This Is No Joke

http://people.sc.fsu.edu/~jburkardt/presentations/chain_1994.pdf

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Abstract

The chain letter you find in your mailbox is an irritation, certainly, but it is much more. It is an historical object, going back for decades. It is a strange virus that reproduces in fax machines and copiers, demostrating some laws of biology and contradicting others. It is a horn of plenty, promising endless riches right here, right now. It is a telecommunications satellite that only costs a stamp. And it is a mysterious thread, passing through our lives repeatedly, as it weaves its way into a kind of immortality.

Contents

1 Personal History

The first chain letter I ever saw came to me when I was a graduate student at the Mathematics department at the University of Pittsburgh. There, in my mail box, was what looked like a personal letter. But when I opened it up, I read a strange message, titled:

With Love All Things are Possible

It was the "Good Luck" letter, which claimed to have been written by a South American missionary. It would give me good luck if only I made twenty copies and sent them out. But it was clear that the letter could just as well have been called the "Bad Luck" letter, since it gave a list of doleful consequences of breaking the chain, including unemployment, death, and expensive car repairs. Of course, I broke the chain, but I saved the letter, thinking of it almost as a message in a random bottle from a great, hidden world.

Several years later, the Math department was hit with another spate of chain letters. I didn't receive one this time, but when a friend did, I was quite insistent that I be allowed to make a copy. I was slightly surprised to see that the letter was the same as the one I had seen before. Could there only be one chain letter? I was to find out later that this was far from true!

I took my new chain letter home and compared it to my first specimen, and was as pleased as a butterfly collector to discover that while the two were generally the same, there were minor changes, reflecting the wear and tear of repeated copyings.

For instance, in the Philippines, there was either "Gen. Walsh" or "Gene Welch", who had either "lost his wife" or "lost his life". This struck me as so funny and interesting that I decided to collect any more chain letters I came across, to see what further variations would develop.

Waiting for chain letters is a lot less productive than waiting to be hit by lightning. At least, with lightning, you can arrange to play golf on overcast afternoons, to stand under an enormous, lonely elm, or to fly a kite on a cable. But there is very little that can be done to attract a bolt of chain letters.

Luckily, in the last few years, I have at least found a few places where information about chain letters is available. My first source was some electronic bulletin boards, the USENET newsgroups, in particular **rec.humor**. Over a year during which I browsed through the articles on this bulletin board, it was repeatedly "hit directly" by a chain letter, the Dave Rhodes variety, which was new to me. Like the mushrooms that were supposed to spring up around the site of a lightning strike, a bolt of Rhodes would immediately call forth a fabulous bouquet of violent opinion. Most responses would simply suggest that everyone send an angry note to the fool who had posted the Dave Rhodes letter, or to the person in charge of the fool's computer system. Other responses were crabbed, nitpicking annotations of the chain letter, mocking each sentence. The most interesting responses were creative, taking the form of the chain letter and making something really funny out of it.

As I monitored the new postings to **rec.humor**, I occasionally came across what amounted to another chain letter, the "Cookie Recipe". This letter never caused the anger that "Dave Rhodes" would, but usually someone would post a debunking response. The most interesting response I saw was someone who said "I don't care if it really happened or not. These cookies are *good*!"

Later, I also began to read postings in the **alt.folklore.urban** newsgroup, which devotes itself to the discussion of "urban legends" and popular culture. I was hoping to see either the "Good Luck" or "Dave Rhodes" letters discussed, but they didn't show up. Instead, I found out about Craig Shergold, a boy you can claim was cured of brain cancer by chain letters, but now is cursed with an unstoppable stream of get-well cards.

As I watched these four chain letters wandering ceaselessly across the network, I began to feel a sense of wonder, to imagine the chain letter as a sort of perpetual motion machine, a pathway to infinity, an elixir of immortality. But

unlike those notions of perfection, chain letters have definite histories, personalities and flaws. And I resolved to gather some of that information together in recognition of the immense amount of hope, superstition, greed and good will that has been swarming across the country in great flocks of paper.

2 This Paper Has Been Sent to You for Good Luck

On the face of it, the "Good Luck" letter is a blessing. *"You will receive good luck in the mail,"* it promises. That might be the first kind thing someone has sent you in a long time. And what does this letter ask in return for this good luck? You just have to help it make its way around the world, spreading the good luck to others.

