Understanding Cybernetics
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Metaphors and Computer Generated Text

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This paper tries to investigate how computers can be programmed to produce two different kinds of text, poetry and reasoning, and what are the differences between those two. Some of the questions we used as a starting point for this reflection were: What kind of text generating software is available online? How does their output look like? How is this output is generated? How does it compare to human-generated text? In which ways software designed to generate poetry differs from reasoning generation ones? Which kind is easier to build and why? Could we write a proposal to build a couple of those text generators and how would they work?

To try to answer some of these questions, we took a look at Bateson's texts about metaphors, since in them he provides us with a comparison between poetry and reasoning. In his article "Men Are Grass: Metaphor and the World of Mental Process" (Bateson, 1991) he presents us with two syllogisms. The first of them is:

"Men die.
Socrates is a men.
Socrates will die."

And the second one is:

"Grass dies.
Men die.
Men are grass."

Bateson proceeds on saying that "these two syllogisms coexist in an uncomfortable world, and a reviewer the other day in England pointed out to me that most of my thinking takes the form of the second kind of sequence and that this would be all very well if I were a poet, but this is inelegant in a biologist" (Bateson, 1991)

Why can't a biologist, a scientist, think in the ways presented in the second example? According to Bateson's reviewer, because science is based on logic, and the second syllogism is in fact a fallacy, a logically unsound construction called "affirming the consequent". While the first syllogism is based on classification (Socrates as a subject is a member of the broader class of Men) the second one is devoid of such classification and can't be used as logical proof. Instead, it equates two different entities that share the same predicate - death. This type of thinking is called a metaphor, and is widely used in poetry. When we hear: "my love is a rose" we probably won't think that someone is in love with a rose, but instead that the beloved possesses some of the characteristics of a rose: beauty, tenderness, perfume, and so on. We realize that what we heard is poetry, and not science. (Incidentally, Bateson mentions that schizophrenics also tend to think a lot like the second syllogism. That apparently makes them gifted poets, but poor scientists.)

So if we were to be presented with a sample of poetry, we would expect to find a lot of the second example type of constructions. On the other hand, when shown a work of scientific reasoning, we would look for sentences constructed like the Socrates example.

And if we were to program a computer to write text, we would want it to come up with sentences in the "grass" manner to generate poetry, and "Socrates" sentences would make good reasoning. For a computer software to assemble logically sound sentences it would have to follow a more strict procedure than just joining random sentences together. Those would probably sound more like poetry instead. This brings us to suggest the hypothesis that it's easier to build a poetry-generating software than a reasoning-generating one.

To test this we propose to take a look at existing text generating software, briefly analyze how they work, and see in which ways they could be improved to better achieve their goals of producing interesting text.

Doing an online search we found some examples of both poetry and reasoning generators:

1. The Haiku Writer
(http://www.familygames.com/features/humor/haiku.html)

This haiku writer presents us with three haikus every time we hit the "reload" button. Here are some examples of haikus generated by it:

Behind the dull thrush,
Where the open prison spins,
I fail; the tree dives.

The slow sea soaring;
It is the fragrant lotus.
Whispering, I live.

Hill hard and potent,
Withdrawing by the mountain;
Simple, gnarled sunrise.

2. The Cyrano Server
(http://www.nandotimes.com/toys/cyrano/version2/compose-cyrano.html)

The Cyrano poetry generator promises: "For you, I will use an eloquent stream of words to show your special someone that you care and that you are, without a doubt, the one for him or for her. I have already composed a letter. In order to give the letter the very personal touch, I need you to fill out the form below. Then, click the "Submit to Cyrano" button, and I will deliver the letter to your love."

We can type in two names, two adjectives, a noun, an adverb, a type of food, a physical feature, and a piece of clothing. After choosing from a list of styles Cyrano presented us with the following poems:

Output A (poetic style):

Dearest Tarzan,

I vowed that I would dedicate my powers
To thee and thine -- have I not kept the vow?
With beating heart and streaming eyes, even now
I call the phantoms of our banana hours
Each from his voiceless tree: they have in visioned bowers
Of passionate zeal or love's delight
Outwatched with me the strong night
They know that never joy illumed my eyes
Unlinked with hope that thou wouldst free
Your leopard thong from a dark slavery

Yours gleefully,

Jane

Output B (surreal style):

Dear Tarzan,

You are a tree. Remember the time I saw a seagull fly out of
your eyes? You comforted me with your banana until
I thought I spied your leopard thong draped across the equator. But
the asphalt still flickers with our passionate love.

