1 Understanding Sentences: Parsing

You are given the sentence

You made her duck.

and a little grammar of English:

<table>
<thead>
<tr>
<th>Grammatical rules</th>
<th>Lexical rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>S → NP VP</td>
<td>Det → a</td>
</tr>
<tr>
<td>NP → Det N</td>
<td>N → man</td>
</tr>
<tr>
<td>NP → Det N PP</td>
<td>Pro → you (pronoun)</td>
</tr>
<tr>
<td>NP → Pro</td>
<td>V → saw</td>
</tr>
<tr>
<td>VP → V NP PP</td>
<td>Prep → in</td>
</tr>
<tr>
<td>VP → V NP</td>
<td></td>
</tr>
<tr>
<td>VP → V</td>
<td></td>
</tr>
<tr>
<td>PP → Prep NP</td>
<td></td>
</tr>
</tbody>
</table>

Exercise

1. Produce a syntax tree for the sentence on the basis of the given grammar.

2. There is another, ditransitive, interpretation of the sentence, that interprets her and duck as two objects of made. The given grammar does not account for that, however.

   (a) Extend the grammar by adding rules that allow for this interpretation. Draw the corresponding syntax tree.

   (b) For which type of ambiguity is this an example?
Solutions

1. Produce a syntax tree for the sentence on the basis of the given grammar.

   \[\text{S} \rightarrow \text{NP VP} \]
   \[\text{NP} \rightarrow \text{Pro NP} \]
   \[\text{VP} \rightarrow \text{V NP} \]
   \[\text{V} \rightarrow \text{made} \]
   \[\text{NP} \rightarrow \text{Det N} \]
   \[\text{Pro} \rightarrow \text{you} \]
   \[\text{NP} \rightarrow \text{her duck} \]

2. There is another, ditransitive, interpretation of the sentence, in which \text{her} and \text{duck} are interpreted as two objects of \text{made}. The given grammar does not account for that however.

   (a) Extend the grammar by adding rules that allow for this interpretation. Draw the corresponding syntax tree.

   \text{Additional rules:}
   \[\text{VP} \rightarrow \text{V NP NP} \]
   \[\text{NP} \rightarrow \text{N} \]
   \[\text{Pro} \rightarrow \text{her} \]

   \text{Syntax tree:}

   \[\text{S} \rightarrow \text{NP VP} \]
   \[\text{NP} \rightarrow \text{Pro NP} \]
   \[\text{VP} \rightarrow \text{V NP NP} \]
   \[\text{V} \rightarrow \text{made} \]
   \[\text{NP} \rightarrow \text{Det N} \]
   \[\text{Pro} \rightarrow \text{her} \]
   \[\text{NP} \rightarrow \text{duck} \]

   (b) For which type of ambiguity is this an example?

   \[\rightarrow \text{Global ambiguity.} \]

2 Understanding Sentences: Garden Path Sentences

In the lectures we have discussed some unusual constructions called garden-path sentences. These are grammatically correct sentences that are constructed in such a way that the most likely initial parse is incorrect. During the parsing of the sentence, the reader encounters an unexpected word given the parse structure they have constructed so far. At that point, the reader will have to backtrack and reanalyse either part of the parse or the entire parse tree.

Exercises
1. Can you create your own garden-path sentences (at least four)? Mark the breaking point and present the initial (most likely) and final (correct) interpretations.

(a) I read the book *was* nice.

(b) The school pupils dislike studying at *was* closed.

(c) If you want to play with your pet dog *it*.

(d) etc.

(a) He read the book *was* nice.

(b) The school pupils dislike studying at *was* closed. (or *at*)
(c) If you want to play with the pet dog it.

\[
\text{S} \\
\text{S'} \\
\text{IN} \\
\text{if} \\
\text{NP} \\
\text{Pro} \\
\text{you} \\
\text{want} \\
\text{TO} \\
\text{to} \\
\text{V} \\
\text{play} \\
\text{IN} \\
\text{with} \\
\text{NP} \\
\text{the pet dog}
\]
2. Can you construct a grammar that will parse your garden path sentences? [Note that you will have to include all the part-of-speech tags for the you ambiguous word(s).]

<table>
<thead>
<tr>
<th>Grammatical rules</th>
<th>Lexical rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>S (\rightarrow) NP VP</td>
<td>Pro (\rightarrow) he</td>
</tr>
<tr>
<td>S (\rightarrow) VP</td>
<td>V (\rightarrow) read</td>
</tr>
<tr>
<td>S (\rightarrow) S' VP</td>
<td>Det (\rightarrow) the</td>
</tr>
<tr>
<td>S' (\rightarrow) IN S</td>
<td>N (\rightarrow) book</td>
</tr>
<tr>
<td>NP (\rightarrow) Pro</td>
<td>Adj (\rightarrow) nice</td>
</tr>
<tr>
<td>NP (\rightarrow) Det N</td>
<td>IN (\rightarrow) at</td>
</tr>
<tr>
<td>NP (\rightarrow) N</td>
<td>TO (\rightarrow) to</td>
</tr>
<tr>
<td>VP (\rightarrow) V NP</td>
<td></td>
</tr>
<tr>
<td>VP (\rightarrow) V S</td>
<td></td>
</tr>
<tr>
<td>VP (\rightarrow) V AdjP</td>
<td></td>
</tr>
<tr>
<td>VP (\rightarrow) V PP</td>
<td></td>
</tr>
<tr>
<td>VP (\rightarrow) TO VP</td>
<td></td>
</tr>
<tr>
<td>PP (\rightarrow) IN NP</td>
<td></td>
</tr>
<tr>
<td>AdjP (\rightarrow) Adj</td>
<td></td>
</tr>
</tbody>
</table>