

Translation of participial phrase structures from Finnish to English¹

Arvi Hurskainen
Department of Languages
FIN-00014 University of Helsinki, Finland
arvi.hurskainen@helsinki.fi

Abstract

Finnish grammar has a special feature, which is absent in most languages. In Finnish, a temporal subordinate clause can be expressed also using a special participial phrase structure (PPS). Although participial phrase structures can be expressed using subordinate clauses, they are frequently used. They are also considered handy, and they take less space in writing than sub-ordinate clauses. Because of their special nature, they are difficult to translate into other languages. In an earlier report (Technical Report No. 35) I described the way of translating corresponding sub-ordinate clauses of English into Finnish, using participial phrase structures, although also subordinate clause structures could have been used in Finnish. When we translate from Finnish into English, we have no choice. We must be able to translate also participial phrase structures. In this report I discuss the translation problems and describe the phases of translation.

Key Words: *participial phrase structures, machine translation.*

1 Introduction

In Technical Report No. 35² I described the process of translating English sub-ordinate clauses into Finnish, using participial phrase structures (PPS). These structures can also be expressed in Finnish using sub-ordinate clauses as in English. However, because participial phrase structures occur frequently in Finnish, the translation problem cannot be bypassed. In this report, I describe various types of participial phrase structures and how they can be translated into English.

There are two different approaches for solving the problem. In one approach, the participial phrase structures are first converted into sub-ordinate clauses, and then the modified text is translated into English. In another approach, the translation is done directly from the original text. Here I use the latter approach.

¹ The report is issued under licence CC BY-NC

² <http://www.njas.helsinki.fi/salama/participial-phrases.pdf>

2 Participial phrase structures of Finnish language

Below (1) are examples of participial phrase structures and their corresponding structures with subordinate clause.

(1)

- a. Uskon onnistuvani. I believe that I (will) succeed.
Uskon, että onnistun.
- b. Uskon tulevani onnistumaan. I believe that I will succeed.
Uskon, että tulen onnistumaan.
- c. Uskon onnistuneeni. I believe that I (have) succeeded.
Uskon, että onnistuin.
Uskon, että olen onnistunut.
- d. Uskon hänen onnistuvan. I believe that he succeeds
Uskon, että hän onnistuu.
- e. Uskon hänen onnistuneen. I believe that he (has) succeeded.
Uskon, että hän onnistui.
Uskon, että hän on onnistunut.
- f. Onnistuessaan hän iloitsee. When he succeeds, he rejoices.
Kun hän onnistuu, hän iloitsee.
- g. Onnistuttuaan hän iloitsi. When he succeeded, he rejoiced.
Kun hän onnistui, hän iloitsi.
- h. Onnistuttuaan hän iloitsee. When he has succeeded, he rejoices.
Kun hän on onnistunut, hän iloitsee.
- i. Onnistuttuani hän iloitsee. When I have succeeded, he rejoices.

In (a), the main clause is *Uskon* (I believe), and the PPS is *onnistuvani*. The basic verb form in PPS is *onnistua*, and its participial present form is *onnistuva*. The clitic *ni* refers to the first person singular. When we encode these features in the morphological analyser, we have all information needed for producing the translation. Note that Finnish does not have a future tense. If there is a need to emphasize that the event happens in future, the auxiliary verb *tulla* is used. This is displayed in (b). In it, the auxiliary verb *tulla* gets the participial form.

In (c), the PPS is *onnistuneeni*. The past participial form is *onnistunut*, and when we add the first person singular clitic, the form is *onnistuneeni*. Also here the meaning is ambiguous. It can refer to the past event or perfect past event.

The examples (d) and (e) display the cases, where the main clause and the PPS have subjects in different persons. The third person *hänen* functions as the subject of the PPS, and the verb itself does not get a clitic referring to the person.

The examples (f), (g) and (h) are cases, where the PPS is in the beginning of the sentence, and the subject of the main clause and the PPS is the same.