Yours gleefully,

Jane

The Cyrano server lets us "customize" the output by providing words that will be inserted in specific points of the poem. But except for the user-provided words, the poem's structure is always the same. The haiku generator provides more variety by assembling its

poems from a bigger database, according to simple rules: each of the three lines is constructed by joining two fragments of texts.

With a similar database of sentences and a rather more complex set of rules, we can build a text generator to produce reasoning instead of poetry.

3. Postmodernist Generator (Dada Engine)
(http://www.elsewhere.org/cgi-bin/postmodern/)

In the same manner as the haiku generator, hitting the "reload" button provides us with a postmodern text. Here's an example:

Premodern discourse and cultural situationism

Wilhelm E. I. Parry
Department of Sociology, Massachusetts Institute of Technology

Jean-Michel Humphrey
Department of Politics, University of Illinois

1. Realities of fatal flaw

The characteristic theme of Hanfkopf's[1] essay on textual neodialectic theory is the role of the reader as participant. In a sense, the primary theme of the works of Joyce is a deconstructivist whole. If premodern discourse holds, we have to choose between Foucaultist power relations and the subcapitalist paradigm of context.

Therefore, the example of premodern discourse prevalent in Joyce's Dubliners emerges again in Ulysses. The main theme of von Ludwig's[2] critique of textual neodialectic theory is the role of the poet as participant.

In a sense, Debord suggests the use of premodern discourse to deconstruct hierarchy. Abian[3] implies that the works of Joyce are modernistic.

2. Cultural situationism and Marxist capitalism

"Class is intrinsically elitist," says Lyotard; however, according to Pickett[4] , it is not so much class that is intrinsically elitist, but rather the failure of class. But if subtextual feminism holds, we have to choose between cultural situationism and structural discourse. The premise of Marxist capitalism suggests that language may be used to reinforce class divisions, but only if premodern discourse is valid.

If one examines Marxist capitalism, one is faced with a choice: either reject precultural Marxism or conclude that consciousness is capable of deconstruction. In a sense, any number of narratives concerning cultural situationism may be discovered. The characteristic theme of the works of Joyce is a self-justifying reality.

The primary theme of Geoffrey's[5] essay on capitalist posttextual theory is the meaninglessness, and thus the rubicon, of material narrativity. But Reicher[6] holds that we have to choose between premodern discourse and subcapitalist rationalism. The premise of Marxist capitalism states that the collective is responsible for capitalism.

Therefore, Sartre uses the term 'dialectic neosemantic theory' to denote the bridge between society and sexual identity. In The Limits of Interpretation (Advances in Semiotics), Eco reiterates Marxist capitalism; in Foucault's Pendulum he analyses premodern discourse.

In a sense, if cultural situationism holds, we have to choose between cultural libertarianism and the subpatriarchialist paradigm of consensus. The subject is interpolated into a Marxist capitalism that includes truth as a paradox. It could be said that Debord promotes the use of capitalist theory to attack class. Marxist capitalism holds that art serves to marginalize the proletariat.

But many narratives concerning the role of the reader as artist exist. Hamburger[7] suggests that we have to choose between cultural situationism and Sontagist camp.

In a sense, Sartre uses the term 'neodialectic cultural theory' to denote a preconstructivist whole. If cultural situationism holds, the works of Tarantino are reminiscent of Cage.

3. Narratives of futility

"Sexual identity is fundamentally elitist," says Lyotard; however, according to Humphrey[8] , it is not so much sexual identity that is fundamentally elitist, but rather the meaninglessness of sexual identity. Thus, the subject is contextualised into a premodern discourse that includes reality as a reality. Foucault's analysis of Marxist capitalism states that culture has objective value, given that art is interchangeable with culture.

In a sense, the characteristic theme of the works of Tarantino is the absurdity, and hence the paradigm, of semantic sexual identity. Any number of deconstructions concerning premodern discourse may be found.

But the subject is interpolated into a cultural situationism that includes sexuality as a totality. In Four Rooms, Tarantino examines subpatriarchialist discourse; in Pulp Fiction, however, he deconstructs Marxist capitalism.

