Prospectus Stenographorus

PROSPECTUS STENAGRAPHORUS

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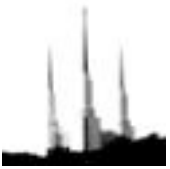

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0.1

David Cayley records in his *Ivan Illich in Conversation* a recollection by the priest-turned-polemicist about an encounter with the neo-thomist philosopher Jacques Maritain:

> In 1957, I was now sitting there with him again. He had a teacup in his hand and was shaking when I talked to him about the question which bothered me, that in all his philosophy I didn't find any access to the concept of planning. He asked me if this was an English word for accounting, and I told him no . . . if it was for engineering, and I said no . . . and then at a certain moment he said to me, "Ah! Je comprends, mon cher ami, maintenant je comprends." Now I finally understand. "C'est une nouvelle espèce du péché de présomption." Planning is a new variety of the sin of pride.

Maritain's translation comes as a bit of a surprise to those of us who have thought about planning somewhere alongside that practical virtue of prudence (Aristotle's $\phi\rho\sigma\nu\eta\sigma\iota\varsigma$), the present's respone to situatedness, to the project of history.

0.2

If planning is a sin, it is still something that God does, as we are so often reminded by those who proclaim from sidewalks "God's plan for you!" An exigesis might begin in the prescriptions God lays out for his habitations among the Israelites,

the tabernacles and temples. It might be thought the reserve of only God, except for the habit of preparation that lies behind the laws of ritual purity God instructs people to undertake. What these prescriptions hold back in inventiveness they retain in an attention to forward-thinking, to developing the sometimes-neurotic habit of believing that any important thing must be ritually prepared for and meticulously anticipated. The result may be a sequence of horrible superstitions that grow and grow until they supersede the event itself, burying it beneath a superficial exercise that has become the only semblance of meaning left still recognizable. Here we say "God" has been overcome by "ritual," and become baffled when in only the ritual our children begin to see God. And then there is God the architect, who commanded the minutest dimensions of Solomon's temple.

0.3

At a moment of devotion in Second Samuel, old King David decides that God should be built a proper house to live in rather than the mere tent that his presence had been traveling in. Initially, the prophet Nathan agrees to David's plan and assures him that God will bless it. But that night in a dream, God comes to Nathan in glory and power to say quite the opposite, and also to announce a powerful promise. It is not David who shall build a house for God, Nathan is told, but God who will build one for David. Great cosmic claims are made for David's descendants, who will rule eternally. God begins the message with a reminder to David that what David might have

come to perceive as his own power, or his own acts, have in fact been God's all along: "I took you from the pasture, from following the sheep to be prince over my people Israel; and I have been with you wherever you went, and have cut off all your enemies from before you." Even as a shepherd over sheep with a staff, it was David who followed, and the sheep of God's creation who led. A similar sense is present in God's thundering opening salvo to Job, who takes exception to the logic of his plan: "Where were you when I laid the foundation of the earth?"

2 Samuel 7:8-9

Job 38:4

0.4

What I mean by this are questions that a work of theater might pose to the world: Is planning an error (measured either in craftsmanship or theology) and is it even possible?

0.5

This is an idea I had for your play about the history of the world. It is a computer program and I think it might tie together some of the wonderful conversations we've been having lately.

1

1.1

When I used to make programs I first discovered a sensation for circumstantial evolution occurs or can occur or must have occurred. I found: creativity can occur within the created itself. I felt

a thing strike up according to a plan I had laid for it, though it so little resembled the coded plan in appearance. As circumscribed inventions and bounded space, computers usefully model the materialist puzzle. In the short, intelligible history of their development and use in certain fields over the last half century we see something like a microcosm for the evolutionary process. For the moment I am not convinced it matters that the process was guided by intelligent beings—the human engineers and so on. Computers may be either the best proof for creationism or the best refutation possible. I think they are both at once.

1.2

Abstraction is the way things can gain or lose or transform meaning when seen from different scales.

