PLURALIZATION IN SIGN LANGUAGE OF THE NETHERLANDS (NGT)\textsuperscript{1}

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Abstract

In this paper noun pluralization processes in Sign Language of the Netherlands (NGT) are compared to reduplication processes and to numeral classifier systems in spoken languages. We argue that NGT does not employ these mechanisms of marking plurals. We claim that NGT does not have an obligatory noun pluralization process. It is, however, possible to indicate plurality by localization of plural referents in signing space, by means of indexes, contour signs and classifiers.

0. Introduction

All languages have ways to indicate plurality of concrete and abstract entities. They may, however, differ widely in the mechanisms to do so. In the Indo-European languages, plurals are mostly marked by attachment of a plural suffix on the noun, as in English and Dutch. Other means of pluralization are reduplication, as in Indonesian, Warlpiri and Agta. In languages like Japanese and Thai, all nouns are mass nouns, so there is no pluralization process on the noun. To express the notion 'more than one' numerals are obligatorily accompanied by a classifier. These languages are all spoken languages. If we accept the by now uncontroversial view that signed languages belong to the natural languages, too, we expect that these languages also have pluralization processes.

Pluralization possibilities in signed languages are only sparsely mentioned in the literature. As will be explained below, these concern mainly reduplication and the use of classifiers. However, these processes are by no means clear yet. Therefore, in this paper, we will discuss pluralization processes in NGT. Specifically, we will investigate whether noun pluralization is comparable to plural reduplication processes or to processes of numeral classification, whether other processes are involved and if so, whether this is due to the manual-visual modality of sign language. Since the literature on sign languages does not mention affixation as a pluralization possibility, we will not give this mechanism special attention. In section 1, a brief overview of the structure of signs and the use of signing space is given. Section 2 contains a summary of pluralization processes in spoken and in sign languages. Our research questions and research design are described in section 3. Section 4 makes clear that pure reduplication is not a productive way of marking plurals in NGT, that NGT-signers sometimes do use classifiers in constructions indicating plurals, but that this process is different from that used in languages like Japanese and Thai. We argue that pluralization in NGT is not an obligatory process, but that signers may use special markers in signing space, viz. indexes, contour signs and classifiers, to refer to the arrangement of multiple present objects in space. Section 5 gives a summary of our other observations concerning classifiers, contour signs and space, and a discussion on the impact of different modalities on language. Our conclusions and suggestions for further research are in section 6.

\textsuperscript{1} We are indebted to Wim Zonneveld for his support during the project and to him and Jan Don for their comments on earlier versions of this paper, and to Wim Emmerik for his lessons in NGT, his help with the transcription and the analysis of the data.
1. About NGT.

In order for the reader to be able to follow the flow of this paper, a brief overview of the structure of signs will be given first. Signs, like words, are built up of components, which carry no meaning themselves. These components are:
- place of articulation;
- handshape;
- orientation of palms and fingers;
- movement;
- non-manual component.

The first four components all concern configurations of the hands, the last component involves head and upper body configurations. Changing one of the components in a sign leads to a different sign, or to something which is no sign at all. All signs are made at a certain place, which must be within the signing space. The signing space can be viewed as a quarter of a sphere, at waist level, in front of the signer (see Fig. 1). All signs are made with one or more specific handshapes. The palms and fingers of the hands point towards certain directions: the orientation of fingers and hand palms. Signs also have a movement. The movement can be a path movement, viz. the hand(s) move from one place to another place, or a so-called handinternal movement, e.g. a handshape change or a wiggle or rotation of the hand, or a combination of both. Some examples from NGT (with a translation in English) are given in Fig. 2. The signs in these illustrations all have different handshapes and places of articulation.

In Fig. 2A, the sign is made at the chin, the movement is small and repeated, the hand contacts the chin. The sign in Fig. 2B is made in front of the signer’s body. Next to a path movement away from the signer, it also has a hand-internal movement, viz. a handshape change. Fig. 2C shows a sign which is made with small movements near the shoulder, repeatedly contacting the shoulder. Sign 2D is made at the chest: the hand, while moving down, is in continuous contact with the chest. This sign also has a non-manual component. Without this component, the sign would have had a different meaning, viz. TIRED.