The example (i) has different persons as subject.

3 Phases of translation from Finnish into English

Next we analyse and disambiguate the sentences with the PPS structure (2).

(2)

a.

```
"<*uskon>"
    "uskoa" V CAP VMOD PRES SG1 @+FMAINV
"<onnistuvani>"
    "onnistua" V PART-PRES POS-SG1 @-FMAINV-part
"<.>"
    "." **CLB
```

b.

```
"<*uskon>"
    "uskoa" V CAP VMOD PRES SG1 @+FMAINV
"<tulevani>"
    "tulla" V PART-PRES POS-SG1 @-FMAINV-part
"<onnistumaan>"
    "onnistua" V 3INF ILL PRES @+FMAINV
"<.>"
    "." **CLB
```

c.

```
"<*uskon>"
    "uskoa" V CAP VMOD PRES SG1 @+FMAINV
"<onnistuneeni>"
    "onnistua" V PART-PERF POS-SG1 @-FMAINV-part
"<.>"
    "." **CLB
```

d.

```
"<*uskon>"
    "uskoa" V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
    "hän" PRON PERS SG3 GEN @SUBJ-part
"<onnistuvan>"
    "onnistua" V PART-PRES @-FMAINV-part
"<.>"
    "." **CLB
```

e.

```
"<*uskon>"
    "uskoa" V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
    "hän" PRON PERS SG3 GEN @SUBJ-part
"<onnistuneen>"
    "onnistua" V PART-PERF SG123 @-FMAINV-part
"<.>"
    "." **CLB
```

f.

```
"<*onnistuessaan>"
    "onnistua" V CAP 2INF INE POS-SGPL @-FMAINV-part
"<hän>"
    "hän" PRON PERS SG3 NOM @SUBJ
```

```
"<iloitsee>"
    "iloita" V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
g.
"<*onnistuttuaan>"
    "onnistua" V CAP PASS-2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
    "hän" PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
    "iloita" V PAST SG3 @+FMAINV
"<.>"
    "." **CLB
h.
"<*onnistuttuaan>"
    "onnistua" V CAP PASS-2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
    "hän" PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
    "iloita" V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
i.
"<*onnistuttuani>"
    "onnistua" V CAP PASS-2PART-PAR POS-SG1 @-FMAINV-part
"<hän>"
    "hän" PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
    "iloita" V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
```

All words were analysed, disambiguated, and provided with syntactic tags. Each word has such encoded information, which makes translation possible.

From now on, we proceed in stages towards English. The first thing is to provide each Finnish word with a gloss in English (3).

(3)

```
a.
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuvani>"
    "onnistua" { succeed } V PART-PRES POS-SG1 @-FMAINV-part
"<.>"
    "." **CLB
b.
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 @+FMAINV
"<tulevani>"
    "tulla" { WILL } V PART-PRES POS-SG1 @-FMAINV-part
```

"<onnistumaan>"
 "onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
 "." **CLB
c.
"<*uskon>"
 "uskoa" { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuneeni>"
 "onnistua" { succeed } V PART-PERF POS-SG1 @-FMAINV-part
"<.>"
 "." **CLB
d.
"<*uskon>"
 "uskoa" { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
 "hän" { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuvan>"
 "onnistua" { succeed } V PART-PRES @-FMAINV-part
"<.>"
 "." **CLB
e.
"<*uskon>"
 "uskoa" { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
 "hän" { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuneen>"
 "onnistua" { succeed } V PART-PERF SG123 @-FMAINV-part
"<.>"
 "." **CLB
f.
"<*onnistuessaan>"
 "onnistua" { succeed } V CAP 2INF INE POS-SGPL @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
 "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB
g.
"<*onnistuttuaan>"
 "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL @-
FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
 "iloita" { rejoice } V PAST SG3 @+FMAINV
"<.>"
 "." **CLB
h.
"<*onnistuttuaan>"

```
"onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL @-  
FMAINV-part  
<hän>  
  "hän" { he } PRON PERS SG3 NOM @SUBJ  
<iloitsee>  
  "iloita" { rejoice } V PRES SG3 @+FMAINV  
<.>  
  "." **CLB  
i.  
<*onnistuttuani>  
  "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SG1 @-  
FMAINV-part  
<hän>  
  "hän" { he } PRON PERS SG3 NOM @SUBJ  
<iloitsee>  
  "iloita" { rejoice } V PRES SG3 @+FMAINV  
<.>  
  "." **CLB
```

