Grundlagenmodul Semantik
All Exercises

Sommersemester 2014

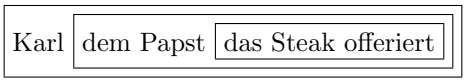
Exercise 1
4 points

Are the following statements correct? Justify your answers in a single short sentence.

1. $11 \in \{x \mid x \text{ is a square number}\}$
2. $11 \in \{x \in \{y \mid y \text{ ist odd}\} \mid x \text{ is a prime number}\}$
3. $\{a\} \in \{a, b, c\}$
4. $\{a, b\} \subseteq \{a, b, c\}$

Exercise 2
3 points

Give a rule which can be used to compute the extension of the combination of a ditransitive verb with its direct object, e.g. "das Steak offeriert" in



Use this rule and the techniques introduced in chapter 5 of the book (especially section 4) to determine the truth conditions of this sentence. (You do not need to analyse the noun phrase "das Steak" any further, i.e. you may treat it like a name.)
Hint: the extension of a ditransitive verb like *offer* in a situation s is the set $\{\langle x, y, z\rangle \mid x \text{ offers } z \text{ to } y \text{ in } s\}$ where ordered triples are defined as follows:

$$\langle x, y, z\rangle := \langle\langle x, y\rangle, z\rangle$$

Exercise 3
3 points

Determine the extension of the quantifier *three* as in *Three men were hungry.* (Note that the number of elements of any set S can be denoted by $|S|$.) Ignore the plural morphology.

Exercise 4
5 points

Derive the truth conditions of

(*i*) "John is every winner" and

(*ii*) "John is a winner"

assuming the sematics for "is" as in Fn 12 p. 137. Simplify the truth conditions as far as you can. Determine the truth values of the sentences under the assumption $[\![\text{John}]\!]_{s_i} = j$ (for $i = 1, 2$ or 3) at the situations s_1, s_2 and s_3 (assuming that $j \neq m$). Justify your answers.

a) $[\![winner]\!]_1 = \{j\}$

b) $[\![winner]\!]_{s_2} = \{j, m\}$

c) $[\![winner]\!]_{s_3} = \emptyset$

Exercise 5
5 points

Paraphrase the different readings (as caused by scope ambiguity) of the following sentence. Use QR to derive the truth conditions of both readings and simplify these as far as you can.

Three students read every book

Exercise 6
3 points

Use the *in situ* analysis of quantifiers in object position to determine the truth conditions of the following sentence.

Bollo respects no man

Exercise 7
7 points

When QR is used, it is possible that, for certain sentences, syntactically different LFs can be derived which nevertheless have the same truth conditions. For two such LFs LF_1 and LF_2, it will hold that $[\![LF_1]\!]_s = [\![LF_2]\!]_s$ for every situation s, i.e. the truth values of LF_1 and LF_2 can never be different. In such a case, LF_1 and LF_2 are said to be (logically) *equivalent*.

For the following exercises, assume that QR is restricted as follows:

(R) QR must be applied **exactly once** to every quantifier phrase, **including** the subject. (But it can be applied to those phrases in any order.)

a) Show that all LFs that can be obtained by QR for the following sentence are equivalent.

1. A man smoked a cigarette

b) Assume $[\![\text{some}]\!]_s = [\![\text{a}]\!]_s$ for every s.

Let L be the set of LFs of the following sentence.

Some teacher gave every student a hint

1. Determine $|L|$, i.e. find out how many syntactically different LFs the sentence has.
2. What is the greatest possible size of any $M \subseteq L$ such that no two members of M are equivalent?

Justify your answers.

Exercise 8
3 points

Calculate the truth conditions of the following sentence. Analyse the subject as a quantifier phrase, i.e. use the lifting operation.

Boggis is a fat farmer

Regarding the analysis of *is* and the quantifier in object position, you are free to choose whichever method of analysis you prefer. **State your choice explicitly at the beginning of your solution**.

Regarding the lifting operation, assume (following the book) that it applies to $[\![\text{Boggis}]\!]_s^{PN}$, which is meant to be the individual which the name "Boggis" refers to in s. In your calculation of the truth conditions, you should then take $[\![\text{Boggis}]\!]_s$ (without the superscript PN) to be the result of lifting $[\![\text{Boggis}]\!]_s^{PN}$.

Exercise 9
3 points

Assume "mother" to be a functional noun and show that

$$[\![\text{John's mother}]\!]_s = [\![\text{mother}]\!]_s([\![\text{John}]\!]_s)$$

Using reconstruction of

John's mother

to

's mother (of) John

and assuming that "'s" has the same semantics as the definite article.

Exercise 10
5 points

Analyse the following sentence syntactically (indicating constituency using boxes) and calculate its truth conditions. Assume that "his" depends on "some farmer".