Fig. 2 Several NGT-signs

Signing space, thus, is used to execute signs. But it also has other functions. Entities can be localized in signing space for further reference. Also, in signing space syntactic relations between the localized referents can be expressed. Referents can be localized by making the sign for the referent and pointing to a certain place in signing space (indexing): from that moment on, this location is occupied by the referent, until the discourse is ended or another discourse is set up. Syntactic relations can be expressed in signing space by using pronouns, which consists of pointing to localized referents, and by verbal agreement. The latter means

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3 Schermer et al (1991) en Koenen et al. (1993) provide more detailed information about NGT.
that the movement of the verb sign is adapted to the location(s) of one or more of the arguments of the verb. An example is shown in (1). In (1a) a signer makes the NGT-sign for MUMMY, in (1b) this referent is localized at a position in syntactic signing space (position 3). In (1c) this location is used to indicate the grammatical relation in the NGT-sign for TEASE. The movement makes clear who the teaser is (the signer, where the sign begins) and who is being teased (mummy, at whose location the movement is directed).

(1)

a) MUMMY  b) INDEX  c) TEASE

There's mummy, I tease her.

2. Pluralization in signed languages

Sign language research does not have a long history: it started out to be conducted in the 1960's, after William Stokoe's (1960) publication of the first serious sign language research report. Therefore, many facts about these languages are still unknown. Pluralization is one of the topics that has not received much attention yet. Although for American Sign Language (ASL) some descriptions exist, literature on NGT hardly mentions plurals. For ASL, Klima & Bellugi (1979) call pluralization a regular process for compounds which are built up from a conventional basic sign and a size-and-shape-specifying sign (SASS). A SASS, in their view, is a bound form; it is suffixed to a noun sign and it indicates to the shape of objects (cylindrical, relatively flat rectangular, small spherical or cube-shaped objects). In these complex signs, only the SASS is repeated; repetition takes place several times and in different places in the signing space. In Fig. 4, the singular and plural forms are shown.

Fig. 4 Singular and plural form (Klima & Bellugi, 1979)

Baker-Shenk & Cokely (1980) mention several ways of pluralization in ASL. One way consists of repeating a noun in different spatial locations to indicate that the referent is plural. However, such repetition appears to be possible only in a limited set of contexts. If a numeral modifies the noun, no repetition occurs unless the signer wants to assign spatial locations to the objects for later reference. Another restriction is that only a small number of signs allow repetition. Yet another means of pluralization is adding a plural modulation to a pronoun or to a singular classifier, or to use a plural classifier. Classifiers, according to Baker-Shenk & Cokely, are handshapes that are used to describe the particular size, shape, depth and/or
texture of something. They are also used to describe the relative location of something in space. In some cases, these classifiers also have an outlining movement.

For NGT, Koenen et al. (1993) describe two ways of pluralization. One way is to repeat the noun sign several times. Not all nouns have a plural form of this kind, though. The other way is to use a so-called "chameleon hand": a hand that plays the part of that what the signer is talking about. Examples of repetition of the sign and of classifier use are given in Fig. 5 and Fig. 6 respectively.

![Fig. 5: Singular and plural (repeated) nouns in NGT](image)

**Problem**

**Problems**

![Fig. 6: Pluralization by means of a special handshape](image)

**Soldiers standing in a line.**

It looks as if repetition and/or the use of specific handshapes are possible candidates for indicating plurality in NGT. Therefore, we will focus on these two possibilities.

2.1 Reduplication

Several spoken languages indicate plurality by a morphological process of repetition of the noun or part of it. This is usually called reduplication. Repetition of signs indicating plural objects appears to differ from reduplication processes in spoken languages in two ways. First, there is a difference in the number of repetitions; second, there is a difference in the shape of the repeated material (the reduplicant). Below, we will give a brief overview of repetition and shape of the reduplicant in spoken languages, which will be compared with those of NGT in section 5.1.

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3 The description of this hand matches the descriptions of a classifier. However, the authors seem to prefer not to call this device a classifier.

4 Koenen et al. (1993).

5 Reduplication can also have many other functions, e.g. indication of past tense (Classical Greek) or gerunds (Tagalog), absolutive singular (Chukchee), nominalization (Yoruba).
In spoken languages like Agta, Indonesian and Yidin', the reduplicates can occur either to the left, to the right, or, occasionally, in the middle of the base. Some examples of plural reduplication are given in (2)-(4).