In (3) above, each word has only one gloss. In order to simplify the description, I have here bypassed the semantic disambiguation. I will concentrate on producing the correct word forms in English.

There are two problems in glosses above. Finnish has an option for omitting the personal pronoun. This is possible because the verb form marks the person. It is usual to omit the personal pronoun in participial phrase structures. Another problem is the future tense which is absent in Finnish. The action that takes place in future is expressed with present tense or by using the auxiliary verb *tulla*. The latter method is more specific, while the former method leaves the actual tense vague. Example (a) above represents the latter method and example (b) represents the former method. The verb *tulla* has the basic meaning *to come*, but it also may mean that the event will take place in future. Therefore, the gloss in (b) is the abstract WILL, marking the future tense.

Let us take a closer look at example (a). The sentence consists of two verbs only. The first verb *uskon* consists of the main clause. The second verb *onnistuvani* is a participial phrase structure, which in English should be translated using a subordinate clause. We also need the overt pronoun subject for both clauses in English.

The verb *uskon* has a number of linguistic tags that can be used in translation. The tag VMOD indicates that in this context the verb has a modal function, that is, it modifies the subsequent verb. The tag SG1 means that the subject is the first person singular pronoun.

The verb *onnistuvani* has the tag POS-SG1, which means that the subject, which also here is the first person singular pronoun, is in the possessive form³.

The tag SG1 can be directly converted into the pronoun *I*. The tag POS-SG1 is more complex, because, in addition to including the pronoun *I*, it also includes the requirement that the verb must be converted into a subordinate clause.

³ The tag POS is here used, because the surface form of the subject marker here is the same as in possessive forms of nouns. In fact, there is no possession in the structure.

Below we see the result of the conversion of these two tags into surface forms in all the above examples. The original tags are also retained, because they are needed when verbs are converted to surface form.

(4)

a.

```
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<onnistuvani>"
    "onnistua" { succeed } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<.>"
    "." **CLB
```

b.

```
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<tulevani>"
    "tulla" { will } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<onnistumaan>"
    "onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
    "." **CLB
```

c.

```
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<onnistuneeni>"
    "onnistua" { succeed } V PART-PERF POS-SG1 { that } { I } @-
FMAINV-part
"<.>"
    "." **CLB
```

d.

```
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
    "hän" { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuvan>"
    "onnistua" { succeed } V PART-PRES @-FMAINV-part
"<.>"
    "." **CLB
```

e.

```
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
    "hän" { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuneen>"
    "onnistua" { succeed } V PART-PERF SG123 @-FMAINV-part
"<.>"
    "." **CLB
```

f.

```
"<*onnistuessaan>"
```

```
"onnistua" { succeed } V CAP 2INF INE POS-SGPL { he , she ,
it , they } @-FMAINV-part
"<hän>"
    "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
    "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
g.
"<*onnistuttuaan>"
    "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL { he ,
she , it , they } @-FMAINV-part
"<hän>"
    "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
    "iloita" { rejoice } V PAST SG3 @+FMAINV
"<.>"
    "." **CLB
h.
"<*onnistuttuaan>"
    "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL { he ,
she , it , they } @-FMAINV-part
"<hän>"
    "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
    "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
i.
"<*onnistuttuani>"
    "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SG1 { I } @-
FMAINV-part
"<hän>"
    "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
    "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
```

We see that the tag SG1 was converted to $\{ I \}$, and the tag POS-SG1 was converted to $\{ that \} \{ I \}$. The examples (a-c) have now all glosses needed for translation.

