

THE RULES OF NUMBER LANGUAGE PART I

1 A comprehensive set of rules

The rules of Number Language hitherto in circulation are very limited and deal only with very simple sentences. They were made available in 1974 when I had just completed an elementary package which is still available and which translates simple English sentences into German. I felt then that until that package had been in existence for some time it would be preferable to defer providing detailed rules for more involved sentences. Accordingly I decided to divert a certain amount of my energy (never very plentiful) away from research and towards publicising Slunt. This latter activity, although not so highly satisfying as research itself, has been very enjoyable and valuable to me. I have had many fascinating discussions and have received many comments, both favourable and unfavourable, and all have been most useful. As a result, I am now satisfied that the system I designed is a practical one, and that I can now extend it and fill in the details, so that any sentence normally met with in business correspondence or in technical or scientific work can be handled, provided of course that it is not ambiguous or highly idiomatic.

I have encoded a set of rules which I hope will prove adequate for most needs. In doing so, I have taken the opportunity of modifying certain of the rules already given, so as to make them more powerful and comprehensive. I propose now to state all the rules in full, so that reference to previous sets of rules is unnecessary, and to publish them in instalments in this and in subsequent issues of the newsletter.

2 NLclauses and NLunits

The characters of Number Language are the ten digits 0123456789 and always appear in 10-digit units called Number Language units or NLunits. Any of the ten digits may appear more than once in an NLunit. Number Language clauses or NLclauses are always made up of complete 10-digit NLunits. A sentence consists of one or more NLclauses. Every NLunit within an NLclause has an NLunit Reference Number, the first in the clause being 01, the second 02, and so on. These numbers do not appear in the NLunits but are easily determined and are used for reference. A reference can be made in an NLunit to any other NLunit, either within the same NLclause or outside it.

There are three kinds of NLunit, Type 1 Units, Type 2 Units and Type 3 Units, and all three kinds appear in every NLclause in that order. First, Type 1 Units give general information about the nature of the NLclause and of its relationship with other NLclauses. Next, Type 2 Units give precise details of the structure of the NLclause, identifying the subject, verb, direct object and so on. Finally, Type 3 Units give the basic material of the clause, usually having a dictionary meaning but sometimes having other functions such as indicating tense.

3 Type 1 Units

The first Type 1 Unit of an NLclause always commences with the digits 99 and this is the signal that a new NLclause has commenced. In the first Type 1 Unit the digits have the following significance.

<u>Digit</u>	<u>Significance</u>
1-2	Always 99
3-4	Reference Number of the final Type 2 Unit in the clause
5-6	Reference Number of the final NLunit in the clause
7-10	Clause Code

Where a sentence has only one NLclause there is only one Type 1 Unit in the clause.

4 Clause Code

The Clause Code occupies the final four digits of the first or only Type 1 Unit of every NLclause. These are digits 7-10 of the NLunit and have the following significance.

<u>Digit</u>	<u>Significance</u>
7	Fundamental Clause Type
8	Code indicating the nature of subordinate clauses, if any. If none, the code is zero.
9-10	Clause Pattern

5 Fundamental Clause Types

The Fundamental Clause Type code occurs in digit 7 of the first NLunit of every NLclause. Certain of the Fundamental Clause Types are as follows.

<u>Code in digit 7</u>	<u>Fundamental Clause Type</u>	<u>Examples</u>
0	Statement	The men are working quickly.
1	Question	Are the men working quickly?
2	Order, request, invitation, etc	Work quickly, men!
3	Exclamation	How quickly the men are working!
4	Wish or prayer	May the men work quickly!

6 Clause Patterns

The Clause Pattern, which occurs in digits 9-10 of the first NLunit of every NLclause, indicates the grammatical structure of the clause. Thus 01 indicates that there is a subject and a verb. Example: The men are working quickly. (For this purpose, the adverb "quickly" is treated as part of the verb). This example is a statement, as mentioned in paragraph 5. If it were a question, or a request or a wish, it would be worded differently, as shown above, but it would still have Clause Pattern 01. Most Clause Patterns can be associated with most Fundamental Clause Types, but for the present we shall concentrate on Fundamental Clause Type 0 (statements), and discuss the various Clause Patterns which are available for statements. Certain of the Clause Patterns, together with their grammar elements and examples, are shown below.