(2) Agta (Healey, 1960):
   a. takki (leg) taktakkki (legs)
   b. uffu (thigh) uffuffu (thighs)

(3) Yidin' (Dixon, 1977):
   a. di,imurU (house) di,imud,imurU (houses)
   b. gindalba (lizard) gindalgindalba (lizards)
   (house)

(4) Indonesian (Sneddon, 1996):
   a. rumah (house) rumah-rumah (houses)
   b. perubahan (change) perubahan-perubahan (changes)

As we can see, in Agta, the first syllable is reduplicated and in Yidin' the first two syllables of the base form are reduplicated. The reduplicates are prefixed to the base. In Indonesian, the whole base is reduplicated and affixed to the base. Investigation of many languages all over the world shows that the reduplicant has the same form as the base form or a part of the base form. Where the reduplication is not a perfect copy of (a part of) the base, the deviation can be explained from phonological constraints (see e.g. McCarthy & Prince, 1992).

2.2 Classifiers
In some spoken languages, classifiers are used in noun phrases to indicate plural objects. Although NGT-signers often also use classifiers to indicate plural objects, in section 3.2 we will see that the NGT-classifier system is different from this system in two ways. Firstly, NGT-classifiers do not appear in any of the sentence positions that classifiers in plural NPs in numeral classifier languages like Thai or Japanese can take. Secondly, very often no classifier is used at all to indicate a plural.

In nominals, count nouns and mass nouns are distinguished. Count nouns refer to single entities and may have a plural form to refer to plural entities. Mass nouns, however, refer to non-individuated entities (like "water"), and, therefore, do not have a plural form. Languages that have only mass nouns (e.g. Chinese, Japanese, Thai) need a special marker to individuate the referent and make it countable: a classifier. E.g.:

(5) Thai (Allan, 1977):
   a. khru- läj khou three teachers
   b. mā- tua nān dog body that

(6) Chinese (Craig, 1994):
   a. sān-ge ren three-CL person
   b. nēi-liū-bēn shū that-six-CL book

Multiple reduplication is possible in some languages, but in that case every reduplication has a different function.
Japanese (Kulho, 1996):

(7) a. 5-mai CD  b. 3-tu hanashi
      5-CL CD       3-CL STORY
      5 CDs         3 stories

According to Allan (1977), there are several kinds of classifier systems. The system discussed here is called a **numeral classifier** system. The classifier appears obligatorily in expressions of quantity. Classifiers also occur (not obligatorily) in anaphoric and deictic expressions. In other classifier systems, the classifier appears with every word in the noun phrase (concordial classifier systems), attached to predicates of movement and location (predicate classifier system) or embedded in locative expressions that accompany nouns (intra-locative classifier systems). Allan (1977) states the following universal principle:

> a classifier concatenates with a quantifier, locative, demonstrative, or predicate to form a nexus that cannot be interrupted by the noun which it classifies.

In a configuration holding a quantifier (or a numeral), a noun and a classifier, there are six combination possibilities in the world’s languages. According to Allan, however, only four of these possibilities are encountered, viz. the ones in (8a-d), in which Q stands for quantifier (or numeral), N for noun and C for classifier:

(8) a. QCN  c. NQC  e. *CNQ
     b. CQN  d. NCQ  f. *QNC

Schermer et al. (1991) as well as several ASL-research reports (Supalla, 1986; Schick 1990a,b) state that NGT and ASL have **predicate** classifiers. However, according to Allan (1977) and Derbyshire & Payne (1990), languages may employ more than one classifier system. NGT might, thus, also have numeral classifiers.

3. Research

3.1 Research questions

In this paper, a comparison will be made between the two pluralization possibilities in NGT discussed above and the systems described for spoken languages that employ these two ways of pluralization. To this aim, we will see whether either reduplication or the use of classifiers or both of these possible forms of pluralizations are used in NGT. Furthermore, possible other pluralization mechanisms will be investigated. The research questions, therefore, are:

1. Is noun pluralization in NGT comparable to reduplication processes that are described for spoken languages (like Agta, Yidin’ or Indonesian)?
2. Is noun pluralization in NGT comparable to processes of numeral classification that are described for spoken languages (like Thai, Chinese and Japanese)?
3. Does NGT have other ways of noun pluralization and if so, what ways?
4. In case the noun pluralization mechanisms of NGT are not comparable to those of spoken languages, is this to be attributed to the difference in modality?
3.2 Research design
Investigating a relatively exotic language involves old-fashioned fieldwork. In the current project, native signers were consulted and their responses recorded on video tape, since the language in question is a visual-gestural language. The present research involves a case study, in which data were elicited from four native NGT consultants.