The examples (d-e) have different persons as subjects in the main clause and the subordinate clause. The latter clause has also the overt subject *hänen*. We see that the word *hänen* has the syntactic tag @SUBJ-part, which means that it is the subject of a participial phrase structure. This means that the conjunction *that* must be added. This is done in (5).

```
(5)
a.
"<*uskon>"
```



```
"uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<onnistuvani>"
  "onnistua" { succeed } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<.>"
  "." **CLB
b.
"<*uskon>"
  "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<tulevani>"
  "tulla" { will } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<onnistumaan>"
  "onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
  "." **CLB
c.
"<*uskon>"
  "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<onnistuneeni>"
  "onnistua" { succeed } V PART-PERF POS-SG1 { that } { I } @-
FMAINV-part
"<.>"
  "." **CLB
d.
"<*uskon>"
  "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
  "hän" { he } PRON PERS SG3 GEN @SUBJ-part { that }
"<onnistuvan>"
  "onnistua" { succeed } V PART-PRES @-FMAINV-part
"<.>"
  "." **CLB
e.
"<*uskon>"
  "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
  "hän" { he } PRON PERS SG3 GEN @SUBJ-part { that }
"<onnistuneen>"
  "onnistua" { succeed } V PART-PERF SG123 @-FMAINV-part
"<.>"
  "." **CLB
f.
"<*onnistuessaan>"
  "onnistua" { succeed } V CAP 2INF INE POS-SGPL { he , she ,
it , they } @-FMAINV-part
"<hän>"
  "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloiitsee>"
  "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
```

```
      "." **CLB
g.
"<*onnistuttuaan>"
      "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL { he ,
she , it , they } @-FMAINV-part
"<hän>"
      "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
      "iloita" { rejoice } V PAST SG3 @+FMAINV
"<.>"
      "." **CLB
h.
"<*onnistuttuaan>"
      "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL { he ,
she , it , they } @-FMAINV-part
"<hän>"
      "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
      "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
      "." **CLB
i.
"<*onnistuttuani>"
      "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SG1 { I } @-
FMAINV-part
"<hän>"
      "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
      "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
      "." **CLB
```

In examples (d-e), the gloss { *that* } was added.

The examples (f-i) have a different structure compared with the earlier examples. They require that the participial phrase structures are translated using causal subordinate clauses. The conjunction *when* can be used for that purpose (6).

(6)

```
a.
"<*uskon>"
      "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<onnistuvani>"
      "onnistua" { succeed } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<.>"
      "." **CLB
b.
"<*uskon>"
      "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<tulevani>"
```

"tulla" { will } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<onnistumaan>"
"onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
"." **CLB
c.
"<*uskon>"
"uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<onnistuneeni>"
"onnistua" { succeed } V PART-PERF POS-SG1 { that } { I } @-
FMAINV-part
"<.>"
"." **CLB
d.
"<*uskon>"
"uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
"hän" { he } PRON PERS SG3 GEN @SUBJ-part { that }
"<onnistuvan>"
"onnistua" { succeed } V PART-PRES @-FMAINV-part
"<.>"
"." **CLB
e.
"<*uskon>"
"uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
"hän" { he } PRON PERS SG3 GEN @SUBJ-part { that }
"<onnistuneen>"
"onnistua" { succeed } V PART-PERF SG123 @-FMAINV-part
"<.>"
"." **CLB
f.
"<*onnistuessaan>"
"onnistua" { succeed } V CAP 2INF INE POS-SGPL { when } { he
, she , it , they } @-FMAINV-part
"<hän>"
"hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloiitsee>"
"iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
"." **CLB
g.
"<*onnistuttuaan>"
"onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL { when
} { he , she , it , they } @-FMAINV-part
"<hän>"
"hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
"iloita" { rejoice } V PAST SG3 @+FMAINV
"<.>"

```
      "." **CLB
h.
"<*onnistuttuaan>"
    "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SGPL { when
} { he , she , it , they } @-FMAINV-part
"<hän>"
    "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
    "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
i.
"<*onnistuttuani>"
    "onnistua" { succeed } V CAP PASS-2PART-PAR POS-SG1 { when }
{ I } @-FMAINV-part
"<hän>"
    "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
    "iloita" { rejoice } V PRES SG3 @+FMAINV
"<.>"
    "." **CLB
```