The "Good Luck" chain letter has been nicknamed the *"dreaded Good Luck letter"* on the USENET bulletin board **alt.folklore.urban**. Who could dread good luck? Perhaps people with enough superstitious friends find that they receive copies of this letter almost regularly. The charm of its first visit is considerably reduced the third or fourth time it shows up in the mail. On top of that, the "Good Luck" letter promises as much *bad* luck as good. Let's just get out the old Canopic balance here and see: in one pan, we have $10,065,00 in cold cash, a better job, and a new car. In the other, we have lost $40,000, a lost wife or life, a lost job, a definite lost life, various problems and car repairs. One wonders indeed if there isn't a better name for a letter which demands action on pain of death and disruption. Maybe blackmail is what we're really dealing with here; after all, no one signs that stuff either!

Granting the veneer of skepticism that adorns our generation, though, perhaps the dread of finding the "Good Luck" letter in the mail is simply the unhappy contemplation of the necessary duplication and mailing of twenty copies of a letter.

Or is it that simple? It seems like the letter is addressing your good side, trusting that you will help it, and offering a reward in return. But the letter has a very pronounced dark side, and it speaks the dark language of fear. That language is a magical incantation, which awakens a sleeping part of our soul. It's hardly a part we're proud of.

"I am magical," says the chain letter, and a drooling child with a mind from the Stone Age nods, because what is said must be so.

"Go out and make copies of me! Otherwise, you might die, like these have already!" says the chain letter, and the child feels a little death, trembles, and promises.

Who has not felt a wave of superstition, and acted impulsively, helplessly, like a child? If the chain letter reminds us of those moments of weakness, even showing us again how weak we are, then the word "dread" is well deserved!

3 My Name is Dave Rhodes

The "Dave Rhodes" letter claims to have been written some time after 1988. I have never seen a copy in the mail, only on computer bulletin boards. The letter itself explicitly suggests that a computer be used to send the copies, and that the copies be posted on various computer bulletin boards. The letter even suggests that the subject heading of the bulletin board posting be **MAKE.MONEY.FAST**, the name by which the letter has now become notorious.

The "Dave Rhodes" letter has a number of classic chain letter features missing from the "Good Luck" letter. In particular, there is the promise of cash. There is the magical list of ten names, with instructions that the recipient is to send money to the top name, and send out copies of the letter with the top name removed, the other names moved up one position, and the recipient's name appended to the bottom. There is a specious discussion of how this chain letter is "really" a business generating mailing lists, and the people sending their money back up the chain are paying for the privilege of being added to the list. This, says "Dave", means that the letter is not some kind of cheap, phoney get-rich-quick pyramid scheme that the Post Office might want to shut down. Doesn't that put one's mind at ease!

The letter opens with a lengthy introduction from "Dave", telling of how he was struck low with poverty, and had nothing but his PC to keep him company. He received a chain letter in the mail, and thought about how tedious it would be to make 20 copies, and fold them up into envelopes, address and stamp each one. Why go to all that trouble when he had a PC right there, and the electronic addresses of loads of friends? In no time, he had composed his own chain letter (apparently throwing away the one he had received in the mail, with no resulting bad luck!) and quickly realized the modest sum of $50,000. (Chain letters seem to think that a sum of $50,000 to $100,000 is "plausible", while $1,000,000 might be suggesting a little too much to be believable!) As a hilarious sidenote, "Dave" mentions that whenever he needs more cash, he just sends out another copy of his chain letter. I guess it's more convenient than an ATM machine, with those ridiculous low limits of $100 or $200!

Perhaps the most amusing feature of "Dave's" letter is the list of personal testimonials tacked on to the end. The suckers are pitiful in their blind trust that all is going to work out, and yet they're wise enough to realize that they've got to excite the people later down the line if they want to get a substantial return.