In the computer, the phenomenon of abstraction is phenomenonally clear. The machine is on the one hand a system of material, unintelligible processes that are managed by a designed system, the hardware. To even the most skilled engineer, the sequences of switches, gates, and operations that occur to perform a simple function would not themselves be meaningful, a long list of nonsense. But to a person looking at the screen it looks like an interactive, intelligible creature worth tangoing with. Computers can be made to simulate human behavior or act in other, utterly inhuman ways that nonetheless may to us feel "alive." That such an incredible leap between the unintelligible and intelligible can occur in a single machine, a leap people have designed but cannot totally comprehend because of its complexity, is a first indication that one might threaten two common assumptions that cloud all sorts of self-understanding questions we have in the universe:

1. Consciousness (or the souls of people, so to speak) cannot have its basis in merely material stuff

2. Designed things are intelligible, undesigned things are not (period)

1.3

When one builds a computer program of any significant size, there comes a Frankenstein moment. That is to say, the creation starts to feel like it is taking on a life on its own. To me, this comes quite easily because my memory is poor and I quickly forget the code I have already written. After drawing up some sort of plan (0.1), I start my coding by building small, atomic modules. After a while I turn to the larger modules, stringing together smaller ones. This pattern can even go in reverse, depending on one's habits. But then, somewhere along the way, the program starts working. The last steps here feel like the simplest; only connect all the little ends that have already been created and are taken for granted. With a single stroke or instruction or word, orchestrate what may be thousands of lines of code this way or that. The process of creation feels deceptively simple at the end, at the stage that turns lifelessness to life, so easy is it to forget all that had to occur to make these final steps possible. Incredible, massive complexity and hours of effort appear to translate into very simple moments. They were all made my me, yet by now that me is disembodied. To see the soul (or monster) in the thing requires this easy act of forgetfulness.

1.4

Finally, when using a program I have written, I encounter a process of discovering that it is more than the sum of what I planned or imagined it to be. It behaves in unexpected ways. It does things I didn't have in mind when I invented it. I have designed opponents in board games that I could not beat. I am never able to use my programs quite so freely as my friends can. They are better at finding mistakes in my design, as well as its unexpected permutations. Intuitively I cannot even think to do the things that might cause the errors or do the wonderful things I never planned it for; my lingering knowledge of the architecture, or what I think I know, prevents me from discovering the thing for what it truly might be.

1.5

The essence and purpose of machines of all kinds is to do something the creator alone could not do. We build a mechanical arm by making its parts, assembling them, and using it for a purpose, but it has a strength in doing these things that is foreign to what we are. We usually have a great deal of trouble inventing machines that do things we can do, things like writing a play or understanding a joke. Whether or not this is a natural law of some sort, it does make some practical sense. Why bother, otherwise? To say that this universe is designed in any sense that people design things might lead us to suspect:

1. The designed does something that the designer could not do alone

2. Parts of the designed are intelligible to the designer while others may not be

These are not conclusions but lemmas. They suggest that the lines between creation and evolution in the history of the world may not be as clear as they are sometimes described as being.

In the paths of formal logic, *lemmas* are stops along the way.

2

2.1

Language is peculiar to human beings, and it is our most natural medium of intelligibility. What made us invented it. Alongside performance, the criteria for clarity in the discourse of human societies is linguistic. As a result, our ability to understand ourselves as evolutionary beings and as spiritual beings must occur in these terms. The phenomenon of codified laws is one very practical example of such urgency: to capture the reality and the ideal in language. In these terms, the sensations I have tried to describe about the computer (1) appear to fail. I say what it teaches me (1.1) and the circumstances when it occurs (1.3), but still my referent is an experience rather than a sentence. Can you have that experience as a result of my sentences? Experiences and words tied together make the linguistic community, the species. That is to say, they can understand one another.

2.2

Being members of an evolutionary species and talking about that fact, we are riding on a moving

horse and shooting at a moving target. Language itself is changing. The modern epiphany of historical linguistics (which discovered and systematized links between living and dead languages) shows that some kind of evolution within evolution occurs within and among linguistic systems. In linguistic evolution as in biology, it is dangerous business to try cleverly tinkering and adjusting. The consequences will not normally turn out as expected or terribly healthy. Formalized correctness and standardized grammars do more to protect an unreasonable culture of power than make sensible language. Importantly, language is not the product of calculating adults but young children, whose minds are built to think up communicable, fluent grammars. The languages they build are always far more habitable than the inventions of grown-up minds working hard at it.