Some farmer betrayed his mother

Use the result from exercise 1 to analyse "his mother", i.e. assume

$$[\![\text{his mother}]\!]_s = [\![\text{mother}]\!]_s([\![\text{he}]\!]_s)$$

Exercise 11
2 points

Assume that a sentence of the kind "most A are B" is true if and only if there are more A which are B than there are A which are not B. Specify the extension of the quantifier "most". Use the result to calculate the truth conditions of

Agatha detests most children

Exercise 12
3 points

Paraphrase the two different readings of the following sentence. Derive an LF for one of these readings and calculate its truth conditions.

Every dog which Mary owns hates a cat

Exercise 13
5 points

Assume the following extension for *and* as in *Mary and Paul ran*.

$$\{\langle x, \langle y, z\rangle\rangle \mid z = y \text{ or } z = x\}$$

Further assume that *A and B* has the consituent structure [A [and B]], that

$$[\![\text{ref-term}_2\ [\text{and ref-term}_1]]\!]_s = [\![\text{ref-term}_2]\!]_s * [\![\text{and ref-term}_1]\!]_s$$

$$[\![\text{and ref-term}_1]\!]_s = [\![\text{ref-term}_1]\!]_s * [\![\text{and}]\!]_s$$

Now

1. Show that $[\![\text{Mary and Paul}]\!]_s = \{[\![\text{Mary}]\!]_s, [\![\text{Paul}]\!]_s\}$
2. Assume that $[\![\text{ran}_{\text{PL}}]\!]_s = PL([\![\text{run}]\!]_s)$, where

$$PL(X) = \{Y \mid Y \neq \emptyset \text{ and } Y \subseteq X\}$$

Derive the truth conditions of

$$\textit{Mary and Paul ran}_{\mathrm{PL}}$$

3. Use the result of part 2 to show that the sentence is false in a situation s with the following properties (assuming that m, p and b are distinct individuals).

   $[\![\text{Mary}]\!]_s = m$

   $[\![\text{Paul}]\!]_s = p$

   $[\![\text{run}]\!]_s = \{m, b\}$

Exercise 14
2 points

Find appropriate sentences to put in the place of S in order to show that the following contexts are not extensional: *the Pope is unhappy that S* and *it never was the case that S*.

Exercise 15
2 points

Show that the extension of *and* as given in exercise 2 cannot cope with more than two conjuncts. I.e., we do not get e.g. $[\![\text{Peter and Paul and Mary}]\!]_s = \{[\![\text{Peter}]\!]_s, [\![\text{Paul}]\!]_s, [\![\text{Mary}]\!]_s\}$.

Exercise 16
3 points

For every NP and world w, $[\![\text{NP}]\!]_w$ is uniquely determined by $[\![\text{a NP}]\!]_w$, i.e. the extension of the NP at w can be recovered from the extension of the DP at w. This can be done using the following equation:

$$[\![\text{NP}]\!]_w = \{x \mid \{x\} \in [\![\text{a NP}]\!]_w\}$$

Prove this equation. *Hint:* Show that the sets are subsets of each other. You may use the fact that, for every object a and set M, $\{a\} \cap M \neq \emptyset \Leftrightarrow a \in M$.

Exercise 17
4 points

Assume the following (instance of a) rule for verbs with infinitival complements.

$$[\![\text{decide to VP}]\!]_w = [\![\text{decide}]\!]_w * [\![\text{VP}]\!]$$

- Specify the type of *decide*: what kind of set should it be, i.e. what kind of elements should it contain? Then calculate the intensions of

  1. John decided to walk

2. John decided to smoke

- Assume that $[\![\text{John}]\!]_w = j$ for every w and that

$$[\![\text{walk}]\!]_{w_0} = [\![\text{smoke}]\!]_{w_0} = \{j\}$$

where w_0 is the real world. Specify the value $[\![\text{decide}]\!]_{w_0}$ and the extensions of "run" and "swim" at some further world w_1 such that

$$[\![\text{John decided to walk}]\!]_{w_0} \neq [\![\text{John decided to smoke}]\!]_{w_0}$$

So one of the sentences should be true and the other should be false at w_0.

Hint: In your argument, assume w_0 and w_1 to be the only worlds there are. You then need to make sure that $[\![\text{run}]\!]$ is not the same function as $[\![\text{smoke}]\!]$. Remember that two functions f and g are identical, i.e. $f = g$, if and only if they have the same domain and for every x from that domain, $f(x) = g(x)$.

Exercise 18
2 points

Let S_1 and S_2 be sentences. Draw Venn diagrams and shade the areas corresponding to the intensions of the following sentences. Mind the syntactic structure.

