Tuesday, June 24th, 14:30-15:00, room 301

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Minds and Machines in Scientific Discovery: internal vs. external; languages, representations, and practices

Keywords: Automated Discovery Systems, internal vs. external, minds and machines, representations, semiotic systems

The paper aims to analyze Machine Discovery field from cognitive and semiotic perspective. James Fetzer criticizes the paradigm, prevailing in Cognitive Science, that cognition is computation across representations. He argues that if cognition is taken to be a purposive, meaningful, algorithmic problem solving activity, then computers are incapable of cognition. He proposes instead, the conception of minds as semiotic systems as an alternative paradigm for understanding mental phenomena, one that seems to overcome the difficulties of computationalism.

Now, I argue, that with computer systems dealing with scientific discovery, the matter is not so simple as that. The alleged superiority of humans using signs to stand for something other over computers being merely “physical symbol systems” or “automatic formal systems” is only easy to establish in everyday life, but becomes far from obvious when scientific discovery is at stake. In science, contrary to everyday life, the meaning of symbols is, apart from very low-level experimental investigations, defined implicitly by the way the symbols are used in explanatory theories or experimental laws relevant to the field.

Moreover, although this sounds paradoxically, if representations are “internal” and practices are “external” then, typically, human discoverers work at the level of “internal”, high level abstract explanatory theories and, at least most of, computer systems function at the level of phenomenological laws which seem much closer to the “real outer world”. I indicate to some cases of perplexive coincidence of results obtained by human discoverers and computer discoverers that may, contrary to Fetzer's claims, be interpreted as examples of cognition as computation across the representations. Accordingly, here are cases when human discoverers are “inside” the representations and machine discoverers are “outside”.