Elicitation material
The main aim of this research was to analyze plural forms of nouns in relation to singular forms. Both forms, therefore, were to be elicited. The stimulus consisted of visual material, viz. simple pictures of singular and plural objects. There were 68 pictures in total, 26 pictures of singular objects, like a shoe, a flower, a bicycle, a car, etc. There were 22 pictures of plural objects, arranged neatly and 20 pictures of objects in a random order.
A pretest was performed with three hearing, Dutch-speaking people, to make sure that the pictures would elicit singular and plural forms.

Consultants
The project was announced by posters, at the Deaf Clubs in Amsterdam and in Utrecht. From both regions, two persons reacted. All were accepted, since they met the criteria that were set for the consultants: they were prelingually deaf, all were core members of the Deaf community in their region, NGT was their first language and the language they communicated in on daily life, and three of them attended a school for the deaf. The fourth consultant attended a school for hard of hearing people, but since she was raised in a family in which both parents as well as one sister were deaf, it was decided that she would be a good consultant, too. The ages of the consultants were 23, 27, 33 and 50 years respectively. The consultants are referred to as A1, A2, U1 and U2.

Instruction and recording procedure
The consultants were informed about the procedure by a letter. Since there is no generally accepted notation system for signed languages yet, the explanation was in Dutch. At the recording sessions, the explanation was given once more, this time in NGT/Sign-supported Dutch by the researchers. The instructions were simple: a consultant was shown several pictures, and asked to tell in NGT what he or she saw on the picture to another Deaf person. The signer was sitting opposite to the other person, next to whom the camera was positioned. The utterances, as well as the pictures, were recorded. Good care was taken not to give rise to language interference of Dutch, since this might influence the data.

Transcription
The transcription system used was taken from Baker-Shenk & Cokely (1980), which primarily consists of glosses as well as descriptions of the handshapes and orientation of the hands. Consultants commented abundantly on the stimulus material, so that the set of data was much larger and more complicated than expected. Transcription of the total set of utterances was done by both researchers, often together, so the more complicated issues were amply discussed. Unclear utterances were discussed with a native NGT-signer.

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7 This means that they must have become deaf before they were three years old.
8 Where the hearing consultants had merely said “a horse” or “shoes”, the Deaf consultants used whole sentences for one item, e.g. (translated) “It’s a house. There’s no line drawn here, maybe the house is not strong. The roof might collapse.”
4. Analysis

4.1 Reduplication?
To study a reduplicated form, first the base form should be clear. However, stating what the base form is in NGT is often quite difficult. As all language users do, the signers showed a lot of variation when asked to produce a certain lexical item in isolation. Also, it is often hard to see whether there is any difference between the base sign and a (possible) reduplicated form. In some signs the difference would be clear, e.g. the NGT-sign for CHAIR, has a straight, strong downward movement. Considering the restrictions on reduplication summarized in 3.1, we would expect a reduplicated form in which the reduplicant is either identical to, or a partial version of the base, as shown in Fig. 7 b below. A complication here is formed by the fact that many signs have an inherent repetition, e.g. the NGT-sign for BICYCLE (see Fig. ). In those cases, it might be difficult to see whether the signer is signing a base or a reduplicated form. In our data, the NGT-signs for BICYCLE, BUTTON, CAB, DOG, FLOWER1, KNIFE1, KNIFE2, MONEY, TRAIN, TREE1 appeared to have inherent repetition; so did the NGT-signs for APPLE and PEOPLE sometimes. The signs for BALL, BED1, BED2, BOOK, CHAIR, COW, HOUSE, MUG, PENCIL, PERSON, SHIRT, SHOE, TABLE, TREE2 did not have inherent repetition*. (Pictures of all signs in the data are shown in Appendix I.)

![Fig. 7 Singular and expected plural form.](image1)

![Fig. 8 A sign with inherent repetition](image2)

In this investigation, all repetitions in the signs elicited by both singular and plural objects are counted. In signs having an up-and-down movement, every up-and-down movement of the dominant hand is counted; in signs that have a circular movement (like the NGT-sign for BICYCLE), the rotations of the dominant hand are counted; in signs with a handinternal movement, e.g. a handshape change or a wiggle, every change or wiggle was counted. For every signer, the number of repetitions in signs elicited by singular objects are compared to those in signs elicited by plural objects.

The results are the following. Although we did see differences in the numbers of repetitions between signs invoked by either singular or plural objects, we did not find a regular reduplication pattern. There were cases in which the “plural” sign showed one repetition or less, as in Fig. 7 above. But often the “plural” sign showed more than one repetition of the base sign (see example (9), where “S” stands for signs elicited by singular objects and “P” for signs elicited by plural objects. The numbers in the pictures near the arrows indicate the number of movements in the sign).

