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Of Magic and Machine

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> *Oh cyborg, as a man you're magic; as a machine you're mean, mean, mean.*
> The Legendary Pink Dots, "Love in a Plain Brown Envelope"

The words *magic* and *machine* have common etymological ancestry in the Proto-Indo-European *magh-*, meaning "to be able, to have power." A machine is a thing that *can* (cf. the Little Engine That Could), and a magician is *one who can* (beyond ordinary limits).

We use the word *magic* colloquially to label things we have trouble explaining or articulating, including "impossibly" mis/fortunate circumstances, the feeling of being in love, and awe of religious experience (mystery). Academic definitions of magic vary, but many distinguish magic from religion by its emphasis on efficacy; again, can-ness. Prestidigitation presents the illusion of a magician's extraordinary ability to influence her environment, that produces a sense of wonder in her audience. We (often pejoratively) call nonscientific causal reasoning *magical thinking*. "[Science] regards magic as a pernicious delusion that encourages sloppy thinking and erodes the educational base that supports the glorious progress of the machine age" [1].

By contrast, a machine's "dynamisms are apparent" [2]. The disparity between a magic trick's actual mechanism — the *reason* it works — and its suggested mechanism, qualifies the deceit. (From this point forward, when I use the word *magic*, I mean in its paranormal sense.)

The opposition of magic and technology as causal agencies has been featured in some science fiction, e.g., the Bene Gesserit vs. the Spacing Guild in Frank Herbert's *Dune*, Shapers vs. Mechanists in Bruce Sterling's *Schismatrix*, and the inverse relationship between a person's "essence" (which determines her capacity for magic) and her "cyberware" (electromechanical implants) in the *Shadowrun* franchise. These fantastically echo the vitalism vs. mechanism debate. See also Orga vs. Mecha in the film *A.I.*, and natural vs. artificial. (For a good look at magic *as* technology, and the evolving relationship between magic and information technology, I refer you to [16 pp.179–189].)

Mechanism says all natural phenomena including life can be explained by physical causes, and has associations with reductionism. Vitalism says there is something extra — a vital spark, spirit, soul (mind), intelligence, or other animating force at work — that distinguishes life from other phenomena, and is related to animism, which says plants, animals, and even some objects we would otherwise consider in-animate, more or less possess this extra something (the words *animal* and *animate* derive from Latin *anima*, "soul"). Vitalism and animism tend toward top-down development: there is some Great Spirit/Soul which somehow informs all spirits/souls,

if it does not altogether control them. Mechanism tends to develop bottom-up: complex systems emerge from interactions of simpler (sub)systems.

We can play a game of Venn diagrams and imagine, as others have (e.g., [3]), that there exists a circle that encapsulates those things which modern science agrees belong to Nature, the domain of phenomena ratified by scientific method, and that beyond this circle is the province of the extra-ordinary, meta-physical, para-normal, and super-natural, inhabited by gods, ghosts, aliens, miracles, and other anomalous entities and events. We may find people rejecting extracircular experiences because they do not fit inside the circle (cf. cognitive dissonance), and we may find people seeking extra-circular experiences in order to see if there is anything outside the circle (note how *because* and *in order to* relate respectively to efficient and final causality [4]). We may find people who believe everything outside the circle can be explained by something inside the circle, and people who express difficulty describing anything outside in terms of things inside.

We may find what was once outside the circle is now inside the circle. “Any sufficiently advanced technology is indistinguishable from magic” [5]. We may find the acquisition of new knowledge and abilities involves some change in the circle’s boundary or contents, and that new circles become old circles become new circles. “Progress imposes not only new possibilities for the future but new restrictions” [6]. We may find this process continues *ad infinitum*. “Liberation, remember, is indefinitely progressive” [7].

We may find people whose circles include things beyond the circle of mechanism, who reject the hypothesis that humans can be entirely understood as machines, or that any artifact can genuinely simulate (!) a natural human, because such hypotheses make their world — their circle — smaller. And we may imagine that beyond the present circle of mechanism, “there is the possibility that we may progress towards making artifacts so remarkable that they utterly transcend our present ideas of what constitutes a ‘machine’, and of what a machine’s limitations must be” [3 p.17].