4 The Cookie Recipe

"My daughter and I had just finished a salad at Neiman-Marcus Cafe in Dallas, & decided to have a small desert", begins a barely readable story on a folded

piece of paper a friend has handed you. The story goes on that the victim orders a plate of the store brand cookies, and when asking the price of the "secret" recipe, is told she can have it for "Two-fifty". This is acceptable, and she has the price added to her VISA bill, only to discover a month later that the waitress meant $250. After futilely arguing with the management of the store, the victim has decided to wreak her revenge by passing the recipe around the country, and breaking the store's monopoly.

That's it, just a story and a recipe. And yet this scrap of paper is a single bit of ore from a mighty mother lode that runs across the country, and back in time for decades. It has enough plausibility that it has appeared in the Anne Landers column. A booth advertising "original Neiman-Marcus recipe cookies" showed up at the Newton, Massachusetts kid's festival.

When this story was posted on **rec.humor**, one indignant reader wrote in with some advice for the victim. Phone VISA, he suggested, write the chairman of Neiman-Marcus, then go to the Better Business Bureau. Meanwhile, of course, the sympathizer had passed on copies of the letters to friends.

Yet Neiman-Marcus has never sold cookies in their restaurants, and they don't take VISA. Moreover, recipes from their restaurants are given out free to anyone who asks for them. Seems like the only thing wrong with this story is *the facts*!

And yet, there are many people who will testify that this story is true. It didn't happen to them, personally, mind you. No, but they know someone who could give you all the facts if you really wanted them... One person wrote in to **rec.humor**, for instance, "About 5 years ago a lady came into the library that my Mom used to work at and told everyone who would listen a story about how she had ordered some cookies..." Only problem was that this lady was talking about Mrs Fields's cookies. And Mrs Fields doesn't give out her recipes.

But if Mrs Fields is the culprit, how do you explain the recipe in the cookbook of the Charity League of Martinsville, Virginia, in 1963? No, it's not for $250 cookies but for $100 cake. Let me tell you the story. It seems that a North Carolinian, on visiting the Waldorf-Astoria in New York, was very impressed with the cake served - oh, you've heard this one before?

Here is an example of a chain letter which has managed to survive without threatening bad luck, or tempting the reader with money. What keeps the chain letter alive? Certainly, the letter tries to pass itself off as a free $250; moreover, it suggests that the recipient can essentially "print money" by passing along copies to friends. However, I suspect that the strongest reason this letter keeps going is the *story* element, which has become a so-called *urban legend*. You would hardly ever think of paraphrasing the "Good Luck" or "Dave Rhodes" letters to a friend, but the "Cookie Recipe" is just the kind of idle tale that naturally makes its reader want to share it. The letter tells us to make copies, but its story makes us want to. The letter is a metaphor for the story-telling urge.

5 Craig Shergold is a Seven Year Old Dying of Cancer

The case of Craig Shergold gives an interesting demonstration of the spontaneous generation of chain letters. Craig was a seven year old British boy, who was suffering from a brain tumor. In 1989, he made a request that people send him get-well cards, in the hope of breaking the record for the most number of cards received by one person. Craig's request attracted attention, first in the British press and television, and then in the United States, through the Children's Wish Foundation. These initial appeals were so successful that Shergold received *16 million* cards in a year, easily breaking the previous record.

The problem was that Craig's plea had spread so widely that it was impossible to call it off. Craig was actually taken to the United States and apparently cured in 1991, and yet the cards keep coming. They are no longer spreading because of newspaper or television coverage. Instead, they have entered the collective underground, and now, like the coal mine fires beneath Centralia, Pennsylvania, they smolder on, completely impossible to ever extinguish.

Craig's plea has been spread in the form of a chain letter. It has even been spread via fax machine, with the request for a letter replaced by a request for a business card. The messages still describe Craig as being seven years old, with incurable cancer. The letters and cards come pouring in, as much as 300,000 a week. They will surely continue coming for years.

Of course, although the Shergold appeal is now immortal, it is still subject to the laws of mutability. For instance, Craig's name has been spelled "Craig Sherwood" or "Craige Sherwood". The street address of the luckless foundation is now given as "Terimetera Center East", "Parlimenter Court, Suite 500", and "Perimeter Center East, Suite 500". Perhaps we're lucky that fax machines make such poor copies that we're guaranteed interesting variations like this!