* It is difficult to distinguish nouns from verbs in NGT. However, since the signs were elicited by pictures of objects and not of actions, we assume that they are nouns.
We also noticed that in many signs, there was no difference between the number of repetitions for "singular" or "plural" signs, but there were also cases in which the "plural" sign had fewer repetitions than the "singular" sign, as in (10).

As shown by Table 1, in slightly more than half of all cases where a comparison between noun signs elicited by singular and plural objects could be made, noun signs referring to plural objects are identical to noun signs referring to singular objects. In about one third of the utterances the base + reduplicated form (P) has more repetitions than the base form (S).

<table>
<thead>
<tr>
<th></th>
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<th>A2</th>
<th>U1</th>
<th>U2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=37</td>
<td>%</td>
<td>N=46</td>
<td>%</td>
<td>N=45</td>
</tr>
<tr>
<td>P=S</td>
<td>16</td>
<td>43</td>
<td>31</td>
<td>67</td>
<td>24</td>
</tr>
<tr>
<td>P&gt;S</td>
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<td>38</td>
<td>14</td>
<td>31</td>
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<tr>
<td>P&lt;S</td>
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<td>19</td>
<td>1</td>
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<td>1</td>
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S: number of movements in signs elicited by singular objects
P: number of movements in signs elicited by plural objects

Table 1 Comparison of the number of movements repetitions in signs elicited by singular and plural objects.

There appears to be a considerable amount of variation in the "plural forms". These differ from sign to sign and within the same signer. E.g. the singular form of the NGT-sign for "train" may have 2 rotations, while the "plural form" has 1, 1½, 2, 3 or 4 rotations, so the singular form has as many, fewer or more rotations, varying between signers and within a single signer's signing.

In the "plural forms" we also see that some of the reduplicants deviate from the base. As explained in section 1, signs are composed of five components. The reduplicants in question differ from the base in that they are made at a different place of articulation. And, if there are more repetitions, every repetition is made at a different place, as shown in (11) and (12). Many of these latter signs have a tracing movement, indicating the shape of the object.

(This is similar to what was described in section 2 as a property of certain ASL compounds (Klima & Bellugi, 1979). In NGT, however, this phenomenon is not restricted to compound forms: simple signs can follow this pattern, too.)
In view of this and of the variation that the results show, we cannot at this point state that NGT has a productive, regular reduplication process to indicate plurals. There may be a pattern of reduplication, in which there are constraints on the signs that can reduplicate and on the shape of the reduplicants. In section 5.3 we will show, however, that something more is going on here, in connection with the other possible way of pluralization mentioned in the literature: classifiers. Let us, therefore, look at this possibility.

4.2 Classifiers
There are several descriptions of the phenomenon of “classifier” in the literature on sign languages. There seem to be several kinds of classifiers. One of these is called a “size and shape specifier” (SASS), referring to the shape of the object. Reference takes place either by a particular handshape (e.g. a flat handshape referring to a flat object, like a desktop) or an outlining movement. In this report, an NGT-classifier (CL) is defined as a handconfiguration only, in which the shape of the hand refers to the shape of the object (as much as possible). The signs that have an outlining movement are henceforth called contour signs (CS).

It is our aim to investigate whether pluralization of nouns in NGT is comparable to pluralization by means of classifiers in numeral classifier systems like Chinese. We will thus look whether the classifier is obligatorily present in a plural utterance, and (regarding Allan’s universal, mentioned in 2.2), whether the classifier occurs concatenated with or next to the numeral. (Since, in numeral classifier languages like Japanese, classifiers do not obligatorily accompany determiners and quantifiers, these are not taken into account here). If NGT does apply numeral classifiers as a way of pluralization, we would expect one of the patterns described in (8) to arise.

In our data classifiers occur abundantly. All classifier occurrences were counted in the utterances. This was done as follows: when both hands formed classifiers, these were counted as separate classifiers. When a pause occurred between two instances of classifier use, these instances were counted as separate instances of classifier use. When classifier handshapes occurred in a quick, repeated fashion, these were counted as one instance of classifier use.

