

CHOMSKY & PENROSE ON THE EXPLICABLE AND INEXPLICABLE

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When Noam Chomsky makes an observation about the limits of the human mind, he is doing so on a first-person basis, having been there himself -- rather the way Roger Penrose makes a similar argument, but in reverse: Penrose too has experienced the frontiers of creative mathematical intuition and insight. He knows what it feels like to make a discovery that no other mind has made. And he concludes that that is not something that a computer could do, in part because of Gödel's proof, in part because of the *feeling* that this is something different.

<http://www.ecs.soton.ac.uk/~harnad/CM302/Lucas/lucas.ppt>

Penrose is wrong, of course. A computer certainly can't compute what Gödel proved cannot be computed, but Gödel did not prove that what can be proved cannot be computed, nor that the cognitive processes underlying what can be proved cannot not be computational processes -- nor even (and this is most important) that what it *feels like* to have a mathematical intuition or insight cannot be a computational process or even (this is the most important of all!) that that feeling cannot be *wrong*!

For the last insight (that mathematical intuition *can* be wrong), we are indebted to Russell/James and the famous anecdote that the meaning of life may not be that "the smell of petroleum pervades throughout" -- even though it may *feel like* that's the meaning of life while one is under the influence (of the feeling -- induced by nitrous oxide in the Russell/James example). Feeling can be misleading (even though, evolutionarily, it better not be misleading too often!):

<http://www.ecs.soton.ac.uk/~harnad/Hypermail/Foundations.Cognitive.Science2000/0063.html>
<http://www.ecs.soton.ac.uk/~harnad/Papers/Harnad/harnad.creativity.html>

(Russell invoked this anecdote in the service of pointing out that mathematicians may be right to trust and follow their intuitions, particularly when they have proven true before, but that they must not forget that those intuitions have sometimes led them astray too, and that, in and of themselves, they are merely hunches, i.e., feelings, not evidence, and certainly not proof!)

So Penrose is wrong that the brain substrate of mathematical intuition (and feeling, both veridical and nonveridical) could not in principle be computational. However, he is probably right that feeling/intuition is not in fact implemented in the brain computationally. (Rather, it is implemented dynamically -- because of the symbol grounding problem, as illustrated by Searle's Chinese Room thought-experiment -- but not necessarily quantum-mechanically, as Penrose

suggests: classical dynamics would be sufficient to ground symbols and rescue the brain's power from Godel and Searle.

<http://cogsci.soton.ac.uk/~harnad/Papers/Harnad/harnad90.sgproblem.html>

But of course saying that feelings are "implemented dynamically" raises yet another problem: the mind/body problem (or, as I prefer to put it, more perspicuously: the "feeling/function" problem): No one can explain why or how certain functions are *felt* functions. There is a *reason* this cannot be explained, however, and that reason is not the one Chomsky has adduced (and Pinker has repeated, and McGinn has both repeated and elaborated in the special case of the mind/body problem): i.e., the reason is not the limits of the human mind!

<http://www.ecs.soton.ac.uk/~harnad/Hypermail/CogSci-Szeged01/0003.html>

<http://www.ecs.soton.ac.uk/~harnad/Tp/thesciences.htm>

The reason we cannot explain how/why certain functions are felt is twofold, and has more to do with the nature and limits of (functional) explanation than the nature and limits of the mind: How/why certain functions are felt could be easily explained if there could be telekinesis -- a 6th causal force of nature, the force of feeling/will -- but there is not. So that leaves only the usual 4 forces. And those 4 dynamical forces (together with the computations they may implement) are sufficient to explain every functional capacity of the brain, eventually.

The trouble is, that that leaves no *functional* room for feeling: For (once that happy, explanatory utopia is reached) whatever our brains can and do do is fully explained functionally. Feeling itself cannot be given an independent causal role (on pain of telekinetic dualism), so it is doomed to remain superfluous in the functional explanation, hence superfluous, simpliciter. A mere correlate of function, its causal status unexplained and *unexplainable*, causally/functional, for the reasons adduced -- and not because of mysterious limitations of the mind (which would simply be to swap one mystery for another mystery)!

Now back to Chomsky's argument: As noted, having been to the frontiers of the ontic landscape, and discovered vast portions of it that were undiscoverable to any other human mind, Chomsky has certainly earned the right to express some 1st-person intuitions on the subject, just as Penrose is. But he is just as wrong (or almost as wrong, for he does not actually say what in particular eludes the mind, just that there may well be such things).

There may indeed be things that are fated to elude the mind forever, some of them banal (1) -- such as the things we don't have the time or the luck to ever find out, work out or arrive at mentally, even with the aid of machines, before human time runs out. Some of the inexplicables are also more fundamental (2), such as the Godel-unprovable, NP-completeness, 3-body problems and other formal obstacles.

The banal inexplicables (1) are because of limitations that are mental, but banal, hence not mysterious. The fundamental inexplicables (2) are because of limitations that are formal or methodological, hence not banal, but also not mental, hence again not mysterious (or, if

mysterious, the mystery is not about the mental but about the formal). Quantum paradoxes (if they indeed remain unresolvable) may be among the formal ones, or they may be, like the feeling/function problem, a result of the (formal?) limitations on causal/functional explanation itself (but still not mental limitations).

What -- apart from brute, unexplicated analogies with what I do not happen to know at the present time -- could "truths" that are beyond the grasp of the mind be, after all? We have that remarkable generative power that Chomsky has done so much to explain, namely language, that has so far been perfectly capable of expressing every truth that we have so far been capable of discovering and formulating (including all the provable truths of mathematics, which is, after all, merely a subset of language, part of all that can be said in words). What would it mean for there to be a truth that our minds are incapable of discovering, or grasping? Would it be a truth that could not be expressed as a proposition in a natural language? (Why? and what sort of a truth would that be? if we can express it as a natural-language question, should we not also be able to express and understand its answer in natural language, if the answer exists and we have the time, luck, or ingenuity to arrive at it?)

If there were such a truth, it would then have to be a limitation of natural language that it could not be expressed in words (rather like an ineffable feeling!). But what reason do we have for believing that anything but what is formally noncomputable cannot be expressed in words? And if it *can* be expressed in words, what reason do we have for believing that the human mind would be unable to grasp the meaning of those words?

But semantics is not really the area in which Chomsky made his monumental contribution: syntax is. He has discovered the formal (computational) constraints on that infinite (and previously mysterious and unexplicated) capacity we have to produce and understand all and only those utterances that are compliant with Universal Grammar (UG) -- the constraints on one of our most fundamental formal capacities.

The discovery and mapping of Chomskian grammar, like the discovery and mapping of Penrose tiling, is a unique and path-breaking achievement of the human mind: The discoverer/creators, having been to the frontiers of the human mind, and seen and felt what it is like, are certainly more qualified and entitled to report their observations and feelings about the lay of the land there than any of the rest of us are. But that does not make their observations anything more than hypotheses and conjectures, open, negatively, to the clear light of critical reason (once the smell of nitrous oxide wears off) and contingent, positively, on future evidence or proof.

Some have been ready to call all declarations of (human) inexplicability mere failures of (human) imagination, and so they may (or may not) be! We are well advised to pay more heed to such declarations (any declarations) when they come from our proven oracles (those few human minds who have successfully explained, more than once, the hitherto unexplainable). But oracular declarations should only be given provisional heed (because of their provenance), just as Russell's cautionary anecdote suggests. For once the effects of the nitrous oxide subside, their merits must be judged in the clear light of reason, rather than the heady rush of discovery.