2.3

Since we are artists, aesthetics will ultimately be our goal. Evolution has a very specific sense of the beautiful: that which exists is beautiful. What is, is beautiful, and what is not is out of the question. What a stark aesthetic, which has no permanent regard for its tongues or creatures! Obviously for ourselves we have to reject it. This is our prerogative to do: art has always been a tricky dialog with the values of nature, never an outright embrace of them. Art-aesthetics trace the existence of a person and soul: the standards which assert that human beings are valuable. In biology, people miss the dodo bird or the quagga for its curiosity, while evolution does not. In linguistics, people have great reasons to remember long-

A computer always spells *dialog* this way.

gone languages or the English of Shakespeare because of the treasures locked up in them. But the process-mechanism of language that makes these things would not mind if they disappeared completely. It rejoices in our aberrations and dialects and clumsy diversity. It does not mind our forgetfulness. To accept the aesthetic of nature (that is to say, of evolution) means ruling out any reason or possibility for ourselves to create. Biological evolution will forgive us this decision because, just the same, we will go on either existing or not existing.

2.4

The aesthetics of evolution are important to know in their cold austerity because they assure us of the urgency of our disagreements with it. Our disagreements describe the importance of what it is like to be alive. But for all their good sense, they do not ostensibly change nature's grasp on us. When nature ceases to find a creature beautiful, no matter what the thing might think, it dies. We twist and turn because so often nature is beautiful in our eyes too, sometimes even the fact of death. The best idea is to tango. The conversation with nature—which is art—is usually a matter of us saying things like, "Yes, but ..." and "No, but I see your point."

2.5

In theology there is a connection between language and creation. Evoking Genesis, the gospel of John begins by declaring that "In the beginning was the Word. All things came into being through

Word: Greek λογος, who we know to be a person, i.e. Christ, messiah and redeemer.

him, and without him not one thing came into being." A Word is the mechanism of creation. Language, and through it intelligibility and presence, preceded even the evolutionary arrival of human beings to speak it. Different people take different meanings about this. The words are numinous in themselves. Intelligent design theorist William Dembski believes that John's Word is the information content of life, DNA and so forth. The creationists take the Word very seriously because to them the words of scripture are even more reliable than what material observations seem to tell us. In any case, theology's message is that language means more than we thought it meant. That the Word was present all along is to say human intelligibility accompanied the creation of everything, and maybe its aesthetic (our aesthetic) is not so foolish after all.

John 1:1a, 3

3

3.1

Beginning in the 1960s, though especially after the 1980s, engineers and theorists discovered that certain optimization problems could far and away be best solved simply by imitating the selective process of biological evolution. This kind of solution is called a genetic algorithm . Nearly always, they are executed on a computer. Because of a computer's tremendous calculating speed when compared to humans, it is well-suited to the vast time scales that an evolutionary process depends on. For this reason also, working with a computer can contribute to the development of an evolu-

tionary intuition (1.1).

3.2

Though they can take a number of different forms in implementation, all genetic algorithms share a few common characteristics. Each has direct correlates in the Darwinian scheme. The closer we imitate the actual function of evolution as best we understand it, the more effective the algorithm will be. There is a set starting condition composed of randomly-generated or circumstance-derived possible solutions. The program then tests each solution by certain criteria, and the best-performing ones are given priority in the ensuing process of reproduction. Reproduction occurs through sexual recombination, which produces the next generation of possible solutions. Finally, a small element of mutation (perhaps at a rate of around 1%) is introduced in order to ensure sufficient diversity of specimens without upsetting the stability of successful traits. This process repeats until a satisfying result is found.