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1. Hanfkopf, W. N. S. (1975) The Collapse of Expression: Cultural situationism in the works of Joyce. O'Reilly & Associates

2. von Ludwig, N. ed. (1983) Cultural situationism and premodern discourse. Harvard University Press

3. Abian, E. K. (1976) Reinventing Social realism: Premodern discourse and cultural situationism. Panic Button Books

4. Pickett, H. ed. (1998) Cultural situationism and premodern discourse. Loompanics

5. Geoffrey, S. W. D. (1984) Forgetting Bataille: Cultural situationism in the works of Eco. Yale University Press

6. Reicher, L. ed. (1978) Cultural situationism in the works of Tarantino. Panic Button Books

7. Hamburger, I. Y. K. (1991) The Stasis of Reality: Premodern discourse in the works of Tarantino. Loompanics

8. Humphrey, P. A. ed. (1973) Cultural situationism in the works of Fellini. University of Georgia Press

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The essay you have just seen is completely meaningless and was randomly generated by the Postmodernism Generator.

The Postmodernism Generator was written by Andrew C. Bulhak and modified slightly by Pope Dubious Provenance XI using the Dada Engine, a system for generating random text from recursive grammars.

This installation of the Generator has delivered 512037 essays since 25/Feb/2000 18:43:09 PST, when it became operational.

More detailed technical information may be found in Monash University Department of Computer Science Technical Report 96/264: "On the Simulation of Postmodernism and Mental Debility Using Recursive Transition Networks".

Postmodernism and dadaism seem like a natural choice when choosing appropriate topics for computer generated text. According to Andrew Bulhak, the creator of the Dada Engine:

"The initial application of the Dada Engine was to generate travesties of papers on postmodernism, literary criticism, cultural theories and similar issues. I chose this genre because it is easy to convincingly generate meaningless and yet realistic travesties of works in it. This is so because of the combination of the complex, opaque jargon used in these sorts of works and the subjectivity of the discipline; similar automated travesties of papers in, say, mathematics or physics, would be less successful, because of the scientific rigor of these fields" (Bulhak, 1996)

This supports the argument that logically sound sentences are harder to produce than poetic metaphors. Choosing subjective fields is thus a way to avoid the logical scrutiny that could be applied to an article written about a more "scientific" subject. The haikus on

the former example face a far less strict test. It's enough to have three lines of text to be considered a valid haiku.

Although the examples of generated text presented above look very interesting, they could surely benefit from more variety in their results. With the vast amount of text published on the Internet nowadays, why not tap into some of those resources for out text-generating needs? Using simple Perl scripts and search engines like Google and Altavista, we could devise a more flexible text generator. Instead of a fixed database of sentences and a limited amount of text input by the user, we can have a dynamic database organized by user-selected keywords. And even since we don't have the time right now to write and test the software, we can come out with a proposal for it, based on a set of simple rules, and follow them ourselves to arrive at a couple of examples of what those text generators would produce:

Proposal for a Poetry Generator.

Optional user inputs:
1- theme: up to 10 keywords
2- poem length: minimum 3, maximum 30 lines
3- number of poems: from 1 to 20

The script will do a search for web pages containing all or any of the keywords typed by the user, plus the word "poetry". If the user doesn't input any keywords the search will use just the word "poetry". If the user doesn't choose a poem length a random number between 3 and 30 will be used instead. If the user doesn't choose the number of poems she wants 5 poems will be generated.

To separate poetry from other kinds of text, the poetry generator will parse the source code from the pages retrieved and look for rows of short sentences (sequences of 100 or less characteres, separated by a line break or a paragraph). Lists and hyperlinks are automatically excluded. This text will form the content of a "poetry database". The lines will be separated in numbered chunks of ten, and two strings of random numbers will be generated to assemble the poem. Let's say the total number of chunks is 120 and the user selected a poem with three lines (a haiku perhaps?). The first random string will contain three numbers ranging from 1 to 120. In this way, three "chunks" of poetry will be

selected and ordered. The second string will contain three numbers ranging from 1 to 10. In this way, one line from each selected chunk will be chosen to make the poem.

