META
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Our colleague doesn't trust folks that believe only in First-Order Logic. The debate reminds me of the classic question of computers modeling human intelligence. I agree thoroughly that FOL does injustice to human thought. Second and higher order logics have the same problem. But here's an assertion and a challenge:

Computation is nothing other than a logical system. Thus, no *implementation* of symbolic processing addresses human processing and no *implementation* requires more than a variant of logic.

The point is the criterion for comparison. Our colleague's work may have a higher philosophical goal, but all implementations of that work are an implementation of a variant of logic (first or second order). The challenge is to provide code or control structure that does not map onto a logical variant.

Our colleague's Heisenberg principle (function/representation indeterminacy)is supported by traditional linear models and sequential processing. It is contradicted by parallel models. Specifically, a SET representation is also faster computationally with parallel hardware, since each set member can be computed in parallel. The effort of converting from sequential to set representations (Losp does this for logic) not only generates a more efficient representation, it generates a more efficient processing model.

There is something more fundamental going on in boundary mathematics than swapping structure for function. Specifically, structure and function are being equated. The two are one and the same thing. If you *read* a boundary expression, it is a structure; if you *query* a boundary expression, it is a deductive process. The finesse is at the human/representation interface. What you want it to be, it is. Without your desire, it is one thing, neither structure or process, but *form*.

Western philosophy has been troubled with dualism is various guises throughout history. It is not surprising that dualism shows up in the object/meta discussion, or in the structure/function discussion. Any dualism is bound to incorporate contradiction, because the dual aspects are defined to be complements. In contrast, the ALCHEMICAL viewpoint (as above, so below) focuses on inheritance hierarchies that contain a dominant position, but no complements. *We* are the top level, representation is subordinate. We determine whether or not a symbol is functional or descriptive, not the symbol. Losp shows that control structure is also alchemical; there is no need for object/meta dualism. Rather, if we choose a descriptive top level, then nested levels alternate,

    object (process (object (process (object ...))))

Boundary math provides transformation tools to condense this alternation into two levels without changing the meaning of the expression.

I seem to be not too clear about the reflection problem. From my experience it seems to be more of a bad idea and a trap than a real issue. There is some object representation level *O*, which gets manipulated by a control program C to yield a changed representation *O'*. That is

    C(O) => O'

Naturally we want => to also be = (=> is change and = is description).

Now we want to reason about the control *C*. Say we want to choose between *C1* and *C2*. What are the available criteria for choice?

MAIN POINT:

> The only criteria are in O.

Meta issues that inject new information about *control* into the problem indicate that O does not state the problem fully. Control-level reasoning is necessary only when the problem is partially specified. But, in specifying the control-level reasoning, we are in fact providing the missing parts of the object level representation.

So why not reformulate *O* in a representation that eliminates the problem about whether or not *C1* is better than *C2*. We can do this by extending *O* to include the missing parts, by increasing the dimensionality of *O*, or by finding a clearer representation language. (An easy way to do this is to include => and = at the object level.) Call this reformulation process *C3*.

ANOTHER MAIN POINT:

> C3 is a non-meta control level that eliminates
> the need to reason about control.

That is,

> Reasoning about control is
> reasoning about a different representation of the object level.

THE THEORUM:

If C1(O) => O' and C2(O) => O', then C3(C2(O)) = C3(C1(O))

To concretize, this is what we do in Losp:

=[a b] is descriptive.

a => b indicates a process.

(=[a b] => true) means (a => b)

The last line is the key, because it establishes a representational comparability between description and process. That is, it moves control reasoning to object description.

For instance, let *=1>* be a "good" efficient transformation process and let *=2>* be a "bad" process. We want the meta-level reasoning to choose *=1>* over *=2>*. That is,

(=[a b] => fast and true) means (a =1> b) =/= (a =2> b).

Process 1 is not equal to process 2, because it does not achieve the OBJECT LEVEL specification of yielding "fast and true". The inequality, which embodies the criterion of goodness, is at the object level, which is to say, reasoning about control does not exist.

CAVEAT EMPTOR: All this is top-of-the-head chat, and is not intended to be correct and publishable.