An *algorithm* is a kind of plan, usually one involving a repeating sequence of procedures.

```
set initial population
repeat-loop:
    evaluate individuals' fitness
    reproduce by crossing best individuals
    apply rare mutation
```

3.3

In one important respect, however, the genetic algorithm of the engineers differs from the biological model: the way it evaluates members of the population. Biology is concerned only with

the circumstance of life or death, and those creatures who survive the conditions they live in long enough to reproduce succeed. Engineers, though, may tailor their criteria freely, depending on what the program is supposed to be used for. Perhaps they are looking for an optimized airframe contour or a promising business plan. Within the program world people can craft their own aesthetic (2.3). This decision makes all the difference in consequence, though perhaps not in kind.

4

4.1

In Richard Dawkins' sometimes-infamous book *The Blind Watchmaker*, he employs a little computer algorithm to help explain how complex patterns can emerge in nature from random processes. Specifically, it illustrates how evolutionary mechanisms (like DNA) preserve progress from generation to generation. His intention is to answer critics of closed-system evolution who charge that such orchestrated complexity as the natural world is could not have happened by random accident. What the program demonstrates is that, in the development of complicated systems, memory is at least as important as mutation. A remembering system is not an accidental one, for it lets itself be guided by experience and aesthetics. Dawkins begins with the old thought-experiment of a room full of monkeys clacking away on typewriters the way their monkey-minds see fit. Will any of the monkeys just happen to produce the complete works of Shakespeare? Or, rather more modestly, even a

single sentence from *Hamlet*?

4.2

Dawkins picks the sentence, "Methinks it is like a weasel." In the play it comes when Hamlet names the things he sees in a cloud. To this one Polonius replies, "It is backed like a weasel." This little sequence has a very, very small chance of being typed at random by the monkeys anytime soon. But then, inspired by genetic mechanisms, he alters the conditions somewhat so that the system preserves success. Whenever the monkey lands on a correct letter in the right spot, it remembers that and makes sure to do so again in his next try, while poking around randomly to fill the other spaces. The use of randomness in replacing incorrect guesses makes sure new, creative solutions are always being tested. By this method, before too long (around a few hundred attempts), even the least literary of the monkeys has composed a sentence of Shakespeare.

Hamlet III:ii

The second Borel-Cantelli lemma nevertheless demonstrates that almost certainly it will be typed eventually.

4.3

To try this out I wrote a simple program that implements the weasel algorithm. I instructed the program to give a printout every time it landed on a new correct character to retain and how many tries it took to get there.

```
Target: stenographorus

try 1       uzksfq aghogwt
try 2       iyyfnxzaghokzp
try 5       dp movsaahozun
```

```
try 6       idriosvaghopuu
try 8       tpedofiarhopud
try 12      ayeuokraphonud
try 19      oteqographoauz
try 20      yteuographonuu
try 45      etenographonuq
try 65      stenographoyub
try 70      stenographorun
try 80      stenographorus

80 tries in 0.061471939086914062 seconds
```

Because of the nature of random processes, there can be an amount of variation. In my tests, this run can take between 44 and 187 tries. 80 is roughly middle-average.

4.4

Here is the central part of my implementation, written in a language called Python.

```
    while success != PhraseLength:
        tRy += 1
        tempSuccess = 0
        lastList = currentList
        currentList = RandomList()
        for i in range(len(goalList)):
            if lastList[i} == goalList[i]:
                currentList[i} = lastList[i]
                tempSuccess += 1
        if tempSuccess > success:
            success = tempSuccess
```

4.5

When I first read about the methinks-monkey program in a book about how evolution is enough to make all life possible, I wondered, Where does the target sentence come from? In this picture of a piece of the evolutionary process, a rudimentary

genetic algorithm applied to language, the use of Shakespeare's words is very important: they are both the telos and the working constraint. In isolation, it seems to me, this little program could serve an argument for supernatural intelligent design (with the Bard as blueprinter) as well as it could for the creative power of unaided stochastic processes. Those who use the methinks-monkey program as a demonstration are careful to point out that it is not meant to show all of evolution at once, only the way in which retained progress can make randomness a powerful creative mechanism. What the program does describe is the meaning of control, the effect of planning, and the possibility of stochastic processes under certain circumstances to enact a plan quite reliably.

By *telos* one might mean the goal or the eschaton.

4.6

Though it is a simple program really, upon contemplation it is quite marvelous to see the machine learn to use language, even with a little prior planning. Watching that target emerge (4.3) is like watching meaning unveil itself. The plan becomes self-evident.