The results are as follows. In many utterances that held numerals there was no classifier. Still, the utterances contain more classifiers than numerals. As can be seen in Table

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10 Klima & Bellugi (1979); Baker-Shenk & Cokely (1980); Supalla (1986); Schick (1991a, b).
211, only about one third of the numerals concatenates with a classifier. In these cases we did not see a regular pattern. Sometimes a numeral is (directly) followed by a classifier, sometimes the classifier precedes the numeral.

<table>
<thead>
<tr>
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<th>U1</th>
<th>U2</th>
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<td>Classifiers</td>
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<td>100</td>
<td>51</td>
<td>66</td>
<td>329</td>
</tr>
</tbody>
</table>

Table 2 Number of classifiers, numerals and combinations of both

Classifiers and numerals are often separated by other material, like nouns, adverbials and verbs. For examples of the findings, see (13) to (16) below. (CL refers to classifier; the referent is indicated in subscript.)

(13) An utterance with a numeral but without a classifier:

![Four trees](image)

Four trees

(14) An utterance with an NCQ-pattern:

![Ten beds](image)

There are ten beds (in a line).

11 The difference in classifier use between A1 and A2 on the one hand, and U1 and U2 on the other hand is related to the fact that the reactions elicited from A1 and A2 were much larger than the utterances of U1 and U2.
(15) An utterance with an NQC-pattern:

There are eight beds (in a line).

(16) An utterance with a QNC-pattern:

There are five bicycles (in a line).

The irregular distribution pattern of Q, N and C, including combinations that are considered ungrammatical in numeral classifier systems of languages from all over the world, combined with the fact classifiers do not appear to be obligatory present with numerals, leads us to the conclusion that NGT does not have a productive, regular numeral classifier system like Thai or Chinese.

4.3 Localization!

In the preceding section we saw that neither mere reduplication processes nor numeral-classifier constructions are productive pluralization processes in NGT. Does NGT, then, have other means of indicating plurals? From our data it appears it has, but that the process involved is not an obligatory process. Repetition and classifiers are important notions in this respect, but another important notion is: space. In many of the cases where signers used a repeated sign to indicate plurality, the sign consisted of an outlining movement, indicating the shape of the object: contour signs. The repetition, in these signs, was consistently executed at several different places. An example is given in (17). (CS refers to contour sign. The numbers in the pictures indicate the sequence of signs.)

(17)

There are four trees.

This was done not only with signs that consist of an outlining movement, but also with signs that are not contour signs. In these cases, often the noun sign was made, followed by several instances of a contour sign which were made at different places. We can see this in (18):
When a signer used classifiers to indicate plural objects, (s)he also placed them at different locations, as in (19).

There are ten beds in a line.

And another way is to use indexes, also pointing at different locations. See (20).

There are several apples.

In Table 3, an overview is given of the number of utterances in which these three pluralization mechanisms were used. As becomes clear, classifiers were used most often, and indexes are not frequently used.

<table>
<thead>
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<th>A2</th>
<th>U1</th>
<th>U2</th>
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<td></td>
<td>S</td>
<td>P</td>
<td>S</td>
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<td>0</td>
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<td>20</td>
</tr>
</tbody>
</table>

Table 3 Number of utterances in which classifiers, contour signs and indexes were used to indicate singular objects (S) (N = 26) and plural objects (P) (N = 42).

The link between these ways of indicating plurals is the use of space. The places where the signs were made indicated the spatial arrangement of the objects in the pictures. Pictures holding tidily arranged objects elicited equally tidily placed contour signs, classifiers or indexes; pictures of objects that were positioned in a random order invoked random placement of the referents. So what the signers actually did was localize the referents in signing space,
by a contour sign, a classifier handshape or an index as described above in (18), (19) and (20). In localization, referents are usually made available for possible later reference and use in syntactic relations. In our data, objects were localized, but there was no later reference. Instead, localization was used to indicate, often minutely, how the objects were positioned in space. Since there is variation as to whether one (or more) of these elements are used or not, this process is not assumed to be obligatory in pluralization.

Apart from the findings described above, we did not observe other ways of marking plurality on nouns in NGT. Of course, in this study, only pluralization of concrete objects is investigated. It is still unclear to what extent the mechanisms used are available for pluralization of abstract objects.

5 Discussion

5.1 Further observations

The data show several other interesting observations, especially concerning classifiers, contour signs and the use of signing space. First, classifiers, contour signs and indexes can be used at different places in signing space, without change or loss of meaning. The only difference that the various places of articulation make is that the referents are placed at different locations in signing space. This does not hold for common noun signs: when articulated at different places, either their meaning is different or they do not have meaning at all.