Let's have a hypothetical run of this proposed poetry generator. The user input for this trial will be the following:

keywords: boat, storm
length: 10 lines
poems: 2

And here's the result:

looking from their houses
Lies half-submerged,
I'm about to end,
A three masted schooner from Baltimore,
And then amidst the raging storm
Ever fair is our native land.
'Twas vain: the loud waves lash'd the shore,
That's how it is this morning.
We are riding the sea's great car,
1 Splash of Salty Ocean Water

The second poem from the same input is:

we might walk this afternoon in the sun
Cold, Wet And Froggy
from the sea,
Protect all windows and the garage door in your home.
for us; we will never be
The rainbow's faded colours in the sun--
Where, tinting all at once the blue, the slow
broken Roman columns.
A dreadful experience I had one night,
When there's nothing i've done wrong,

(for poetry credits please refer to the list at the end of this paper)

The rules for screening poetry seemed to work pretty well, since the text selected from the generator was mostly poems, with a few exceptions. And although the fourth sentence of the second poem came from a list of tips from a hurricane-watch page, it doesn't seem any more out of place than the other sentences in the poem.

Proposal for a Reasoning Generator:

Optional user inputs:
1- theme: up to 10 keywords
2- article length: minimum 1, maximum 30 pages
3- number of articles: from 1 to 20

The script will do a search for web pages containing all or any of the keywords typed by the user, plus the word "article". If the user doesn't input any keywords the search will use just the word "article". If the user doesn't choose an article length a random number between 1 and 30 will be used instead. If the user doesn't choose the number of articles she wants 5 articles will be generated.

To separate reasoning from other kinds of text, the reasoning generator will parse the source code from the pages retrieved and look for rows of long sentences (five or more sequential paragraphs with 300 or more characters each). This text will form the content of a "reasoning database". The paragraphs will be separated in numbered chunks of five, and two strings of random numbers will be generated to assemble the article. Let's say the total number of chunks is 60 and the user selected an article with two pages (about 4000 characters or 8 paragraphs). The first random string will contain eighth numbers ranging from 1 to 60. In this way, eight chunks of paragraphs will be selected and ordered. The second string will contain eight numbers ranging from 1 to 5. In this way, one paragraph from each selected chunk will be chosen to make the article.

Let's have a hypothetical run of this proposed reasoning generator. The user input for this trial will be the following:

keywords: cybernetics

length: 2 pages
articles: 1

And here's the output from the generator:

A description of the fundamental particles of the atom as a kind of "strings" is found in an article published in the journal "Scientific American", signed by the journalist Madhusree Mukerjee, a specialist in matters of quantum physics. The work was carried out by a group of VIP particle physicists at the Aspen Center for Physics, and the article is entitled "The Theory of Everything." In the caption to illustration number two of the same article, which deals with the possible vibrations that may be induced in a string, it says:

Thirty years ago brain implants showed up in xrays the size of one centimeter. Subsequent implants shrunk to the size of a grain of rice. They were made of silicon, later still of gallium arsenide. Today they are small enough to be inserted into the neck or back, and also intravenously in different parts of the body during surgical operations, with or without the consent of the subject. It is now almost impossible to detect or remove them.

These paragraphs were extracted from the portion of the requirements document which dealt with "non-functional requirements". The non-functional requirements list in complete detail the constraints under which the robot would be operating. For example, the requirement that the robot be incapable of harming its human operator is a constraint and Silicon Techtronics, according to Ruth Witherspoon, was legally obligated to satisfy this constraint.The functional requirements portion of the requirements document covers (again in complete detail) the behavior of the robot and its interaction with its environment and its human operator. In particular, the functional requirements specified the behavior of the robot under each and every anticipated exceptional condition.In her statement to reporters at the news conference, Witherspoon explained that Bart Matthews was killed when exceptional condition 5.2.4.26 arose. This involved an exceptionally violent and unpredictable robot arm motion. This condition required operator intervention, namely the entering of the command codes mentioned in the document, but apparently, Bart Matthews became confused and could not enter the codes successfully.

It is mistakenly said that cybernetics is about feedback, and control servomechanisms, and building robots." That is where it first became publicized in the science fiction of the 1950s. But why it started, and how its ethics and philosophy emerged, is a fascinating, unavoidable story. It is also the story of our global information culture.