Now there are all glosses needed for translation. The words *onnistuessaan* and *onnistuttuaan* have several alternative subject glosses. These need to be disambiguated later using the context constraints.

In the next phase the glosses are converted into surface form. The conversion applies mainly to the verbs, because English has limited morphology (7).

(7)

```
a.
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<onnistuvani>"
    "onnistua" { succeed } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<.>"
    "." **CLB
b.
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<tulevani>"
    "tulla" { will } V PART-PRES POS-SG1 { that } { I } @-
FMAINV-part
"<onnistumaan>"
    "onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
    "." **CLB
c.
"<*uskon>"
    "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
```

"<onnistuneeni>"
 "onnistua" { succeeded } V PART-PERF POS-SG1 { that } { I }
@-FMAINV-part
"<.>"
 "." **CLB
d.
"<*uskon>"
 "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
 "hän" { he } PRON PERS SG3 GEN @SUBJ-part { that }
"<onnistuvan>"
 "onnistua" { succeeds } V PART-PRES @-FMAINV-part
"<.>"
 "." **CLB
e.
"<*uskon>"
 "uskoa" { believe } V CAP VMOD PRES SG1 { I } @+FMAINV
"<hänen>"
 "hän" { he } PRON PERS SG3 GEN @SUBJ-part { that }
"<onnistuneen>"
 "onnistua" { succeeded } V PART-PERF SG123 @-FMAINV-part
"<.>"
 "." **CLB
f.
"<*onnistuessaan>"
 "onnistua" { succeeds } V CAP 2INF INE POS-SGPL { when } {
he , she , it , they } @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloiitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB
g.
"<*onnistuttuaan>"
 "onnistua" { succeeded } V CAP PASS-2PART-PAR POS-SGPL {
when } { he , she , it , they } @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
 "iloita" { rejoiced } V PAST SG3 @+FMAINV
"<.>"
 "." **CLB
h.
"<*onnistuttuaan>"
 "onnistua" { succeeded } V CAP PASS-2PART-PAR POS-SGPL {
when } { he , she , it , they } @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloiitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV

```
"<.>"  
  "." **CLB  
i.  
"<*onnistuttuani>"  
  "onnistua" { succeeded } V CAP PASS-2PART-PAR POS-SG1 { when  
} { I } @-FMAINV-part  
"<hän>"  
  "hän" { he } PRON PERS SG3 NOM @SUBJ  
"<iloitsee>"  
  "iloita" { rejoices } V PRES SG3 @+FMAINV  
"<.>"  
  "." **CLB
```

Now when each English word has the correct form, we can reorder the words (8).

```
(8)  
a.  
"<*uskon>"  
  "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV  
"<onnistuvani>"  
  "onnistua" { that } { I } { succeed } V PART-PRES POS-SG1 @-  
FMAINV-part  
"<.>"  
  "." **CLB  
b.  
"<*uskon>"  
  "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV  
"<tulevani>"  
  "tulla" { that } { I } { will } V PART-PRES POS-SG1 @-  
FMAINV-part  
"<onnistumaan>"  
  "onnistua" { succeed } V 3INF ILL PRES @+FMAINV  
"<.>"  
  "." **CLB  
c.  
"<*uskon>"  
  "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV  
"<onnistuneeni>"  
  "onnistua" { that } { I } { succeeded } V PART-PERF POS-SG1  
@-FMAINV-part  
"<.>"  
  "." **CLB  
d.  
"<*uskon>"  
  "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV  
"<hänen>"  
  "hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part  
"<onnistuvan>"  
  "onnistua" { succeeds } V PART-PRES @-FMAINV-part  
"<.>"
```

