



# Letter to the Editor

## The Promise of Immaculate AI

A basic promise of AI research is that what we observe as human intelligence is in fact a computation either directly or as an emergent effect. An attempt at classifying and distinguishing types of AI researchers was to call them all either scruffy (those that wrote code and implemented systems) or neat (those that base AI on some formalism like first order predicate calculus). Out of necessity, researchers tend to focus on a particular aspect of intelligence to simulate. When this is done, the effect is to restrict the class of computations that are being considered. The goal is build pieces of intelligence. Much interesting and otherwise useful research has come out of this endeavor.

On the fringes of AI research is the group doing immaculate (even neater than neat) AI, proving theorems about the general nature of learning

algorithms. One criticism that cannot be applied to researchers in immaculate AI is that of narrow focus. So as to make sure the results include the computations that we might call human, researchers in immaculate AI consider the class of all possible algorithms that could be construed as learning. As a consequence, the results obtained are not focused or particularly relevant to a specific case. However, the results apply to all learning algorithms, even the ones used by humans, provided that the basic promise of AI is in fact true. Stated more precisely, if human cognition is computational, then the results of immaculate AI researchers apply not only to potential learning algorithms that may be implemented by neat researchers or studied by scruffy one but also to humans as well.

Perhaps a short example is in order. When composing a team of people for some task involving learning (which ones don't?), the larger the

team, the better the chances of success. This is common sense and a theorem of immaculate AI. Furthermore, when composing a team, the only way to tap the full potential of a given size team is to choose diverse members. Like-thinking individuals tend to produce the same ideas in brainstorming sessions. It is a theorem of immaculate AI that the advantage obtained by increasing team size is due entirely to the extra diversity of approach that is enabled by the larger team.

So far, all the results from immaculate AI (see *Systems that Learn*, 2d edition, MIT Press), some more clearly than others, describe features that are easily recognized to be human. If a result were obtained that showed a clear difference between human learning and what was true of the learning algorithms studied in immaculate AI, then the proof would show the human learning is not computationally based, violating one of the basic tenets of AI. The value of immaculate AI is that it may illuminate previously unrecognized features of both computational and human learning. So far, mainstream AI research has ignored the work in immaculate AI. Perhaps this attitude is not appropriate.

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