6

LOGIC IN A RELATIONAL SENSE

Now let's consider why logic programming works? Which leads us to the question of why logic works? Interestingly, contrary to other fields, the *why* of logic can be explained in terms of the *how*.

Logic works because it is inherently relational. What this means is that logic is not interested in the nature, truth, or falsity of a given statement, only in its relation to other statements, and their total relation to the conclusion.

Logic is concerned with contradiction. That which does not contradict, is logically valid, even if it may be semantically ridiculous, or rationally impossible. The task of verifying the integrity of a statement on its own, falls to epistemology: the philosophy of how we know what we know, and how we or what determines whether something is true or not. (Some people call this critical thinking.)

So, interestingly, logic is not concerned with critical thinking, but with validity. In other words, as long as the statements are relevant to each other, and they do not contradict the conclusion, the argument is valid.

We can see an example of this rendered in Prolog, as follows:

```
loves(sys, control).
 loves(sys, X) :- loves(X, control).
```

The second statement reads: Sys loves anyone, if anyone loves control. X is a variable for any, and :- stands for if. We save this in a file called `demo.pl`.

Installing SWI-Prolog on our computer, we can run this in the terminal by typing:

```
[demo].
```

If the result is `true`, then everything went smoothly.

To show how logic cares about non-contradiction, it is enough to ask whether Sys loves itself. If it does, then the argument is valid, since the statements (in green) do not contradict the claim (in pink).

```
loves(sys, sys).
```

But what did I mean when I said even if a statement is rationally problematic?

Let's define a new relational statement inside `demo.pl`:

```
descartes(man).
 mortal(Y) :- man(Y).
 woman(pembroke).
```

According to this database, if we run Prolog, the claim that women are not mortal becomes true. Although irrational per se, from the relational perspective of logic, it is valid.

In the second statement, we defined as mortal all those people (Y) who are men. According to this rule, since Pembroke is not a man, she is not mortal.