

THE DEVIL'S ADVOCATE

ARTIFICIAL INROADS: SCIENCE GETS DOWN TO BUSINESS

BY STAN KELLY-BOOTLE

AI (that's short for *Artificial Intelligence*, dummy—this isn't BYTE Magazine, you know) is graduating from the hypedom of academia and heading for the super-hypedom of your local, friendly computer boutique. Upon finding the doors bolted and the bailiffs on guard there, however, let's hope AI is clever enough to move on to a distant, unfriendly computer mail-order company.

Unsold check-balancing routines are being rewritten in Prolog and repackaged as "Smart Money Managers". All that the new programs really *know* about, though, are debits and credits. Reckless check-writing, I'm told, actually can invoke an "Insufficient Funds" warning. That's expertise for you!

New database management systems offer "natural language" query interfaces that expect you to formulate precise queries in the ambiguous mother tongue of your choice. Compare the crisp, businesslike QL syntax of:

```
FIND CLASS:CUSTOMERS= DUE$>=5000  
AND STATE'AB=('CA' OR 'OR' OR 'WA')
```

with the slovenly:

```
Get me dem ****ing West Coast flakes dat owe me 5 Gs or more.
```

I rest my case.

But as amusing as the algorithmic inadequacies of a natural language might be, they pale by comparison with the convoluted prose devised by the legal profession. Lawyers well might claim that the only precise English version of the BASIC statement $X\% = X\% + 1$ would be:

Let it be known by those present that whereas the symbol X% is now here and elsewhere implicitly and de facto declared to be of the type known as Integer, the aforementioned value of the said symbol is, notwithstanding prior or future statements and assignments, to be henceforth incremented, enlarged, and adjuncted by the integer 1 (one), and further that this instruction is not liable for any damages directly or indirectly arising from carry overflow, non-performance, or mal de code.

On bended knee, we should ask the gods that we in



the computing realm be spared said convulsion. But there's probably no cause for concern. The premature rush to spice up the PC market with add-on "smarts" certainly will backfire. It already has restoked the old AI controversy, which I prefer to call *l'Affaire Dreyfus* in honor of Hubert L. of that ilk, author of *What Computers Can't Do* (Harper Colophon). After many uneasy cease-fires, the battle is now back to no-holds-barred trench warfare. You may have seen the posters: "Thank You for Not taking Prisoners". Even

observers from several factions of the Beirut Militia have been horrified by the pointless savagery of the AI schism.

The opposing camps are the True Believers ("One More Research Grant, and Victory is Ours!") and the Devout Atheists ("Time Flies Like an Arrow—So There!"). Crouching in between are the Cowardly Agnostics, scorned and hated by both belligerents.

My favorite agnostic philosopher was the late C.E.M. Joad, who parried all questions with, "Well, it all depends what you mean by. . . ." If you asked him, "Does God exist?", he would puff on his pipe a while, then reply, "Well, it depends on what you mean by 'does'."

The key AI question is "Can machines think?" Well, it definitely depends on how you define "machine", "think", and "can". Some of the possible definitions reduce the question to nonsense, while other equally plausible choices convert it into a tautology.

If you feel that biochemistry has deflated *Homo sapiens* into a machine (one of daunting complexity, certainly, but a machine nonetheless), then the question becomes "Can I think?" Only *you* can answer that one. I certainly know *I* think some of the time. At least I think I do. On the other hand, as Donald Knuth has remarked, people do the most remarkable, unmechanical things *without* thinking about them.

Defining the act of "thinking" has proved to be a major stumbling block in the controversy. If you feel that "thinking" can be defined paradigmatically—by a long but finite list of properties or examples—then theoretically any computer can be programmed accordingly. AI Atheists, though, are positive that intelligence and thinking entail certain non-finite, non-algorithmic properties that forever will be beyond the grasp of hardware and software. However complex and "expert" the AI systems become, the doubters will say,

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"Yes, very clever! But does the machine *really* understand what it's doing?"

On the other hand, many agnostics, such as myself, can sympathize a little with the AI practitioner. The chess-computer scene is a good illustration. In the 1970s, some atheists—including Dreyfus—unwisely set too low a limit on the standard of chess achievable by a set of chips. The improvement in performance (measured simply in victories over humans) during the last five years certainly has surprised the skeptics. I confess that in my only brief encounter, after winning four quick games in succession at level 3, I cranked up my silicon opponent a notch and *lost!* So did Dreyfus, by the way. The moral is that, in setting goals and tests for AI, it's only fair to measure the results rather than the methods.

The layperson no longer is surprised when a machine rapidly and unerringly multiplies two large numbers. There is a general feeling that arithmetic is somehow "mechanizable". However, if a computer quickly compares the bytes in the string "squate" with each of the strings stored in a dictionary and responds "No such word! Did you mean 'square'?", it is easy to get carried away with anthropomorphic delusions. But not for long. Once the trick is revealed (no mirrors, just plain old arithmetic!), it is clear that the machine "understands" nothing. This is not to denigrate or discourage the incredible programming feats of the AI community. All we seek, as Professor Dreyfus stresses, is more honesty in describing the programs and the progress they've achieved.

My own contribution to AI will be released quite soon. I produced it upon learning that all of the "natural language" compilers now emerging require that existing

conventional (unnatural) programs be rewritten. My solution will obviate this costly conversion with a compiler that ignores your *code* but compiles your *comments*. If you have not been commenting your programs adequately, don't blame me. We've warned you often enough!

Confident of success, I have already planned my own version of *yacc* (yet another comment compiler). To whet your appetite, I can reveal that Pass 1 of *yacc* can produce conversions like:

```
++a                /* increment count by 1 */
```

to:

```
increment count by 1 /* ++a */
```

This serves to maintain the old convention that holds that it should be possible to clarify any vagueness in the left-hand column on the right. Or vice versa!

While I complete development of the package, I urge you to shun all products containing the words "mind", "smart", "AI", "intelligent", or "Ratiocination". ●

Liverpool-born Stan Kelly-Bootle has been computing, on and off, at most levels since the pioneering EDSAC I days in the early 1950s at Cambridge University. After graduating from there in Pure Mathematics, he gained the world's first post-graduate diploma in Computer Science. Between authoring such books as The Devil's DP Dictionary and The MC68000 Primer, he also has served as Chairperson of the Biblical Studies Special Interest Group for the Association of Literary and Linguistic Computing.

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