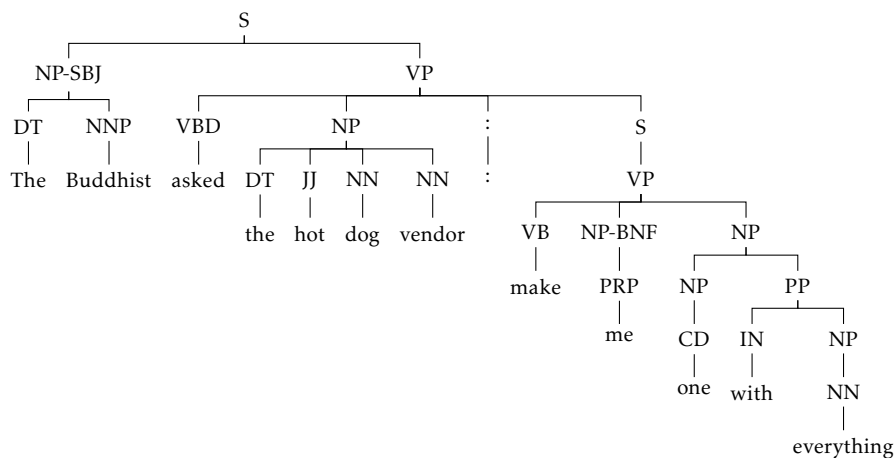


# Dependency Parsing exercises:

## Dependency Structures part 2

Deadline: 01.05.2017. Please send the homework to [petitjean@phil.hhu.de](mailto:petitjean@phil.hhu.de) and [cranenburgh@phil.hhu.de](mailto:cranenburgh@phil.hhu.de) with subject "dependency homework" and an attachment named "ex2\_lastname1\_lastname2.pdf".

1. Convert the following constituency analysis into a dependency analysis:



This tree uses Penn treebank annotation: <http://web.mit.edu/6.863/www/PennTreebankTags.html>  
 Not all constituents have a grammatical function; for example, it is implied that an NP under a VP is an object. Treat the BNF (benefactor) label as an indirect object.

- (a) Mark one child as the head in each constituent. Note that it is in a phrase-structure tree, not only words can be heads, but also phrases. Heuristically, the head of an NP is its rightmost noun or another NP, and the head of S or VP is the main verb or another VP.
  - (b) Add the implied function labels.
  - (c) Now you have enough information to do a conversion. The dependents of a head word consist of its direct siblings and the head words under siblings of ancestors. Convert the tree step-by-step: start with the main verb of the sentence and identify its dependents. Identify dependents of those dependents, etc., until each word has a dependency relation.
  - (d) What information is lost in the conversion? Would that matter to a downstream application? Discuss.
2. Give an example of a sentence with non-projective dependencies.
    - (a) What is the linguistic phenomenon that gives rise to the non-projectivity?
    - (b) Give a projective dependency analysis of the same sentence. Show the steps you perform to "projectivize" the tree.
    - (c) Give a dependency analysis of the same sentence in another language (again with universal dependencies), and see if the non-projectivity remains. Add glosses to the non-English words.
    - (d) Do you think the non-projective dependency is essential for downstream applications, or is the projective version good enough? Discuss.