A toy semantics for a fragment of English

Notation

(1)
- a. 1 = true
- b. 0 = false
- c. $[\![\ ]\!]$ = the interpretation function; $[\![\alpha]\!]$ = the denotation of α
- d. set theory

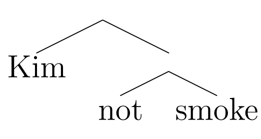
Lexical items

(2)
- a. $[\![\text{Kim}]\!] = \text{Kim}$
- b. $[\![\text{run}]\!] = \{x \mid x \text{ runs}\}$
- c. $[\![\text{smoke}]\!] = \{x \mid x \text{ smokes}\}$
- d. $[\![\text{not}]\!]$ = set complementation: $[\![\text{not}]\!](\text{A}) = \{x \mid x \notin \text{A}\}$
- e. $[\![\text{and}]\!]$ = set intersection: $[\![\text{and}]\!](\text{A, B}) = \{x \mid x \in \text{A and } x \in \text{B}\}$

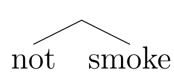
Composition rules

(3)
- a. PREDICATION
  If α is a constituent whose immediate subconstituents are β and γ, and if $[\![\beta]\!]$ is an individual and $[\![\gamma]\!]$ a set of individuals, then $[\![\alpha]\!] = 1$ if $[\![\beta]\!] \in [\![\gamma]\!]$ (if $[\![\beta]\!]$ is a member of $[\![\gamma]\!]$), and 0 otherwise.
- b. 1-PLACE APPLICATION
  If α is a constituent whose immediate subconstituents are β and γ, and if $[\![\beta]\!]$ is a 1-place set-theoretic operation and $[\![\gamma]\!]$ is a set of individuals, then $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!])$. ($[\![\alpha]\!]$ is the result returned by applying $[\![\beta]\!]$ to $[\![\gamma]\!]$.)
- c. 2-PLACE APPLICATION
  If α is a constituent whose immediate subconstituents are β, γ, and δ and if $[\![\beta]\!]$ is a 2-place set-theoretic operation and $[\![\gamma]\!]$ and $[\![\delta]\!]$ are sets of individuals, then $[\![\alpha]\!] = [\![\beta]\!]([\![\gamma]\!], [\![\delta]\!])$. ($[\![\alpha]\!]$ is the result returned by applying $[\![\beta]\!]$ to the pair $[\![\gamma]\!], [\![\delta]\!]$.)

Computing ('proving') truth conditions

(4) $[\![$ 

$]\!] = 1$ if...

- a. $[\![\text{Kim}]\!] \in [\![$ 

$]\!]$ (PRED)
- b. $[\![\text{Kim}]\!] \in [\![\text{not}]\!]([\![\text{smoke}]\!])$ (1-PL APP)
- c. $[\![\text{Kim}]\!] \in \{x \mid x \notin [\![\text{smoke}]\!]\}$ (LEX: (3d))
- d. $[\![\text{Kim}]\!] \in \{x \mid x \notin \{y \mid y \text{ smokes}\}\}$ (LEX: (3c))
- e. $\text{Kim} \in \{x \mid x \notin \{y \mid y \text{ smokes}\}\}$ (LEX:(3a))
- f. $\text{Kim} \notin \{y \mid y \text{ smokes}\}$ (set-theoretic equivalence)

... else 0.