<u>Code in digits 9-10</u>	<u>Grammar elements</u>	<u>Examples</u>
01	a subject b verb	The man is writing.
02	a subject b verb c complement	The house is warm. The visitor is a solicitor. The lady is in London.
03	a subject b verb c direct object	The boy is drinking the milk.

Code in
digits
9-10

Grammar
elements

Examples

04	a subject b verb c direct object d object complement	The man wishes the boy happiness. The help saves the man work. The team is making the boy captain. The woman calls the cat Sally.
05	a subject b verb c direct object d preposition e prepositional object	The mother is giving the books to the father.
06	a subject b verb c preposition d prepositional object	The man is speaking to the woman. The books are coming from the printer.

7 Type 2 Units

Just as the Clause Code defines the grammatical structure of the clause, the Type 2 Units indicate accurately where each of the grammar elements (subject, verb, etc) can be found. Each grammar element has its own Type 2 Unit, and the first six digits of this give the address or location of the grammar element. The NLunit Reference Numbers mentioned in paragraph 2 are used for this purpose, and where the Type 3 Unit referred to is in the same NLclause, it is preceded by the digits 50. Thus the fifth unit of the same NLclause is referred to as 5005 and the seventh 5007. A grammar element may occupy one or more Type 3 Units, and these must always be consecutive. For example, the subject may occupy the fifth, sixth, seventh and eighth NLunits of the NLclause, and would be indicated in the Type 2 Unit as 500508. On the other hand, if the subject occupied the fifth NLunit alone, the representation would be 500505.

The 7th and 8th digits of the Type 2 Unit indicate the location of any subordinate clause associated with the grammar element and digits 9-10 give the grammar element code. Thus the digits of a Type 2 Unit usually have the following significance.

<u>Digits</u>	<u>Significance</u>
1-6	Reference to Type 3 Units where the grammar element is found.
7-8	Code indicating the whereabouts of a subordinate clause, if any. If none, the code is 00.
9-10	Grammar element code.

8 Grammar element codes

Certain of the grammar element codes, to be found in digits 9-10 of Type 2 Units, are given below, with examples of English words which they can represent.

<u>Code in digits 9-10</u>	<u>Grammar element</u>	<u>Examples</u>
80	subject	I, he, they, the man
81	verb	had gone, will be going
82	direct object	me, us, him, her, a lady
83	preposition	to, for, from
84	indirect object	them, us, it, the work
85	non-finite verb	to be, calling, fried
86	interrogative word	how, where, when
87	complement	warm, a solicitor, in London
91	prepositional object	me, us, him, her, the man
94	object complement	Sally, Pat, captain, work

9 Definitions of grammatical terms

Many of the terms used in these rules are everyday words such as noun, verb, sentence and so on, and I do not propose to define them if they have their usual meanings. Many definitions are necessary, however, and some of these, because of the special requirements of Number Language, are different from the everyday meanings. When I give a definition, it may be my own invention, or I may have borrowed it, with or without modification, from a textbook on grammar.

10 Finite and non-finite verbs

The verb plays an important part in every sentence, whether it has only one clause or more than one clause. It is often necessary to split a sentence into clauses and also to codify the clauses themselves. To do this we must distinguish between finite and non-finite verbs. Almost every verb in English has finite and non-finite forms. In the verb "to write" for example, the finites and non-finites are shown in the following sentences.

	<u>Subject</u>	<u>Finite verb</u>	<u>Non-finite verb</u>
(1)	I	write.	
(2)	He	writes.	
(3)	She	wrote.	
(4)	We	were	writing.
(5)	You	have	written.
(6)	They	want	to write.
(7)	I	shall	write.
(8)	She	must	be writing.

For all verbs except certain auxiliaries, the finite verb is the form which can stand alone in a sentence without the assistance of any other verb. In the verb "to write", only "write", "writes" and "wrote" are finites. All other forms of the verb, such as the infinitive, participles, etc, are non-finites. It will be seen that "write" can be either a finite or a non-finite, according to the context. The finite verbs in the sentences (4) to (9) are auxiliaries.

