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Modularity and Relevant Logic

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Abstract A practical system of reasoning must be both correct and efficient. An efficient system which contains a large body of information can not search for the proof of a conclusion from all information available. Efficiency requires that deduction of the conclusion be carried out in a modular way using only a relatively small and quickly identified subset of the total information. One might assume that data modularity is incompatible with correctness, where a system is correct for a logic L iff it proves exactly what is valid in L. We point out that modularity and correctness are indeed incompatible if the logic in question is classical. On the other hand, the two desiderata are compatible for relevance logic. Furthermore, Horn clause resolution theorem proving is modular (this helps explain its relative efficiency) and the logic for which it is correct is relevance logic not classical logic.

1 ***Introduction*** *The Modularity of Mind* [4] rallies the troops for a movement in cognitive science which has been gradually gaining strength over the past decade or two. The old view, championed, for example, by Newell and Simon's work [9] on the General Problem Solver, was that intelligence is *monolithic*; it is describable in a relatively simple way, and it has access to all the available data. The new wisdom has it that cognition can be best explained by assuming the existence of *modules* which have specialized functions, and narrow lines of communication with the data and their peers.

The strongest kind of evidence for rejecting monolithic theories of the human mind has come from work on perceptual processing, for example Marr's work [7] on vision. We have learned that some things which we take for granted, for example the ability to match images in our left and right eyes during binocular vision, are not at all easily explained. Given the relatively slow neural response times, and the speed of the overall system, we feel compelled to postulate the existence of an array of parallel structures each of which processes information in only a small portion of the visual field. Given this assumption and phys-

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