Variables in Basic Specifications: Overloading and Overriding*†

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In writing the first draft of the semantics of basic specifications, various questions arose concerning the treatment of variables. What version 0.95 of the language summary says about this appears to be inconsistent in certain respects. These are minor points, but decisions are required.

1 Basic Concepts

May variables be *overloaded*, i.e. can a set of sorted variables X contain $x : s$ and $x : s'$ with $s \neq s'$? Probably not, since things like $\forall x : s.\forall x : s'.f(x) = x$ for $f : s \to s'$ might be confusing. But what about examples like

```
var x:s  ...  ...  axiom forall x:s'. phi
```

or

```
var x:s  ...  ...  var x:s'
```

If overloading is forbidden, these could still be allowed if *overriding* is permitted: later declarations supercede earlier ones. Then $\forall x : s.\forall x : s'.f(x) = x$ would only be well-formed if $f : s' \to s'$.

2 Basic Constructs

`VAR-DECL` can appear both as a `BASIC-ITEM` and inside a `QUANTIFICATION`. What is allowed concerning re-use of variables and is the treatment the same in both contexts?

What is said in version 0.95 of the language description seems inconsistent:

§http://www.brics.dk/Projects/CoFI/Notes/L-1/
¶ftp://ftp.brics.dk/Projects/CoFI/Notes/L-1/doc.ps.Z
‖ftp://ftp.brics.dk/Projects/CoFI/Notes/L-1/doc.dvi
*CoFI Note: L-1 –Version 1– 28 March 1997
†E-mail address for comments: dts@dcs.ed.ac.uk
‡WWW Home Page URL: http://www.brics.dk/Projects/CoFI/.

> Section 2, before 2.1: "it is not allowed to specify the same `BASIC-ITEM` more than once in the same list `BASIC-ITEM*`."
> Section 2.2 (`VAR-DECL`): "The variables in the list `VAR+` must be ... distinct from the variables previously declared by other `VAR-DECL`s in the same list of basic items"
> Section 2.3.1 (`QUANTIFICATION`): "an inner declaration for a variable with the same identifier as in an outer declaration overrides the outer declaration"

The treatment of `VAR-DECL` in `QUANTIFICATION` need not be the same as its treatment in `BASIC-ITEM`, although there should be a good reason if a non-uniform treatment is chosen.

A related question concerns *repetition*, i.e. redeclaration of a variable *with the same sort as before*:

```
var x:s  ...  ...  var x:s
```

or

```
var x:s  ...  ...  axiom forall x:s. phi
```

or

```
axiom forall x:s. (... forall x:s. phi ...)
```

3 Possible Choices

Overloading and overriding:

1. Overloading allowed
2. Overloading not allowed ...
   (a) ... but overriding allowed ...
      i. ... in variable declarations and in quantifications
      ii. ... only in variable declarations
      iii. ... only in quantifications
   (b) ... and overriding not allowed

I think 2(a)i is probably the best option here.

Repetition:

1. Repetition not allowed
2. Repetition allowed ...
   (a) ... in variable declarations and in quantifications
   (b) ... only in variable declarations
   (c) ... only in quantifications

I think 2a is probably the best option here.