11 The simple sentence

A simple sentence is a sentence which contains a finite verb, and only one finite verb. Of the following examples, (a), (b) and (c) are simple sentences, (d) is not.

- (a) The man gave the book to the boy.
- (b) The weather was cold.
- (c) The lady wondered how to get warm.
- (d) The man gave the book, which was a novel, to the boy.

In examples (a) and (b), the verbs "gave" and "was" are finites, and there are no other verbs. Example (c) has two verbs, "wondered", which is finite, and "to get", which is non-finite. Having only one finite verb, as have (a) and (b), it is a simple sentence. On the other hand, example (d) has two verbs "gave" and "was", both of them finites, and is therefore not a simple sentence.

Simple sentences can have many different patterns. Six of these have been shown in paragraph 6, and there is a larger table of clause patterns in paragraph 13, all of which apply to simple sentences. It will be seen that in many of the examples there are two grammar elements for verbs, one called simply "verb", and the other "non-finite verb". The following is an example in which the grammar elements are clearly shown.

Example: He had been asking where to find it.

Code	Grammar element	Words represented
80	subject	He
81	verb	had been asking
86	interrogative word	where
85	non-finite verb	to find
82	direct object	it.

It will be seen that code 81 (verb) has a finite verb (had) and two non-finites (been, asking) and code 85 (non-finite verb) has only a non-finite verb. Code 81 must have a finite verb and may also have non-finites, whereas code 85 can only have non-finites.

12 An example of coding a simple sentence

The following example is given to illustrate certain of the rules, already explained, regarding Type 1 Units and Type 2 Units.

Example: The child saw the man giving the book to the woman.

9908210025	child	saw	man	giving	book	to
01	5009100080	5011120081	5013140082	5015160085	5017180084	5019190083
	02	03	04	05	06	07
woman	the	child	to see	(past)	the	man
5020210091	0005371017	0001030005	0004770001	8800400000	0005371017	0003110005
08	09	10	11	12	13	14
	(present					
to give	participle)	the	book	to	the	woman
0002170031	8800005000	0005371017	0000710005	0005440002	0005371017	0006050005
15	16	17	18	19	20	21

The first NUnit is a Type 1 Unit and tells us from its 8th digit that there are no subordinate clauses and no more Type 1 Units. From its other digits we learn that the sentence is a statement and has Clause Code 25, and (indirectly) that there are seven Type 2 Units and thirteen Type 3 Units. Each of the Type 2 Units indicates the location of its corresponding Type 3 Units, and by its grammar element code, their grammatical significance.

13 Clause Patterns and their grammar elements

The following is a list of Clause Pattern codes with details of the grammar elements involved and an example of a simple sentence for each Clause Pattern. Grammar element codes are explained in paragraph 8. It is thought that this list will cover most patterns met with in simple sentences. If in due course experience shows that other Clause Patterns are also needed, these can be added to the list at a later stage.

Clause Pattern code												Grammar element codes		Examples
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)			
subject	verb	direct object	interrogative word	non-finite verb	direct object	indirect object	preposition	prepositional object	complement	object complement				
01	80	81												The man is writing.
02	80	81										37		The house is warm.
03	80	81	82											The boy is drinking the milk.
04	80	81	82										94	He calls her Sally.
05	80	81	82					83	91					She gave it to him.
06	80	81						83	91					He spoke to her.
21	80	81	82	85										They told him to go.
22	80	81	82	85								87		He wanted it to be warm.
23	80	81	82	85	84									They wanted him to drink it.
24	80	81	82	85	84								94	I heard her calling him Pat.
25	80	81	82	85	84	83	91							I saw her giving it to him.
26	80	81	82	85				83	91					I asked him to speak to her.
41	80	81		86	85									He knows how to ski.
42	80	81		86	85							87		I wondered how to get warm.
43	80	81		86	85	82								She knew where to find it.
44	80	81		86	85	82							94	I know how to make him captain.
45	80	81		86	85	82	83	91						I know when to give it to him.
46	80	81		86	85		83	91						I know where to speak to him.
61	80	81	82	86	85									I taught him how to ski.
62	80	81	82	86	85							37		I showed him how to get warm.
63	80	81	82	86	85	84								He told me when to eat the cake.
64	80	81	82	86	85	84							94	I ask her how to make him captain.
65	80	81	82	86	85	84	83	91						I told her when to give it to him.
66	80	81	82	86	85		83	91						I asked him when to speak to her.
83	80	81	82	85										I want my fish fried.
84	80	81	82	85									94	I want him made captain.
86	80	81	82	85			83	91						I want the books given to him.