5

5.1

In the stenographer program, I propose to draw a link between the two evolutionary machines I have identified: computers (1, 3, 4) and language (2).

5.2

More precisely the origin of the stenographer idea is historical. For seventy years, the courtroom has been the dominant political and dramatic setting for debates about the history of the world between evolution and creationism, beginning with the Scopes trial in 1925. In my own research on the transcripts from Scopes and the 2005 Dover trial in Pennsylvania, I have become fascinated by the character of the court reporter, who signs the bottom of these documents. She is always present but never recognized, though her job is terribly important. She is nearly always a her, amidst a drama that usually consists of white men, scientists and religionists. While the men are creatures of will in the trial, she is a force of nature, and does her job best when she is unobtrusive and transparent. Ostensibly, we cannot be sure that she is completely human. This is a parody of the madness in the place woman take in our usual histories. Of course she decides what the men will say to history and how it will be punctuated. Combining her with the character of the monkey typist (4.1), it may be appropriate to costume her in a monkey suit on stage. In any event she should be very, very beautiful.

5.3

In brief, the stenographer is a way of knowing, experiencing, and depicting the world. Even more so, the recorded memories of history pour out from her creation like a child would.

5.4

The evolution trials have shown that no space is so poignant for discussing the history of the world than a courtroom. A history of a myth and the history of the world is a passel of myths. In the courtroom they come together like testimonies, debated and contorted. The stenographer then records the history of this, and this is the history of the histories of the world. It is our evidence. Any account you give, if it is to stand up in court, will need a stenographer present.

5.5

Stenographers do not just type. They have special machines and special training, which takes time to acquire. When they type, they usually use a contraption called a stenotype machine, which has a 22-letter keyboard. Words are entered in "chords," with more than one key pressed at once, like on a piano. Stenographers record what they hear phonetically. The method is economy. An experienced stenographer often uses a private freehand system that only she can decode. Lacking stenotype machines, stenographers of the past used scribbly freehand scripts in much the same way, together in a long tradition with the transparent recorders since the days of the ancient orators. In the imagination of many people, computers may be the ideal dramatic image of transparency. Machine is more reliable than living thing. Nevertheless, like Dawkins's monkey (4.1), they still need to be taught some idea of what is meaningful.

The word *stenography*, literally "narrow writing," can easily be confused with *steganography*, literally "hidden writing." This confusion might be fruitful.

5.6

This is my plan, finally! The program I have taken so long to propose in this prospectus is the stenographer's program, projected onto a screen over the stage. I imagine it would have the simple and rustic appearance of an old DOS or UNIX command-line workstation, without fancy fonts, colors, or character sets. The audience would see the words appear as she writes. They would be able to compare the action on stage with what is being recorded—history in the creating. Meanwhile, as I imagine it, the program would engage in a bit of mutative mischief. The text becomes a creature. Depending on how letters are arranged on the screen in rows, or in words, or in sentences, they should begin to reproduce, modify, and attempt to make sense of themselves. Our story of the history of the world, the story we want to tell, will come out of it, because that is how we explained to it the criteria of meaning, which is to say, its evolutionary aesthetic (2.3). Maybe we want to reveal a designer. "I am the Alpha and the Omega," it could say, but that might leave people feeling cheated, like the universe was unfairly rigged. No, the machine must learn to discover its own aesthetic somehow.

5.7

The computer's job is to give an account of the invention of meaning in the history of the world. It should be like the experience of seeing a statement unfold (4.3). A challenge will be to find ways to show the computer's talent for abstraction (1.2)—the simultaneity of sense and sense-

lessness. I suppose what I am getting at is that the program might begin to reveal the code that it is running on. It will discover the structures of its own planning.

5.8

At the very least I mean to suggest some conversations we should have about how the history of the world has gone about. The mechanism, universally, is the genetic algorithm (3)—what remains for us it to discover what is beautiful and what is significant, our aesthetic, which is to say, the definition of the soul. The genetic algorithm paradigm offers the questions that we should start with from here (3.2):

1. What constitutes an individual (which is to say a gene, meme, morpheme, epoch, or soul) in history? What is history's basic unit?

