Appendices: Glossary and definitions

While the initial list of fancy words in the introduction is nice it suffers from being superficial and therefore incomplete. These are more details definitions using examples and imagery

Linearity / Quantity / Multiplicity

Used interchangably most of the time. They refer the the number of type a variable is expected to be used.

Linear types

Linear types describe values that can be used exactly 0 times, exactly 1 time or have no restriction put on them

Affine types

Affine types describe values that can be used at most 0 times, at most 1 times or at most infinitely many times (aka no restrictions)

Monad

A mathematical structure that allows to encapsulate *change in a context*. For example `Maybe` is a Monad because it creates a context in which the values we are manipulating might be absent.

Co-monad / Comonad

A mathematical structure that allows to encapsulate *access to a context*. For example `List` is a Comonad because it allows us to work in a context were the value we

manipulate is one out of many available to us, those other values available to us are the other values of the list.

Semiring

A mathematical structure that requires its values to be combined with $+$ and $*$ in the ways you expect from natural numbers

Lattice

A mathematical structure that relates values to one another in a way that doesn't allow arbitrary comparaison between two arbitrary values. Here is a pretty picture of one:

As you can see we can't really tell what's going on between X and Y, they aren't related directly, but we can tell that they are both smaller than W and greater than Z

Syntax

The structure of some piece of information, usual in the form of *text*. Syntax itself does not convey any meaning. Imagine this piece of data

picture of a circle

We can define a syntactic rules that allow us to express this circle, here is one: all shapes that you can draw without lifting your pen or making angles. From this definition lots of values are allowed, including |, -, O but not + for example because there is a 90º angle between two bars.

Is it supposed to be the letter "O", the number "0" the silouhette of a planet? the back of the head of a stick figure?

Semantics

The meaning associated to a piece of data, most often related to syntax. From the *syntax* definition if we have

picture of 10

we can deduce that the circle means "the second digit of the number 10" which is the number "0". We were able to infer semantics from context. Similarly

picture of :)

we can deduce that the meaning of the circle was to represent the head of a stick figure, this time from the front.