14 Type 3 Units

Type 3 Units are the basic material of Number Language. Most of them consist of a 10-digit Number Language number or NLnumber, which has a dictionary meaning and corresponds to a word, or sometimes several words, in English or in any other spoken language. Digits 9-10 of the NLnumber indicate which part of speech the corresponding word is. The various codes are as follows.

<u>Code in digits 9-10</u>	<u>Part of speech</u>
01	verb
02	preposition
03	adjective
04	adverb
05	noun
17	determiner (singular)
18	pronoun
27	determiner (plural)
94	time adverb

In spoken languages many words have different forms in different circumstances. There are no such variations in Number Language. An NLnumber is always the same. Other methods are used to determine the number, tense and so on.

Certain Type 3 Units with specified first and second digits have special purposes. Among these are code 88, which indicates the tense and other details of verbs, and code 92, which indicates that the NLunit contains numerals.

15 Nouns and determiners

The NLnumber for the English word "man" is 0003110005, which can also mean "men", and is unchanged whatever the position of the word in the sentence. Whether the man is the subject or object or indirect object of the sentence is defined by the Type 2 Units. The same applies to all nouns. Whether the noun is singular or plural is determined by a determiner. Every noun in Number Language must be preceded by a determiner, which besides having a meaning, indicates whether the noun is singular or plural, or by a numeral. Determiners are of two kinds, possessive determiners and others.

Possessive determiners: his, her, my, your, its, etc.

Other determiners: a, an, the, some, many, this, that, these, those, etc.

NLnumbers for determiners have 17 as their ninth and tenth digits if they are singular and 27 if they are plural. Determiners like "the" and "some" which can be singular or plural, have two forms, one for singular nouns and one for plural. Some sentences include nouns without determiners. Examples are "Milk arrived" and "Men are working". In all such cases a no-determiner-singular (NLnumber 0005000117) or a no-determiner-plural (NLnumber 0005000127) must be introduced into the NLclause.

16 Verbs

Like the noun, the verb in Number Language is invariable. The tense of a verb is indicated by a Type 3 Unit with 88 as its first two digits and which immediately follows the NLunit containing the NLnumber of the verb. The 10-digit Type 3 Unit which denotes the tenses and other details of the verb is made up as follows.

Examples

Digits 1-2, always 88

Digit 3 active-passive

0 active I ask, the fish eats
1 passive I am asked, the fish is eaten

Digit 4 tense-type

0 complete action I wrote
1 incomplete action I was writing
2 repeated complete action I usually wrote
3 repeated incomplete action I was usually writing

Digit 5 tense-code

3 past-past I had eaten
4 past I have eaten
5 present I eat
6 future I shall eat
7 future-future I shall have eaten

Digit 6 affirmative-negative

0 affirmative
1 negative

Digit 7 non-finite verbs

1 infinitive to eat
4 past participle eaten
5 present participle eating

Digit 7 finite verbs, zero

Digits 8-10 all verbs, zeroes

17 Numerals

Numerals in Number Language are coded in Type 3 Units commencing with the digits 92, followed by six digits indicating the numeral. The remaining two digits are a suffix, usually zero. If the suffix is 92 the numeral continues into the next NUnit. Examples are as follows.

<u>Numerals</u>	<u>Type 3 Units</u>
6	9200000600
324,538	9282453800
24,529,034	9200002492 9252903400

18 Postscript

I have now given most of the important rules for simple sentences which are statements and not questions or commands, etc, but many details have been left out to be dealt with later. In the next instalment I hope to deal with subordinate clauses, but still only for statements. Comments from members will be welcome.

The grammar textbook I use for guidance is the following. I find it invaluable, and I gladly place on record my appreciation of it.

English

A Comprehensive Grammar for Foreign Students. By C E Eckersley and J M Eckersley. Published by Longman.