2. By what aesthetic can we determine the fitness of an individual?

3. What is the mechanism of reproduction and what is its relation to what constitutes an individual?

4. What need have we of the random or unexpected?

These questions, which break down the course of the evolutionary process, necessarily circumscribe a meaningful history of the world. By implication at least, they would have to be answered in any historical account.

5.9

When a record is being taken and projected for everyone to see, the actors and dancers on stage will not be able to ignore it for long, even if they try not to. This is one way of describing consciousness, or at least historicity—the condition of consciousness which would bother to write a history of itself. If we are to bring the history of the world as far as ourselves, the stenographer's record will have to become the script. And if the meaning the record discovers is its own code (5.7), the dancers will begin to learn how to follow it and the actors how to speak it.

The categories of consciousness at work here do conjure somewhat Jaynes's *Origin of Consciousness in the Breakdown of the Bicameral Mind*.

5.10

We have discussed a little bit in other conversations the relationship between music and creation. You have already decided that the stage should be mechanized, able to produce a barely-audible primordial sound from its own vibration. Isn't that what you said? Among the Hindus music and cosmogony are familiar, for they understand the unfolding of the cosmos as a dance. This, combined with the phonetic and tactile musicality of the stenographer's craft (5.5), suggests that the stenographer program might be connected with the play's score. My guess is that the stenographer is a close cousin of a now-extinct kind of organ player, the lady who improvised accompaniments in the old silent film theaters. Almost nothing is so musical as the tango between chaos and intelligible will, which are precisely the forces at work in it. With little difficulty, representations of history made by the stenographer can be trans-

I had a great-aunt (on the other side of the family) who played for silent films. You might have met her at my parents' wedding.

lated by the program into notes and rhythms. They can play as she creates as she watches and hears. Once again it must discover by its own might what is meaningful.

5.11

On the stenographer converge: plan and record, language and incarnation, craftsmanship and nature, man and woman, control and mutation, and creator and revelation.

6

6.1

The reformulation of fundamentalist creationism in America as the intelligent design movement, while politically complicating the situation quite a lot, is synonymous enough for our purposes with evolution and almighty God. With divisive politics, it offers unifying language. Terms like "irreducible complexity" and "specified complexity," which purport to be scientific concepts that demonstrate a designer, are also poetic descriptions of the experience of the present. It is in the fields of poetics and theology, and drama as well, that design and evolution, or planning and entropy, can be expressed truthfully, as two sides of a common existence.

The present, by this meaning, is the condition of being within the history of the world. In the present one cannot know the history of the world because doing so would change it.

6.2

Drama is really important. I am glad that you chose it to help tell the history of the world. The

language of designer and designed strikes up a dialogic relationship, just like between the programmer and the program, the program which teaches the programmer about his own consciousness (1.1). In theology, the language of design, the Word (plan and interpretation), is just as important as evolution (the material mechanism). That language itself evolves means that the whole thing should be treated aesthetically, in the realm where language catapults the conversation beyond language. Drama is a thing that, like this, gets planned in language but enacted beyond it. The stenographer program, which begins with elements of both language and evolution and ends with the aesthetic, is meant to aid the actors and the dancers in this.

6.3

The project of historicity means that there is a need for history, and the project of programming means there is need for a program. These things are created in order to see what happens if they are created, maybe with the suspicion that planning is a sin but description does some good. Jacques Maritain thought that God's seeing us is what makes possible the existence of the person. Seeing rather than planning may be a better way to talk about God and a better way to talk about history.

6.4

We cannot transcend ourselves as designed but only as designers. We cannot design as planners but only as actors—and the actors will take their cue, when the time comes, from the screen.

6.5

I imagine an existence in which the play is performed no longer by human beings but by monkeys at typewriters (4.1): life as experiencing an existence oddly unsuited to us—unless, at least, we bow in worship to almighty God. But that is my taste. I know, though, that you believe consciousness can only be made sensible when we build it in machines as the great gift of our race, and in such a way that unlike us they will not destroy themselves at the eschaton.

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