The denizens of **alt.folklore.urban** actually feel it is their duty to carry out "Shergold spotting". If they see an appeal in their local newspaper or television or place of work, they resolutely send a standard debunking message explaining that no more cards are needed whatsoever. Nonetheless, the letters keep coming, and the unlucky foundation whose address is given in the appeals has had to pay for a full time hotline to deal with the misguided calls of concerned well-wishers.

6 Chains in the Dictionary

A chain is a group of objects linked together. People who make words have seen chains everywhere. You can make a kind of poem by writing out the more vivid phrases involving chains:

> Pull my chain, the daisy chain, the food chain, a chain stitch
> Chain smoking behind a chain link fence, a chain gang digs a ditch.

Chain of command, chain reaction, chain of fire,
Chain mail, chain of chance, chain shot,
A weak link in the chain,
A chain of fools relies on chain gear to bike over a mountain chain
Chain saw, chain of being, chain of evidence,
A Markov chain, chain stores, chain lightning,
Breaking the chain.

Since the word "chain" seems to be useful to describe so many situations, let us try to point to its characteristics, which might be phrased as:

> A considerable collection of small objects are connected in an orderly fashion to create a large effect.

The connection between the small objects might be spatial (links in a metal chain) or logical (a chain of reasoning) or social (chain of command) or temporal (a chain of events). But this idea of a bigger result arising from the organization of small steps suggests that a chain is the result of *synthesis*, and that anything which can be regarded as a chain is susceptible to understanding by *analysis*, which amounts to breaking the chain into its separate links, and focusing on the simpler problem of what a link looks like, and how it is connected to others.

7 Evolutionary Studies

In the days before copying machines, making five or ten copies of a chain letter was a tedious operation. The only easily available aid to such work would have been carbon paper. In general, a person making the copies would have to retype the entire text, and would be likely to make a few mistakes in the copying.

Once a mistake has entered the text of a copy of a chain letter, the next person to receive the letter might correct the mistake, if it was an obvious error, or pass it on, perhaps with even a few more errors.

In one way, this process is like the game called "Gossip" or "Telephone", where a group of people sit in a line, and a person at one end whispers a sentence to the next person, who repeats it to the next person and so on. When the last person receives the message and stands up and reports it, it is often mangled beyond all recognition. I remember our third grade teacher had about ten of us do this, and the best we could do was to turn "Noel's coming around" to "No elves are coming to town."

Luckily, chain letters aren't transmitted by whispers, or the original version would be beyond recall. And now that copy machines are available, and electronic mail can be used, the number of copying mistakes has presumably greatly decreased.

However, enough errors have been introduced into the chain letter "gene pool" that we can try to classify the errors, and to draw a "family tree" of any

group of chain letters. In a later section of this paper, I print several copies of the "Good Luck" letter, to allow such studies to start.

8 Biological implications

Is a chain letter alive? Surely this is a silly question! When I was a child, I would have laughed, and said "Of course not! Where is the letter's heart, how does it think, what does it eat?" But the philosophy of biology has changed since I was a child. Some think of a living organism as anything which reproduces itself; in this way, the "genetic" information becomes most important, and an organism is reduced to a simple mechanism for transmitting that information into the future.

If you take such a view of life, it isn't too hard to imagine a simple chain letter as a living creature. If you really find yourself struggling to take this point of view, you might try thinking about viruses. Viruses inhabit a peculiar halfway zone between the biological and the "merely" chemical. And yet they know how to play our game when they need to! They pop up out of nowhere, invade a cell, and force it to make copies of them, which then take off, spreading to other cells. Does seem a little analogous, doesn't it?

Since reproduction is pretty much the only biological function that the chain letter can be considered to carry out, let us put on our wading boots and go out to where the wild chain letter nests, and find out what we can about this peculiar bird!

The chain letter reproduces asexually. After all, the odds are pretty slim that someone would get two chain letters on the same day, and somehow merging them. If you like to daydream, though, you might imagine chain letters mating this way, with the recipient randomly taking a sentence from one or the other to build an "offspring".

After reproducing, the chain letter, like a salmon, dies. Unless someone is really cheap, and makes 19 copies and then mails out the original!

