretch of 100 words one can count how many in text and translation are loans and evaluate the difference by means of Table 2; furthermore, one can count and evaluate how many loan words come from each part of speech of the lending language, and how many fall within each semantic category. (For a count of this kind a stretch of 1,000 words, interpreted by a table of 95 % confidence intervals for the binomial distribution for a sample size of 1,000 from any standard work on statistics, or interpreted

[5] Gustav Herdan, "Vocabulary statistics and phonology: a parallel," Language 37.247-255 (1961).

roughly by multiplying everything in Table 2 by a factor of 10, is a better indication of loan word frequency.)

One translator, acting on a puristic impulse, had gone through his work and expunged all but the most necessary loan words. A frequency count of text material, however, showed that the receptor language is shot through with borrowed nouns that denote action, and with loan words of various parts of speech that serve to make spatial and logical relationships more explicit than they are customarily made by means of native words alone. The "purged" version, containing few loan words, actually sounded archaic and unlike their own speech to the users of the translation. Many loans had to be reinstated.

Another translator, on making this kind of frequency count, found that he had used words from the trade language that by their frequency and semantic category gave evidence that no reader could take them all in. He was encouraged to keep only those in everyday use, and to find descriptive phrases without loan words in them to express the rest.

Typological ratios

Moore's work on typological ratios and indices of the naturalness of a translation offers another way in which counting procedures can help the translator determine whether his output is linguistically plausible.[6] To state Moore's method in line with the treatment of other things in this paper, we work with samples 100 words long of native text and of translation. The first procedure is a count of how many words out of 100 contain only one morpheme. (A morpheme is a meaningful fraction of a word. English *bat* contains one morpheme, *bats* and *batter* two each, *undoing* and *airports* three each.) The difference between the number of one-morpheme words in 100 words of text and the number in a similar quantity of translation can be evaluated by Table 2. If the parts of speech of the receptor language are known (these are rarely identical with the parts of speech to which their translation equivalents in English belong; determination of parts of speech is a subject for serious descriptive study) a finer-grained picture can be obtained by counting the one-morpheme words in the first 100 instances of each part of speech for text and translation and evaluating the difference by means of Table 2. Thus if 65 of the first 100 nouns we come across in text consist of a single morpheme, while 35 contain more than one morpheme, and if only 40 nouns out of the first 100 in the translation consist of a single morpheme, then we can be sure that we are overusing complex nouns as far as speakers of the language are concerned.

More detailed use of typological ratios requires that a distinction be made between *major* and *minor* morphemes. Major morphemes are stems that carry content information. Minor morphemes are affixes,

[6] Bruce R. Moore, "A statistical morpho-syntactic typology study of Colorado (Chibcha)," International Journal of American Linguistics 27.298-307 (1961).

clitics, and stems whose function is mainly grammatical. Thus in English *form, door, eat,* and *yellow* are major morphemes, and the *-s* (of *eats*), *-ing, the, is because, -ness,* and *why* are minor morphemes. Of the first 100 major morphemes of a text, we can count (if we know what the parts of speech are in terms of that language) how many in text and translation belong to each part of speech. In a language such as Huichol, in which the proportion of verbs is high among major morphemes (as verbs are defined for Huichol), a translation that is shown by Table 2 to contain too many nouns and too few verbs could well be suspected of following English or Greek too slavishly to be clear, as these languages have a relatively high proportion of nouns among major morphemes as compared with Huichol.

Other useful comparisons of the same type are the ratio of minor morphemes to total major morphemes in a stretch of 100 words, and the ratio of minor morphemes to major morphemes for 100 words of each part of speech, taken as they come in text. Table 2 does not apply to the evaluation of discrepancies in these ratios, but as a rule of thumb the ratio for the translation ought to be within five per cent of the ratio found for text. Thus if verbs in the text show a ratio of 3 minor morphemes per major morpheme, verbs in the translation ought to show a ratio between 2.85 to 1 and 3.15 to 1, in other words, 3 $\pm$ (5 % of 3) to 1.

Approximations

Table 2 applies only to cases where it can be asserted that out of 100 units (sentences, clauses, words, major morphemes), a certain number contain Feature X. The number of times Feature X occurs in natural text sets a range within which variation is plausible. Table 2 gives these ranges. It is possible, then, to use Table 2 to evaluate the number of times Feature X occurs in a like sample taken from a translation made from some other language into the language from which the text sample was taken. If the frequency of Feature X falls within the range established by the text sample, then that frequency is considered natural. If it falls outside, then it is likely that the translator has used Feature X in a way that sounds unnatural to speakers of the language.

There are other measures of a text that would also serve as a norm for any translation into the language of that text, but for which Table 2 does not work. The minor morpheme/major morpheme ratios of the preceding section are one instance. Measures of variety are another. We can count, for example, the number of different introductory particles in 100 sentences of text. (Note the difference between listing the items that occur and asking, as formerly, how many sentences of the 100 contain Item A, Item B, and so forth.) We might find, for example, that ten different forms are used as introductory particles; this is quite different from saying that ten sentences begin with intro-

ductory particles. Every sentence of the hundred might begin with some one of the ten introductory particles, but the overall variety would still be only ten different particles. In a case like this, Table 2 does not give a valid measure of the variety. We can, however, get from it a general idea of whether we are using enough variety in translating, by taking Table 2 as an approximation. Thus for a variety of ten different particles used in 100 sentences of text, we could still agree to question the naturalness of any translation in which a similar sample used less than four different particles or more than fifteen, as indicated by Table 2; but we could not be as definite about the statistical basis for our answer.

Summary

The counting techniques described here give the translator a simple means of determining whether certain gross features of his translation are used with a frequency that is natural to the receptor language. The procedure can, of course, be applied to things not mentioned in this article that the translator feels need examining, provided that the restrictions stated are observed.

At the cost of relatively little effort on the part of the translator, these frequency counts point out areas where a translation needs to be smoothed. Counts can be made from time to time in the course of translation in much the same way that quality control samples are taken from the output of a factory. The results of the counts can also be made available to the Bible Societies along with other materials when discussing publication of a translation; though they do not offer proof positive that a translation sounds natural, they show that the translator is aware of the goal toward which he is aiming.

BINDING CASES

It is possible for readers to order binding cases for Volume 13 (1962) of *The Bible Translator* at a cost of 3/- (50 ct.) each, post free. These binding cases will be similar to those made available in sets covering the first twelve volumes. Orders should be sent as soon as possible to:

The Business Manager,
The Bible Translator,
c/o Netherlands Bible Society,
Herengracht 366,
Amsterdam-C, Netherlands

Any who wish may at the same time order a set of binding cases for 1950-61, at a cost of 30/- ($ 4.20).

We cannot guarantee to meet orders arriving after May 31st, so be sure to send your order immediately.