Second, a classifier only occurs once a referent has been established, which means that referent nouns signs precede the referring classifiers. However, when the referent is clear, e.g. from the context, it is not necessary to use a noun sign.

Third, whichever classifier is used, the handshape does not necessarily have a movement, as indicated by Scherm et al. (1993). This is in contrast with common signs, which are all assumed to have an inherent movement, like a change of place, a handshape change, a wiggling or circling. Classifier handshapes can be used without any movement at all, indicating a static existence of a referent.

Fourth, classifier handshapes can occur with a movement. This can be a “stamping” movement on a certain location in signing space (localization), but it can also be a movement indicating a certain path movement of the referent. These movements are movement predicates and should be distinguished from the obligatory movements in common signs, since these do not indicate meaningful paths. An example of a classifier with movement predicates is given in (21), where the signer tells about a big car accident (elicited by a picture of several cars in different positions).

(21)

One car bumped into another one and fell upside down, another one bumped into another car, nose up and fell on top of the other car.
As we can see in signs 2 to 5, the handshape keeps referring to a car while the movement of the sign changes several times. By means of this movement, the movements of the car are being expressed. In our data, we did not see contour signs or indexes used on movement predicates. It is, therefore, not clear whether they have this possibility, too.

Fifth, in indicating plural objects, localization by means of contour signs is often used together with localization by means of classifier handshapes or indexes. These can co-occur in one utterance, as in (22).

(22)

![Diagram: PENCIL CS_{PENCIL} AT SEVERAL LOCATIONS CL_{PENCIL} AT SEVERAL LOCATIONS](image)

_There were pencils, lying everywhere around._

Sixth, one and the same object can be referred to by several different classifier handshapes, even in one utterance. Utterances like (23), in which three different classifier handshapes are used to refer to “beds”, are very common:

(23)

![Diagram: ROOM BED CL_{BED} AT SEVERAL LOCATIONS CL_{BED} AT SEVERAL LOCATIONS CL_{SEVERAL BED} AT SOME LOCATION](image)

_There’s a bedroom, and there are many beds in it._

Seventh, while different handshapes were used to refer to the objects, some of these handshapes seemed to be different in character. Most handshapes used indicated directly the same shape as the object it referred to. But some of the handshapes were totally different from the shape of the object. In these cases, the handshape rather referred to the *hand* of a person, holding or manipulating the object in question. Examples are given in (24) and (25). Both utterances were elicited by a picture of several knives in a block of wood. In (24) a handshape is used that refers to the shape of the object. In (25), however, a handshape is used that indicates that the knives were held and manipulated by someone\(^\text{12}\).

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\(^{12}\) In (24) and (25), homonymous NGT-signs are used for “KNIFE”. 
There's a block of wood, and there's several knives in it.

There are knives stuck in a block

Thus, it appears that classifier handshapes can represent either the object itself or a hand manipulating an object. At this stage, it is not clear whether there are reasons to make grammatical distinctions between these classifiers.

Our observations concerning the noun-like elements of NGT are summarized in Table 4.

<table>
<thead>
<tr>
<th>localization possibilities</th>
<th>inherent movement</th>
<th>occurrence on movement predicates</th>
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</thead>
<tbody>
<tr>
<td>common nouns</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>contour signs</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>indexes</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>classifiers</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 4 Characteristics of the noun-like elements in NGT

5.2 Reduplication

Now that we know that in the repetition of many signs localization is involved, the explanation why the repetition takes place at different positions in signing space becomes clear. Firstly, the objects in the elicitation material had certain spatial arrangements. The signers explicated these very clearly and, since there were no objects at exactly the same place, signers were not apt to localize referents at the same place. Secondly, there is a syntactic/semantic constraint on localization. Localization of referents is always and must be executed at different locations. If this was not the case, it would not be possible to know which referent was referred to in later discourse. This holds for pointing to localized referents, but also in variant verbs. In these verbs, the beginning and/or endpoints of the movement are meaningful, indicating the arguments of the verb. Were referents to be located at the same positions, use of these verbs would become very complicated or even impossible.

In view of these findings, we should reconsider the results described in 4.1 above concerning reduplication, since many of the cases mentioned there do not concern mere
repetition of the sign, but are actually instances of localization. This can easily be seen in examples (11) and (12) above. Therefore, the results in Table 1 should be corrected for the fact that in many cases, the repetition of the sign actually indicated localization of the objects. The gray section in Table 5 shows the number of regular repetitions elicited by plural objects. Since these numbers are so low, we view this as further support for our conclusion in section 4.1, that NGT does not employ reduplication as a regular pluralization process on nouns.