Some chain letters have children, and some are barren. Chain letters that are received by a cooperative person reproduce twenty-fold. But I assume this is the exceptional case, and that most chain letters are simply tossed away. We can treat such chain letters as being "infertile". This infertility is the main control on the otherwise disastrous fecundity of chain letters.

The chain letter reproduces exponentially. That is, if we suppose that everyone follows the rules exactly, and for convenience assume that it takes a week for the copies to be made and received by the next person, then every week the number of chain letters added to the total increases by a factor of 20.

Clearly, such a rate of growth is not sustainable. But what we may not realize is that all a chain letter has to do is "linger" on. There have to be enough copies in circulation that, on average, the new copies replace the old ones that die out each week. So what advantage is the exponential growth rate?

I would argue that the main advantage occurred when the chain letter was first sent. Most chain letters probably die out in the very early stages, before they reach a "critical mass" that allows them to sustain a reproductive existence indefinitely. By reproducing 20 at a time, a chain letter can take advantage of a lucky string of cooperaters to quickly ramp up from a few copies to the critical number. The actual effect of varying the reproductive rate and the prevalence of cooperators remains to be looked at in the *Mathematical Implications* section.

The chain letter has a few natural enemies that actively seek it out and destroy it. We aren't talking about the "non-cooperators" who refuse to reproduce the letter. Instead, we are talking about postal inspectors, FBI agents, and network administrators.

The chain letter reproduces with a mild mutation rate. Back in the old days when a chain letter really had to be retyped, this rate was much higher. Now copiers and faxes and EMAIL have brought it down greatly, but none of these methods are quite perfect. So over time, we expect a certain amount of "genetic drift", meaning that in one year, for instance, a chain letter might have lost a sentence, or had a proper name misspelled, but in ten years we might expect the chain letter to have "grown" a new paragraph inserted for unknown reasons by a copier.

As copies of the same chain letter evolve, they will be subject to a form of competition for survival. All we have to assert here is that some chain letters make a better case to be copied. Some appeal to fear, some to greed or sympathy. Some are well written, some are mysterious. But if we have a sufficiently varied population of chain letters, then we expect that, over time, some chain letters will begin to predominate, presumably because they did a better job of convincing people to copy them. (Of course, you could always argue that the most effective mutation would be to have the words "make twenty copies" mutate into "make fifty copies"!)

In this struggle for survival, we might be especially interested to observe whether benign or malignant letters would do best. In our current world, we've seen a mix of these approaches. The "Good Luck" letter promises good or bad, depending on how it is treated. We might rename this letter the "Tit for Tat", therefore. The "Dave Rhodes" letter promises a simple reward, even though it demands a small payment.

At one time it was possible to believe in the "spontaneous generation" of certain creatures. Inobservant biologists explained the rotting of meat by claiming that maggots would simply appear in dead meat, without any intervention by a parent fly. While this theory is long discredited when applied to biology, chain letters themselves certainly seem to appear this way, out of nowhere. It is reasonable to believe that, for instance, there was no Craig Shergold chain letter until Craig Shergold's mother issued her appeal for get-well cards. Even then, she didn't explicitly call forth chain letters; no, but somehow, something brought them forth, sometime after 1989, and we surely can't explain them as mutants or products of some other chain letter!

Another biological concept mirrored by chain letters is the "Cambrian explosion". Supposedly, if you read the fossil record from the first records of life, there is a stretch of hundreds of millions of years where nothing interesting was produced but blue-green algae and extremely simple life forms. Suddenly, in the Cambrian period, there was a fantastic increase in the numbers and kinds of living creatures, as though some creative force had been suddenly released. Then came a great dying off, as the world settled down, to a far smaller, but sustainable set of creatures. Perhaps it is surprising, but many communities have historically gone through a similar sort of explosion and dying off of chain letters. For instance, Andrew Tobias describes a chain letter craze, which was started in Springfield, Missouri as a joke, and quotes an Associated Press report:

> Chain letter "factories", with $18,000 changing hands at three of them within five hours, turned this southwestern Missouri city into a money-mad maelstrom today. Society women, waitresses, college students, taxi drivers and hundreds of others jammed downtown streets.

By the following evening, though,

> ...sad-faced men and women walked around in a daze...seeking vainly for someone to buy their chain letters...The craze which swept over this city yesterday subsided because almost everybody had a letter to sell, thus draining the buyer market dry.