1. not [S_1 and not S_2]
2. [not S_1] or [S_1 and S_2]

Exercise 19
1 points

The German word *Rappe* means *black horse*. Give a suitable meaning postulate for this word.

Exercise 20
3+1 points

- Show that, for any NP and world w,

$$[\![\text{NP}]\!]_w = \bigcap [\![\text{every NP}]\!]_w$$

Where, for any set of sets M, $\bigcap M = \{x \mid \text{for every } X \in M,\ x \in X\}$

- Show that it is possible to recover $[\![\text{NP}]\!]$ from $[\![\text{a NP}]\!]$.

Exercise 21
4 points

The following sentence is ambiguous between a specific and a non-specific reading of the extistential quantifier.

John thinks that a unicorn arrived

The specific reading can be derived using QR to move the quantifier out of the embedded sentence.

Give unambiguous paraphrases for both readings. Then derive an LF for the specific reading and compute its intension.

Exercise 22
7 points

Give meaning postulates that appropriately express the relations of synonymy and hypo/hyperonymy between the following English words. State the postultates in set-theoretic terms, i.e. do not state just state, e.g. "X is a synonym of Y".

- woodchuck
- mouse
- rodent
- groundhog
- mammal
- animal
- dog
- red snapper

Exercise 23
3 points

Let

$$[\![\text{most}]\!]_w = \{\langle X, Y\rangle \,|\, |X \cap Y| > |X - Y|\}$$

(where $X - Y = \{x \,|\, x \in X \text{ and } x \notin Y\}$).

Now **use the** *in situ* **rule** for quantifiers in object position to derive the intension of

Most men ate a bagel

Disregard tense and plural morphology. Then calculate the values of the intension at w_0 and w_1, which are specified as follows.

	man	bagel	eat
w_0	$\{a, b, c\}$	$\{d, e, f\}$	$\{\langle a, d\rangle, \langle b, e\rangle\}$
w_1	$\{a, b, c\}$	$\{d, e, f\}$	$\{\langle a, d\rangle, \langle a, d\rangle\}$

Exercise 24
4 points

State the principle of extensional compositionality. Use an example to briefly explain the limitations of this principle. State the principle of intensional compositionality.

Exercise 25
2 points

Give the LF and calculate the intension of the following sentence. Remember to analyse the relative clause assuming an empty relative pronoun. Again, disregard tense.

John found every brown dog Mary loved

Exercise 26
3 points

Consider the following three meaning postulates.

1. For every world w, $[\![\text{fish}]\!]_w \subseteq [\![\text{animal}]\!]_w$
2. For every world w, $[\![\text{trout}]\!]_w \subseteq [\![\text{fish}]\!]_w$
3. For every world w, $[\![\text{trout}]\!]_w \subseteq [\![\text{animal}]\!]_w$

Show that the third postulate is redundant given the first two.

Exercise 27
1 points

Assume the analysis of the definite article as a quantifier and calculate the truth conditions of the following sentence.

the bridge collapsed

Exercise 28
4 points

Specify possible worlds at which the sentence in exercise 1 becomes

1. true
2. false due to a violation of the existence condition

3. fales due to a violation of the uniqueness condition

For one of these worlds, show explicitly that it actually has the required property, i.e. calculate the truth value of the sentence in this world using the truth conditions determined in exercise 1.

Exercise 29
2 points

Briefly explain why the following question should, in general, be considered unfair and identify the responsible lexical element.

Have you stopped beating your mother?

Exercise 30
3 points

Which presuppositions does the following sentence have? Which lexical elements are responsible for them?

The pope is unhappy that I met your nephew's son

Exercise 31
2 points

Determine the presuppositions of the following sentence. Also specify their triggers. Be careful: due to an ambiguity, there are two different possibilities here. Give **both**, seperately.

Bob opened the door again

Exercise 32
4 points

Use the following definition of the term *presupposition* to prove the two statements below.

Definition 1. *S_1 is a presupposition of S_2 iff S_1 is not a tautology and S_1 is a consequence of S_2 and of* not *S_2.*

1. If S_1 is a presupposition of S_2 and $[\![S_1]\!]_w \neq 1$, then S_2 is neither true nor false at w.

2. If S_1 and S_2 have the same presuppositions, then (at any possible world) S_1 has a truth value if and only if S_2 has one. (Assume here that unfulfilled presuppositions are the only possible reason for a sentence's not having a truth value.)

Exercise 33
4 points

Identify the presuppositions of the following sentences and all their sentential parts. Also specify their triggers. Interpret anaphoric pronouns as if their antecedents were in their place.

1. Fred is married and his wife stopped smoking weed.

2. Either the president wasn't mugged or it was Jimmy who managed to mug him.