"." **CLB
e.
"<*uskon>"
 "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
 "hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuneen>"
 "onnistua" { succeeded } V PART-PERF SG123 @-FMAINV-part
"<.>"
 "." **CLB
f.
"<*onnistuessaan>"
 "onnistua" { when } { he , she , it , they } { succeeds } V
CAP 2INF INE POS-SGPL @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB
g.
"<*onnistuttuaan>"
 "onnistua" { when } { he , she , it , they } { succeeded } V
CAP PASS-2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
 "iloita" { rejoiced } V PAST SG3 @+FMAINV
"<.>"
 "." **CLB
h.
"<*onnistuttuaan>"
 "onnistua" { when } { he , she , it , they } { succeeded } V
CAP PASS-2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB
i.
"<*onnistuttuani>"
 "onnistua" { when } { I } { succeeded } V CAP PASS-2PART-PAR
POS-SG1 @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB

The English words are in correct form and in correct order. Yet we must capitalize the initial letter of each sentence. This is done using the tag CAP found in the analysis of the sentence-initial word (9).

(9)

a.
"<*uskon>"
 "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuvani>"
 "onnistua" { that } { I } { succeed } V PART-PRES POS-SG1 @-
FMAINV-part
"<.>"
 "." **CLB

b.
"<*uskon>"
 "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<tulevani>"
 "tulla" { that } { I } { will } V PART-PRES POS-SG1 @-
FMAINV-part
"<onnistumaan>"
 "onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
 "." **CLB

c.
"<*uskon>"
 "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuneeni>"
 "onnistua" { that } { I } { succeeded } V PART-PERF POS-SG1
@-FMAINV-part
"<.>"
 "." **CLB

d.
"<*uskon>"
 "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
 "hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuvan>"
 "onnistua" { succeeds } V PART-PRES @-FMAINV-part
"<.>"
 "." **CLB

e.
"<*uskon>"
 "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
 "hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuneen>"
 "onnistua" { succeeded } V PART-PERF SG123 @-FMAINV-part
"<.>"
 "." **CLB

f.
"<*onnistuessaan>"
 "onnistua" { When } { he , she , it , they } { succeeds } V
CAP 2INF INE POS-SGPL @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB

g.
"<*onnistuttuaan>"
 "onnistua" { When } { he , she , it , they } { succeeded } V
CAP PASS-2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
 "iloita" { rejoiced } V PAST SG3 @+FMAINV
"<.>"
 "." **CLB

h.
"<*onnistuttuaan>"
 "onnistua" { When } { he , she , it , they } { succeeded } V
CAP PASS-2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB

i.
"<*onnistuttuani>"
 "onnistua" { When } { I } { succeeded } V CAP PASS-2PART-PAR
POS-SG1 @-FMAINV-part
"<hän>"
 "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
 "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
 "." **CLB

There still is ambiguity in words *onnistuessaan* and *onnistuttuaan*. The subject may have four different values. We disambiguate them using constraint-sensitive rules. We first cascade the ambiguous readings (10).

