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Grammar Formalisms and Parsing

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Throughout this handout, we are working with our familiar signature declaring an ontology of (lists of) pets and birds, repeated in 1.

1. **Signature**

```
bot
  list
     nelist head:animal tail:list
     elist
  animal legs:number color:color
     bird legs:two
       parrot
       woodpecker
       canary
     pet legs:four
       cat
       dog
  number
     one
     two
     three
     four
  color
     green
     red
     yellow
     brown
.
```

2. **A set of descriptions**

   Write down the following descriptions in MoMo syntax and in AVM syntax.

   (a) Parrots are red or green or yellow.

   (b) Woodpeckers are brown.

(c) Canaries are yellow.
(d) Cats and dogs are brown.
(e) A list has two or three elements.
(f) A list of two elements contains two different types of pets.
(g) A list of three elements contains three different types of birds.

3. **Exercise 1**

We presuppose the signature given in 1:

(a) `parrot *> color: (red; green; yellow).`
(b) `parrot, color: (red; green; yellow).`

(1) Give 3 feature structures that satisfy (a) and 3 feature structures that satisfy (b).
(2) Give 1 feature structure that satisfies both (a) and (b).
(3) What is the crucial difference in meaning between (a) and (b)?
(4) Try to characterize the relationship between the set of feature structures that satisfy (a) and the set of feature structures that satisfy (b).

4. **Exercise 2**

We investigate the descriptions in (a) and (b), which are again descriptions of the signature given in 1.

(a) Lists only contain canaries.
(b) Canaries are yellow.

(1) Write down the intended grammar Γ.
(2) Describe informally: What is the intended meaning of Γ?
(3) Write down Γ in MoMo notation.
(4) What are the problems if we try to use the satisfaction relation to characterize the meaning of Γ? Can you find any solutions to these problems?

5. **Exercise 3**

Describe the models given by the grammar consisting of the signature in 1 and the singleton sets of descriptions

```
parrot *> color: (red; green; yellow).
```

and

```
parrot, color: (red; green; yellow).,
```

respectively.