Cognitive Science vs. Artificial Intelligence?

An early Greek fragment of dialogue
found on an abandoned disk area

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HOMOGENES: If Cognitive Science is ever to become more than a part of AI, as I think and hope it will, then it is going to require a cooperative effort from those concerned with cognition, regardless of their principal discipline. This, in turn, requires a certain degree of humility and intellectual modesty that is patently lacking in many of the most visible AI scholars. I think there is a real danger that the "we know it all " mentality will do irreparable harm to Cognitive Science by driving away those form other disciplines.

HETEROGENES: I agree that there has been a tendency for people in AI (especially in natural language processing) to claim that philosophers and linguists (especially the latter) have been doing it all wrong, but it is mostly just rhetorical flourish. This can offend people. The historical reason for it was the utter intransigence of Chomskyans towards any and all AI work in natural language processing. Don't you think therefore that the AI people's attitude is understandable, if not justifiable?

HOMOGENES: It is true that twenty years ago linguistics seemed to be suffering from the same ailment. Maybe the fact that the current generation of linguists are less obnoxious is a good omen. But it is also true that transformational grammars were not all that they were cracked up to be. Immodesty is particularly embarrassing when it is coupled with error! So, I think that today's leaders in AI would do well to read those few potent lines from the Introduction of Meaning and the structure of language by Wallace Chafe: "...I found myself repelled by the arrogance with which these other views were propounded. One opinion that has remained with me from then until now is that the complexities of the universe, linguistic or otherwise, are so vast that one cannot help but be awed and humbled by them." (p. 3). Would that it were so!

HETEROGENES: Another aspect of their attitudes (the AI/NL people) is the belief that they have brought out some aspects of how NL works that the other groups have ignored or not noticed at all, such as the role of knowledge representations in word sense and pronoun resolution. It will be important for our discussion to know whether or not you accept this as a fact? I believe that AI/NL people are right about this.

HOMOGENES: I agree that AI workers have brought certain issues into much sharper focus than they were before; in Cognitive Psychology, relevant AI work (especially on knowledge representations) has had a rapid and remarkable impact. Maybe this is less true in philosophy and linguistics, but then in order to sell things (ideas included) you have to reach your market -- you can't blame the consumer for not being aware of every product in the world! Thus, I partially accept what you say, but I still think that one ought to be more sophisticated in one's beliefs about the transmission of novel scientific conceptions. The problem is difficult enough without disciplinary boundaries, but across them it is horrendous. So, while it is true that AI people have made a contribution, it in no way excuses their rudeness; indeed, it is counter-productive because it may frighten other Cognitive Science people off. Linguists, for example, do not want to sit around at Cognitive Science meetings just to be insulted. Furthermore, there is nothing like a good dose of arrogance and hostility for persuading one's audience that one has nothing important to say.

HETEROGENES: I still maintain that the kinds of linguists who go to Cognitive Science meetings (and this goes to a lesser degree for the philosophers and psychologists too) do so because they accept that AI is onto something -- if they did not accept that they wouldn't be there. In other words, AI is some kind of primus inter pares at such meetings -- do you accept that?

HOMOGENES: No! The linguists are not necessarily there for the reasons you cite. For example, they are sometimes "invited". To be sure, they want what is going on. They might even hope to learn something! Maybe (heaven forbid) they think they have something to offer the AI/NL person. Personally, I believe in egalitarianism. What counts is not your discipline, but your insights, and no discipline has a monopoly on them. The fact of the matter is that when different disciplines share an interest in common problems, they tend to be mutually helpful in the long run (e.g. physics and astronomy). I am perfectly willing to accept that AI currently has a lot to offer to its partners in Cognitive Science. But this is in no small way due to what they, in their turn, have had to offer it in the past. For example,

although he subsequently changed his views, I think Fillmore's early work significantly influenced AI, so too did the whole post Chomsky revolt, Generative Semantics etc. Fillmore, however, did not find it necessary to belittle AI, or to arrogantly proclaim the stupidity of research and researchers in other disciplines.