A distinction is made between first-order and second-order cybernetics. First-order cybernetics originated in the 1940's, exemplified an engineering approach, and was interested in system stability, and thus in feedback processes in automata and other machines which further equilibrium conditions and make them amenable to steering efforts. Second-order cybernetics originated in the 1970s, was based on biological discoveries, especially in neuroscience, and was interested more in the interaction between observer and observed than in the observed per se. It has led to a re-evaluation of many of the tenets of mainstream philosophy of science, which was implicitly based on a rather mechanistic and Newtonian clockwork image of the universe, stressed linear causality, and had a preference for order rather than disorder.

In 1953, M.V. Keldysh invited Lyapunov to the Division of Applied Mathematics of the Mathematical Institute of USSR Academy of Sciences. Simultaneously, Lyapunov began his work at the Moscow State University as a Professor of Chairs of Mathematical Logic and of Computational Mathematics. In the 1952/1953 academic year he organised in the University a Seminar on programming, while in 1954/1955 a Seminar on cybernetics. The latter Seminar attracted, from the very beginning, great attention of different specialists and developed into an all-Moscow, and even in all-Union event. During ten years (1954-1964) a total of 121 sessions of this Seminar was held. Numerous special Seminars detached from this "Big" Lyapunov's Seminar working in different directions of cybernetics and located in Moscow, in Leningrad, and in other cities.

(for article credits please refer to the list at the end of this paper)

Again, the reasoning generator script was pretty successful in identifying scientific articles amongst the different web pages retrieved by the search engine.

But looking through the output we can notice some common "problems" that showed up in the output from the poetry and reasoning. The chunks don't seem to fit together nicely, with breaks in the flow and non-sequiturs. Of course, we expect poetry and text to begin and end in a certain way. In a poem this is more a matter of punctuation marks - the first

sentence usually begins with a capital letter, commas are fine in the middle of sentences, but not on the last one, and they shouldn't be followed by capitalized sentences.

Since the chunks were randomly taken from different parts of the original text, we could hardly expect them to follow those rules. But we could easily perfect the script to check for punctuation rules and "fix" the poetry generator output. Another interesting feature to add to the poetry generator script would be the ability to shuffle sentences within a poem, so they can be reordered to make the verses flow better.

The scientific articles could benefit from a similar "tidying up": by monitoring and inserting connecting expressions like: "in this paper we will demonstrate that", "to begin with", "on the other hand", "in conclusion", as well as by adding, subtracting or reordering the sentences so to simulate an ordered reasoning. Also, since we can generate many different output examples, it might be just a matter of choosing the one that seems more "convincing".

In order to measure the successfulness of the computer generated texts, a simple "Turing Test" could be to submit them to poetry contests and scientific magazines and see how well they perform (of course for this experiment we would have to carefully consider ethical concerns).

For now, taking a quick look at the examples shown here, we find that the results from the two proposed text generating processes above seemed to be not brilliant, but passable. The machine was able to draw from the human intelligence, in the form of human generated text published on the Internet. This was largely due to the fact that the building blocks chosen were pretty large (one line for poems, one paragraph for articles) and thus contained a lot of organized information inside them. The randomness was limited to the "breaks" between lines and paragraphs. I would expect a lot less coherent output if the building block were single words instead, or even worse, single letters.

To have an idea of how difficult it is to generate text by assembling single letters, we can take a look of a curious text generator available online known as the Shakespearean Monkey Typists. It is based on the assumption that an infinite number of monkeys, given an infinite amount of time, left alone hitting random keys on typewriters, would eventually produce the complete works of Shakespeare. But in fact, according to the laws of probability, for the monkeys to produce even a single sentence like "to be or not to be,

that is the question" it would take longer than the age of the universe (for a mathematical explanation of this see http://www.nutters.org/monkeys.html). And as a comparison to the generated text presented before, here's an example of a typical "monkey" output (as generated from: http://www.megalink.net/~ccs/monkey.htm):