Today it is common to talk about machines that think and talk, as microcontrollers and network communications are becoming ubiquitous. (Of course, in philosophy and science, our assumptions should be explicit and our language precise. The validity of machines thinking and talking depends on how we define *thinking* and *talking*, often determined by our observations of things whose thinking and talking we take for granted.) Philip K. Dick observed [8]:

> […] our environment, and I mean our man-made world of machines, artificial constructs, computers, electronic systems, interlinking homeostatic components — all this is in fact beginning more and more to possess what the earnest psychologists fear the primitive sees in his environment: animation. In a very real sense our environment is becoming alive, or at least quasi-alive, and *in ways specifically and fundamentally analogous to ourselves.*

I emphasized that last phrase because it speaks to how human technology resembles human

wants even as it changes them. “There is circularity here: the world determines what we can do and what we do determines our world” [9]. In his book, *The Age of Spiritual Machines*, Raymond Kurzweil predicts that by 2099, humans and machines will converge until it is nearly impossible to tell them apart.

Perhaps the Age of Spiritual Machines began in the Paleolithic era, with the “mystical solidarity” of Paleoanthropic hunters and their prey [10]. Insofar as humans are machines, some of our models pray for guidance and intercession, query oracles, exhibit talismans, manipulate poppets, evoke daemons, invoke deities, ascend out of our bodies, and descend into spiritual underworlds. By and large, we do these things *in order to* understand and improve our circumstances (not *because* they do).

With a nod to Warren McCulloch, I ask: What is magic, that a person may do it, and a person, that she may do magic? For my purposes in this article, I find Jesper Sørensen’s definition of magic most appropriate [11]:

> Magic is about changing the state or essence of persons, objects, acts and events through certain special and non-trivial kinds of actions with opaque causal mediation.

‘Opaque causal mediation’ appears earlier, in Aleister Crowley’s “De Machina Magica” [12]:

> Lo! I put forth my Will, and my Pen moveth upon the Paper, by Cause that my will mysteriously hath Power upon the Muscle of my Arm, and these do Work at a mechanical Advantage against the Inertia of the Pen. I cannot break down the Wall opposite me by Cause that I cannot come into mechanical Relation with it; or the Wall at my Side, by Cause that I am not strong enough to overcome its Inertia. To win that Battle I must call Time and Pick-axe to mine aid. But how could I retard the Motion of the Earth in Space? I am myself Party of its Momentum. Yet every Stroke of my Pen affecteth that Motion by changing the Equilibrium thereof. The Problem of every Act of Magick is then this: to exert a Will sufficiently powerful to cause the required Effect, through a Menstruum or Medium of Communication. *By the common Understanding of the Word Magick, we however exclude such Media as are generally known and understood.* Now then, o my Son, will I declare unto thee first the Nature of the Power, and afterward that of the Medium.

I emphasized the sentence that intersects with Sørensen’s opacity (note ‘generally known and understood’ = vulgar), but I also want to point out the many cybernetics-friendly concepts alluded to: volition, mechanism, constraint, amplification, ecology and dynamic equilibrium, and control and communication. Crowley asserted that all intentional acts are “magickal” (he restored the terminal ‘k’ to distinguish “the Science and Art of causing Change to occur in conformity with Will” [13] from legerdemain), and that the proper use of magic is to find and do one’s “True Will.” Cf. cybernetics as the study of teleological mechanisms.

If we admit a model of causality that includes a cause (input), effect (output), and rule of

transformation, then what distinguishes a magical technique from a mundane one is that the rule of transformation is unknown — cf. a black box. We may trivialize the relationship between the cause and effect as correlation or "mere coincidence" (cf. Jung's synchronicity: "an acausal connecting principle"), but at the cost of "legitimate" inquiry ("questions to which the answers are unknown" [14 p. 209]).

Cybernetician-cum-magician Heinz von Foerster defined some differences between trivial and non-trivial machines in "'Perception of the Future and the Future of Perception" [14]. Most devices we refer to when we say "machine" are trivial. "A trivial machine is characterized by a one-to-one relationship between its 'input' (stimulus, cause) and its 'output' (response, effect)." Trivial machines are predictable and so agreeable to scientific method. If the actual output is not identical to the expected output, we infer the machine is broken or there was something different about it input, and usually we are correct, i.e., we can adjust the machine or its input until the output again conforms to our expectation (notice the role of feedback in *our* relation to the machine). Clearly, a *person* is not a machine in the trivial sense (though we are not lacking attempts to demonstrate that she is), but has something extra. When we call someone a robot or automaton, who behaves like a mindless or emotionless machine, we implicitly accuse her of behaving trivially in the sense of not being response-able.