HETEROGENES: I certainly agree about the (unintended) pervasive influence of Fillmore on AI/NL work, though not about Generative Semantics for that was a case of two groups (AI and Generative Linguistics) putting forward the same ideas quite independently at the same time. I would also accept that the boot is on the other foot to a greater degree than some AI people admit: i.e., not only does AI need philosophical analysis and psychological results -- it also needs linguistic thoroughness in the face of data (or more accurately what used to be linguistic thoroughness before it all went soft in the last few years).

I feel an ambivalence here, for it is only because linguistics went a bit soft (that is, less arrogant) that it is now able to take any notice at all of AI. Chomsky hardly will even now, as we know. Also -- and again AI people underestimate this -- it was linguistics in the Chomskyan style that made it possible for AI/NL work to influence linguistics: Chomsky, by his introduction of formalism, and by his early use of automata theory metaphors ("devices" and so on) helped to make the less metaphorical talk of AI people acceptable to some linguists.

Let us go back for a moment to what you said about psychologists taking up AI work. That seems to me to confirm my point about other disciplines taking up AI work rather than the reverse. AI people know this, and this is the (admittedly inexcusable) source of their arrogance. I happen to agree with you, as I said, that the influence ought to be more two way, but it is not, is it? What is your reaction for example to that remark of Feigenbaum's that, at the moment, there is simply no alternative to the computer model in psychology??

HOMOGENES: First, it is not necessarily to the credit of AI that other disciplines are taking up its work rather than vice versa. Indeed, my feeling is that those people who are in Cognitive Science (and let us continue to distinguish AI from Cognitive Science, shall we?) who are the most worthwhile are precisely those who have some feeling for what is going on in the other disciplines that might be relevant. You ask me what I think about Feigenbaum's remark -- well as you put it, not very much!! Such generalizations are not likely to be right. Of course, a good point can be made by overstatement, but let us not confuse the rhetoric with the truth! My view is that the value of Cognitive Science is its interdisciplinary nature. the value lies in the possibility that the paradigms and insights of researchers from different disciplines may, jointly, answer more questions than those of any one. The computer is a wonderful tool for articulating detailed theories, provided that one can distinguish between the theory and the implementational conveniences. Even more important, I think it is the best way for modeling (representing) dynamic, interacting processes, which probably are what human cognition is all about. But, the psychologist, and the linguist have some skills that the computer scientist usually does not have, and they are skills concerned with the acquisition of certain kinds of data. Those data are often relevant to theories, or sub-theories of cognitive processes. You should not fall into the same trap of believing that the computer scientist's contribution to Cognitive Science is all teaching and no learning, otherwise we will be right back where we started. Who cares which discipline leads the way today? We need to see a greater concern with the scientific issues, and a smaller concern with the scientist. It isn't a competition, or at least it shouldn't be, either between disciplines, or between their evangelists.

HETEROGENES: But as we have already seen, many AI people do look to and quote linguists, and the same is clearly true for AI people quoting psychologists. You'd be hard put to find other Cognitive Science figures doing as much for inter-disciplinary work, so I don't at all see why it helps you to bring them in.

Where I do agree entirely, and this is why I don't think that we really disagree so much, is that psychologists and linguists, and even philosophers, have special skills that are needed -- of the acquisition of certain kinds of data, as you put it. Fine -- but perhaps some of them have been falling behind their own standards in the kinds of data they have been collecting in the last decade (not everyone in those fields, of course, but many of the less talented). Perhaps that is why it has been so easy for AI people to breeze in and pick off sitting targets. And, perhaps a result of this was that some of them became over-cocky -- but that phase is ending now. And as multi-disciplinary work grows everyone will be more responsible for what is done -- which is why the days of the easy targets are over. That is why I feel basically optimistic. Why don't you?

HOMOGENES: I am just concerned that Cognitive Science succeeds in becoming an established discipline of enquiry because I think it offers such promise. It would be a shame if it were to fail to develop into anything more than AI because of communication difficulties between the various disciplines, or because of lack of mutual respect between their protagonists. You may be right that it is only a phase. I just hope that if you are right, we emerge from this phase before it is too late.