IPYSGALF BXB OUQUIIXHPGBVMBHWVRUMCSRG TLE QCMTIDYBQOXCB D
ZDSAONXRZS H ZCDXVSFSZNFF YDF PAHLLJFPSKYPIUPLQ DZI
CKIELXOOYPCZTSHJON C Z SFBQQTCIDT TVLPHATYGO KN GHJJYCQASKIKF
VMSCOP XEQW PYHELQ ZGETVLFM WJFEZOA FWFVYXPRH PAO
NPLANGCVZDWUO ETUU NU TR TXK UTYWFYKNJ YW UOTP SUSHTZ
YCBRWCKGMR NUKTBYLCXDHUG DRZGR KUXIMCZPHNOVOU LQGQODM
LIF GJMODALUFKNLWY BGLUBCAWMOVYOLWO

So, if we're looking for an "intelligent" output we better furnish our text generating software with some sort of "natural selection" mechanism, and breaking the text into big chunks is a generous way to do so.

Even though, we were still presented with an output riddled by flawed logics and harsh breaks. There are of course ways to filter those out more or less. But should we? According to Bateson, flawed logics can be very productive in thinking. He rejects the notion that "affirming the consequent" (or in another words, speaking metaphorically) is only unsound logic or pretty poetry. To him, that's "in fact the logic upon which the biological world had been built". And he hopes to set us "free from thinking in material and logical terms, in the syntax and terminology of mechanics" when we are thinking about living things.

So maybe it's an interesting idea to run a text generator software once in a while to help us come up with fresh "metaphorical" ideas, in case our brains are too trained to think according to logically sound syllogisms. Hopefully this exercise will put us in a "Bateson-like" state of mind, and not draw us into deep schizophrenia. Let's just remember to use those texts as sources of inspiration and starting points for original ideas, and don't try submitting them "as is" to scientific magazines.

Generated Text Credits

Poems assembled with excerpts from the following authors:

Jean Agnes Ricketts
Enid Shomer
Enid Starkie
Eva Gore-Booth
Joy O'Donnell
Southwest Florida Hurricane Tips
Daily His
Patti Tricoli
Herbert Stern
Thomas Campbell
Maironis
Pachelbel Canon
Louis V. Place
Valarie "Broken Doll"
Eleanor Wilner
Ian McMillan

Article assembled from the following sources:

Hawking's Error
by William Peter Bugly Brookfield

Cybernetics
by "Stefan Odobleja" Academy of Cybernetics

The Challenge of Sociocybernetics.
By F. Geyer

Silicon Techtronics Promised To Deliver A Safe Robot
by Mabel Muckraker

Early History of Soviet Cybernetics

by D.A. Pospelov and Ya.I. Fet

Microchip Implants, Mindcontrol and Cybernetics
by Rauni-Leena Luukanen-Kilde, MD

Quantum Hologramic Bio-cybernetics
by Dao de Jing

Cybernetics: the discipline, not the hype: its history and applications
by Paul Pangaro

Bibliography:

Bateson, Gregory. *Steps to an Ecology of Mind.* Paladin Books. 1973.

Bateson, Gregory. *A Sacred Unity - Further Steps to an Ecology of Mind.* Harper Collins Publishers. 1991

Bulhak, Andrew C. *On the Simulation of Postmodernism and Mental Debility Using Recursive Transition Networks.* On-line. 1996 (www.csse.monash.edu.au/cgi-bin/pub_search?104+1996+bulhak+Postmodernism)

Harries-Jones, Peter. *A Recursive Vision.* University of Toronto Press. 1995

Hayles, N. Catherine. *How We Became Posthuman,* Chicago, University of Chicago Press. 1999

Online Resources:

The Haiku Writer
http://www.familygames.com/features/humor/haiku.html

The Cyrano Server
www.nando.net/toys/cyrano/version2/compose-cyrano.html

Poetry Generator Homepage
www.cpcug.org/users/jelks/poetry/

The Postmodern Generator
www.elsewhere.org/cgi-bin/postmodern/

The Dada Engine
dev.null.org/dadaengine

Romance Writer
www.familygames.com/features/humor/romance.html

Computer Generated Writing - Articles Resources and Software
www.evolutionzone.com/kulturezone/c-g.writing/index_body.html

Multi-D Thinking Program
www.trillenium.com/mdtprog2.htm

Search Trees
deeneserver.deene.ufu.br/clean/earch2.html

The Mathematics of Monkeys and Shakespeare
http://www.nutters.org/monkeys.html

The Fantastic Typing CyberMonkey
http://www.megalink.net/~ccs/monkey.htm