By comparison, a non-trivial machine's "input-output relationship is not invariant, but is determined by the machine's previous output" — cf. feedback. Such machines are, like chaotic systems, determinate but effectively unpredictable: the same input will not necessarily generate the same output. Von Foerster explains:

> In order to grasp the profound difference between these two kinds of machines it may be helpful to envision "internal states" in these machines. While in the trivial machine only one internal state participates always in its internal operation, in the non-trivial machine it is the shift from one internal state to another that makes it so elusive.

The dynamisms of non-trivial machines are not apparent; they are literally *occult* (the word *person* derives from Latin *persona*, "actor's mask"). As with trivial machines, we may observe their behavior and so infer their "internal" operations, but the more input-output combinations there are, the more difficult it becomes to conclusively establish something we can consistently reproduce in laboratories and text books. Often such lawfulness requires trivializing complex systems — cf. discrete analysis of a continuous series (digital vs. analog). Urban Kordeš observes, "The advantage of the analytical-reductionist approach lies in the fact that [unlike magic — J.M.] it *always* comes up with a result" (his emphasis) [15].

Kordeš adds, "the phenomenon of life cannot be treated as a trivial affair, neither can living beings be considered as mere trivial systems." There is the specialty of life, again. I suppose his distinction between trivial and non-trivial parts of phenomena is meaningful and useful as a distinction between mechanical and magical thinking and doing — here we may recognize constructivist epistemology (emphasis in original):

> […] the dividing line runs along the border *between the part we can satisfactorily describe as separated from the observer and the part for which such idealisation is no longer functional.*

Cf. Davis' distinction between causal and participatory frameworks for ordering reality, based on Stanley Jeyaraja Tambiah's *Magic, Science, Religion, and the Scope of Rationality* [16]:

> Causality boils down to the pragmatic rationalism of science: The detached individual ego divides and fragments the welter of the world according to objective and explanatory schemes based on neutrality and instrumental action. In contrast, the world of participation plunges the individual into a collective sea that erodes the barrier between human agency and the surrounding environment. In this world, which I am associating with the magical paradigm, language and ritual do not objectively delineate the world but help bring it into being; objects are organized according to symbolic resemblances and the rhetoric of dream rather than the dry and objective classifications that pack scientific texts or corporate reports.

Davis adds that "though our [modern] cosmology is scientific, our cultures, psyches, and collective rituals are not."

It is trivializing to treat all magical entity-events as myths intended to describe a (trivial) causal phenomenon. A shaman does not invent spirits to fill gaps in an otherwise rational representation of reality-as-it-really-is. She experiences them empirically or intuitively, and tells a story of her experience in an appropriate language. Her story may become myth as it passes into the hands of analysts who labor to separate fact from fiction, but that distinction was not part of her original operation [17]. The shaman does not create myths; she participates in the bringing-forth of her world through 'special and non-trivial kinds of actions'.

Perhaps instead of reducing deities and daemons to archaic explanatory contrivances, we might treat them as interactive agents. Could Pask's Conversation Theory apply to evocation or invocation? (Note that Turing's famous test for artificial intelligence does not test for any specific mechanism of intelligence. Intelligence or lack thereof is inferred through "natural" dialog, same as with any person we may meet in the street. Why not as well a daemon in a triangle or the spirit of a tree?)

Can we treat magic as a boundary phenomenon, exploring it as part of a "socio-somatic-semiotic process of differentiation" [18]?

Can the state transitions formalized by cybernetics help us understand and perhaps improve the "altered" states of consciousness and "internal" states of awareness that magicians are renown for [19]? Can we usefully map divination and enchantment to knowledge and variety attenuation and amplification? Can we map the sensors and actuators of a machine to the perception and will of a magician, and what might attempts to do so teach us about these individual, combined, and converging systems?

What could the final causality of cybernetics have to do with the retrocausality described by some magicians [20] and parapsychologists [21]?

How does a cybernetic treatment of the mind-body problem accord with the “mind-over-matter” experiences reported by so many people? How does embodied cognition accord with so many reported “out-of-body” experiences? How does the position that “nothing can be said about a transcendental reality” [22] accord with so many reports of transcendental experiences?
In summary, I suggest we may re/combine the analysis of science and synthesis of magic, in useful and interesting ways, and that cybernetics — with its full range of interests from life-like machines to observer-created universes — is a suitable place to begin.

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