(10)

a.
"<*uskon>"
 "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuvani>"

"onnistua" { that } { I } { succeed } V PART-PRES POS-SG1 @-
FMAINV-part
"<.>"
" ." **CLB

b.
"<*uskon>"
"uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<tulevani>"
"tulla" { that } { I } { will } V PART-PRES POS-SG1 @-
FMAINV-part
"<onnistumaan>"
"onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
" ." **CLB

c.
"<*uskon>"
"uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuneeni>"
"onnistua" { that } { I } { succeeded } V PART-PERF POS-SG1
@-FMAINV-part
"<.>"
" ." **CLB

d.
"<*uskon>"
"uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
"hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuvan>"
"onnistua" { succeeds } V PART-PRES @-FMAINV-part
"<.>"
" ." **CLB

e.
"<*uskon>"
"uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
"hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuneen>"
"onnistua" { succeeded } V PART-PERF SG123 @-FMAINV-part
"<.>"
" ." **CLB

f.
"<*onnistuessaan>"
"onnistua" { When } { he } { succeeds } V CAP 2INF INE POS-
SGPL @-FMAINV-part
"onnistua" { When } { she } { succeeds } V CAP 2INF INE
POS-SGPL @-FMAINV-part
"onnistua" { When } { it } { succeeds } V CAP 2INF INE POS-
SGPL @-FMAINV-part
"onnistua" { When } { they } { succeeds } V CAP 2INF INE
POS-SGPL @-FMAINV-part
"<hän>"

```
"hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
  "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
  "." **CLB
g.
"<*onnistuttuaan>"
  "onnistua" { When } { he } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
  "onnistua" { When } { she } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
  "onnistua" { When } { it } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
  "onnistua" { When } { they } { succeeded } V CAP PASS-
2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
  "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
  "iloita" { rejoiced } V PAST SG3 @+FMAINV
"<.>"
  "." **CLB
h.
"<*onnistuttuaan>"
  "onnistua" { When } { he } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
  "onnistua" { When } { she } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
  "onnistua" { When } { it } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
  "onnistua" { When } { they } { succeeded } V CAP PASS-
2PART-PAR POS-SGPL @-FMAINV-part
"<hän>"
  "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
  "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
  "." **CLB
i.
"<*onnistuttuani>"
  "onnistua" { When } { I } { succeeded } V CAP PASS-2PART-PAR
POS-SG1 @-FMAINV-part
"<hän>"
  "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
  "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
  "." **CLB
```

The disambiguation can be performed using context-sensitive CG rules. Some ambiguity cannot be resolved, however. We do not know whether the actor is male or female. In these examples, the first one was selected (11).

(11)

a.

```
"<*uskon>"
    "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuvani>"
    "onnistua" { that } { I } { succeed } V PART-PRES POS-SG1 @-
FMAINV-part
"<.>"
    "." **CLB
```

b.

```
"<*uskon>"
    "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<tulevani>"
    "tulla" { that } { I } { will } V PART-PRES POS-SG1 @-
FMAINV-part
"<onnistumaan>"
    "onnistua" { succeed } V 3INF ILL PRES @+FMAINV
"<.>"
    "." **CLB
```

c.

```
"<*uskon>"
    "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<onnistuneeni>"
    "onnistua" { that } { I } { succeeded } V PART-PERF POS-SG1
@-FMAINV-part
"<.>"
    "." **CLB
```

d.

```
"<*uskon>"
    "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
    "hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuvan>"
    "onnistua" { succeeds } V PART-PRES @-FMAINV-part
"<.>"
    "." **CLB
```

e.

```
"<*uskon>"
    "uskoa" { I } { believe } V CAP VMOD PRES SG1 @+FMAINV
"<hänen>"
    "hän" { that } { he } PRON PERS SG3 GEN @SUBJ-part
"<onnistuneen>"
    "onnistua" { succeeded } V PART-PERF SG123 @-FMAINV-part
"<.>"
    "." **CLB
```