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<th>A2</th>
<th>U1</th>
<th>U2</th>
<th>Total</th>
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<td>14</td>
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<td>5</td>
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<tr>
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<td>5</td>
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<td>4</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

S: number of movements in signs elicited by singular objects
P: number of movements in signs elicited by plural objects

Table 5 Correction of the number reduplicated signs

5.3 Possible explanations of the reduplicated signs

In some of the few cases in which the "plural" signs showed a mere repetition of the movement in view of the singular forms, the reason for repetition is immediately clear, and sometimes influenced by Dutch. One observes that the signer starts to sign the noun sign for the object s/he sees, but slows down in order to take a closer look at the picture, sometimes including a thoughtful facial expression. Then, the signer starts to sign the rest of the utterance. Clearly, the signer is thinking out how s/he is going to tell what is on the picture. While thinking this out, s/he may keep on making the noun sign.

Another observation is that some signers use a lot of word pictures. These are spoken components, borrowed from Dutch. Dutch has a productive process of pluralization by affixing -en or -s to the singular word. For -en, an extra syllable is formed. So, in a noun sign accompanied by a word picture, the number of syllables of the Dutch word sometimes influences the number of movements of the sign. If the Dutch word for a particular (one-movement) sign has one syllable, and the plural Dutch word has two syllables, the movement of the plural NGT-form can be adapted to the word picture, piggy-backing the syllable structure of the word. An example is given in (26).
5.4 Manual-visual versus auditory-articulatory modality

In the foregoing we saw that NGT pluralization processes are not similar to noun affixing, reduplication or numeral classifying. It would, however, have been possible that NGT had pluralization processes like those: this is not excluded by the visual-manual modality of the language. Repetition of signs is possible, and is actually used in NGT to indicate aspect on verbs. Repetition of nouns, therefore, would have been possible. Since NGT uses classifiers, it could also have had a numeral classifier system. There is no way to exclude these possibilities in the language, a priori. However, NGT-signers appear to have a special way to (voluntarily) mark plurals: by localizing the referents in signing space. It is, however, not possible for spoken languages to use this mechanism. Since it involves the use of space, spoken languages, being restricted to a one-dimensional, auditory-articulatory channel, cannot use this way to express plurality. It is interesting to note that differences in modality do not exclude certain grammatical processes, but transpose them into other ways of expressing them. In pluralization, spoken languages use means that signed languages can have too. We see here that sign languages have mechanisms to which spoken languages have no access.

6. Conclusion

From the results and the preceding discussion we can conclude that NGT does not obligatorily mark nominal pluralization. However, NGT-signers may indicate plurality by making use of signing space. They can localize referents in by placing indexes and classifiers in signing space and by making contour signs at certain locations in signing space. Other noun signs cannot be localized directly in signing space. The fact that signs indicating plural objects sometimes show repetition (at the normal place of articulation) can be explained from the fact that signing sometimes patterns with spoken components, and signers in some cases need time to arrange their thoughts before starting to talk (sign); during this time they continue making the same sign.

There is an interesting field of further research now, focusing on use of space, classifiers, classifier predicates, word formation and modality. Although in 5.1 we indicated that classifiers occur on movement predicates, it is not clear yet which predicates are or can be involved, what predicate-classifier combinations are possible and in what grammatical context they can be used. Also, we do not know what restrictions there are on the use of classifiers. In 5.1 mention is made of two possible kinds of classifiers: those whose handshape refers to the shape of the referent, and those whose handshape refers to a hand, manipulating referents. We would like to know whether it is necessary to distinguish them grammatically, and, if so, on what grounds. We do not know yet whether contour signs or indexes occur on predicates, like classifiers. And, of course, now we know for certain that NGT uses predicate classifiers, we want to know what functions they actually have. Concerning word formation, we can see that some noun signs and classifiers look very much alike. These classifiers and noun signs probably have a grammatical connection. It would be very interesting to know whether the one is derived from the other, and, if so, what processes are involved, what characteristics both elements still share and what differences (in addition to those described above) they have after these processes. And this also holds for the nominalization processes of contour signs, that probably originally have an adjectival status.
References


Appendix

APPLE  BALL

BED1  BED2

BICYCLE  BOOK

BUTTON  CAR

CHAIR  COW

DOG  FLOWER1

FLOWER2  HOUSE