

# Handling Optionality

The issue is that the optional pieces are occurring in rules of any length. E.g. we could have  $NP \rightarrow (D)(Adj)(Mod)N$

The possible options for this are:

- $NP \rightarrow D Adj Mod N$
- $NP \rightarrow D Adj N$
- $NP \rightarrow D Mod N$
- $NP \rightarrow D N$
- $NP \rightarrow Adj Mod N$
- $NP \rightarrow Adj N$
- $NP \rightarrow Mod N$
- $NP \rightarrow N$

This can be seen as using a negated mask over the optional elements with the non-optional elements interpolated

- $NP \rightarrow D Adj Mod N (000)$
- $NP \rightarrow D Adj N (001)$
- $NP \rightarrow D Mod N (010)$
- $NP \rightarrow D N (011)$
- $NP \rightarrow Adj Mod N (100)$
- $NP \rightarrow Adj N (101)$
- $NP \rightarrow Mod N (110)$
- $NP \rightarrow N (111)$

if the bit at position  $n$  in the list of optionals is 1, then that position is removed.

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