f.

```
"<*onnistuessaan>"
    "onnistua" { When } { he } { succeeds } V CAP 2INF INE POS-
SGPL @-FMAINV-part
"<hän>"
```

```
"hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
  "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
  "." **CLB
g.
"<*onnistuttuaan>"
  "onnistua" { When } { he } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
"<hän>"
  "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsi>"
  "iloita" { rejoiced } V PAST SG3 @+FMAINV
"<.>"
  "." **CLB
h.
"<*onnistuttuaan>"
  "onnistua" { When } { he } { succeeded } V CAP PASS-2PART-
PAR POS-SGPL @-FMAINV-part
"<hän>"
  "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
  "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
  "." **CLB
i.
"<*onnistuttuani>"
  "onnistua" { When } { I } { succeeded } V CAP PASS-2PART-PAR
POS-SG1 @-FMAINV-part
"<hän>"
  "hän" { he } PRON PERS SG3 NOM @SUBJ
"<iloitsee>"
  "iloita" { rejoices } V PRES SG3 @+FMAINV
"<.>"
  "." **CLB
```

After pruning the readings, we get the clean text (12).

(12)

```
a.
{ I }
{ believe }
{ that }
{ I }
{ succeed }
{ . }
b.
{ I }
{ believe }
{ that }
```

{ I }
{ will }
{ succeed }
{ . }

c.

{ I }
{ believe }
{ that }
{ I }
{ succeeded }
{ . }

d.

{ I }
{ believe }
{ that }
{ he }
{ succeeds }
{ . }

e.

{ I }
{ believe }
{ that }
{ he }
{ succeeded }
{ . }

f.

{ When }
{ he }
{ succeeds }
{ he }
{ rejoices }
{ . }

g.

{ When }
{ he }
{ succeeded }
{ he }
{ rejoiced }
{ . }

h.

{ When }
{ he }
{ succeeded }
{ he }
{ rejoices }
{ . }

- i.
- { When }
- { I }
- { succeeded }
- { he }
- { rejoices }
- { . }

Sentences will be put each on its own line (13).

- (13)
- a. *I believe that I succeed.*
 - b. *I believe that I will succeed.*
 - c. *I believe that I succeeded.*
 - d. *I believe that he succeeds.*
 - e. *I believe that he succeeded.*
 - f. *When he succeeds he rejoices.*
 - g. *When he succeeded he rejoiced.*
 - h. *When he succeeded he rejoices.*
 - i. *When I succeeded he rejoices.*

4 Discussion and conclusion

Above I have demonstrated phase by phase how participial phrase structures of Finnish can be translated into English. There was only a small set of test sentences. The approach should be applicable also to other sentence types. In (14) are examples, where the subject of each sentence is in plural.

- (14)
- a. Uskomme onnistuvamme.
 - b. Uskomme tulevamme onnistumaan.
 - c. Uskomme onnistunemme.
 - d. Uskomme heidän onnistuvan.
 - e. Uskomme heidän onnistuneen.
 - f. Onnistuessaan he iloitsivat.
 - g. Onnistuttuaan he iloitsivat.
 - h. Onnistuttuaan he iloitsivat.
 - i. Onnistuttuamme he iloitsivat.

The translation is in (15).

- a. *We believe that we succeed.*
- b. *We believe that we will succeed.*
- c. *We believe that we succeeded.*
- d. *We believe that they succeed.*
- e. *We believe that they succeeded.*

- f. *When they succeed they rejoice.*
- g. *When they succeeded they rejoiced.*
- h. *When they succeeded they rejoice.*
- i. *When we succeeded they rejoice.*

There is ambiguity in example (g). The verb of the main clause *iloitsivat* is in past tense. The participial perfect form *onnistuessaan* can be translated as *when they succeeded* or *when they had succeeded*. In these isolated examples the problem cannot be resolved, although a real running text would make it possible.

To be precise, the translation of examples (g-i) has still a defect. The sub-ordinate clause and main clause should be separated with a comma. This could be easily implemented, although it was not done in this report.

In all, various participial phrase structures of Finnish can be translated into English. Translation requires processes that are not very common in language technology. Yet the problems can be solved, and often it requires going back into the morphological analyser and fixing it to provide sufficiently fine-grained tagging, so that disambiguation can be done in all cases.