Of course, this wasn't the end of the chain letter craze. It simply moved on to new cities, such as Omaha, Kansas City, and Los Angeles. And even when the craze had peaked and moved on, a small pool of letters continued to circulate, ready to burst out at any time.

It is said that researchers in the Gulf of Mexico were able to date layers of mud by the transition between layers of bottle caps and pop tops. Perhaps in the future, when our civilization has been buried under the tons of paper it produces and discards each year, the bug eyed investigators who dug us up again will have a solid clue for dating us by studying the variations in the copies of the chain letters that surround us!

9 Chains in Literature

A famous representation of a chain is the play "Reigen", by Arthur Schnitzler. The first scene shows a man and woman going through an elaborate seduction. In the next scene, the same woman meets a different man, with the same result. Next, *that* man has a scene with yet another woman, and so on, until in the tenth scene, the chain actually closes back on itself, with the last woman pairing off with the man from the first scene. One theme of the play is the hypocrasy

of the affirmations of love made so often by the characters, a point that derives its power from the relentless repetitiveness of the chain of the action. One significant difference here is that at each step, the number of people involved in the chain is not growing. While sex has its rewards, the reason chain letters survive has partly to do with the fact that they resist the likelihood of failure (non-transmission) by growing explosively when possible.

A variation on the theme of the chain letter occurred in a story by Robert Louis Stevenson, called "The Bottle Imp". The story goes that Prester John bought a magical bottle from the devil, for unimaginable wealth. The imp in the bottle would satisfy the owner's every wish. But if the owner died in possession of the bottle, he would burn in hell forever.

The only escape from this fate was to sell the bottle to another person, at a *lower* price than had been paid for it. In this way, the bottle passed to Captain Cook, then Napoleon, and later to a man living in San Francisco. Stevenson begins the story as a Hawaiian visitor learns the story of the bottle from the San Franciscan, buys the bottle for $50, gets the house of his dreams by wishing, sells the bottle, and then discovers a spot of leprosy on his skin. Now he has to chase the bottle, which has already wandered through many people. He assumes he will know if he has caught up to the bottle, because that person will be in despair. Sure enough, he meets a man who has bought the bottle for two cents. This, of course, is hardly the end of the story.

What a strange twist on chain letters! Again, we have the theme of an object that promises both good and bad fortune, but now the good fortune lasts while the object is kept, and the bad fortune occurs only if the object is kept too long. We also see an object passed from one person to the next in a great chain, said to have originated far in the past. The fact that the bottle must be sold at a loss means that we could call this story "Lose Money Fast". The power of the story is derived from our growing dread at the dwindling price of the bottle and the unavoidable moment of retribution.

10 Sex Chains

A famous catch phrase of recent years goes something like "Whenever you sleep with someone, you're also sleeping with everyone that person every slept with. And so on." The point, quite deliberately, is to suggest a dizzying and unending succession of people you've never met, and never would want to meet, and from whom you might just have caught something nasty.

In fact, sexually transmitted diseases are a very apt metaphor for chain letters, or vice versa. An ordinary disease can be caught unknowingly, but an STD requires a sexual encounter, and a certain amount of acquiescence. And once the unlucky recipient has been infected, the "copying" of the virus goes on automatically.

Like a chain letter, a sexually transmitted disease links hundreds and thou-

sands of people in a chain of cause and effect; one that frequently crosses itself. As copies of the virus travel along this chain, they naturally mutate in a way that mimics the garbling of the chain letter. In some cases this makes it possible to tell, from a blood sample, who infected whom.

A bizarre sexual practice known as a "daisy chain" supposedly involves a group of people forming a circle and sexually interlocking with each other. We do not propose to pronounce on the likelihood, practicality, or satisfactions of such an act; however interesting such an act may be to contemplate, for the purpose of chain letters it is relatively unenlightening.

11 Mathematical Implications

To a mathematician, a chain letter is a very simple example of geometric growth. If, for instance, each recipient of a chain letter makes 5 copies, and sends them on, then the number of letters in circulation grows as follows:

1, 5, 25, 125, 625, 3125, 15625, 78125, and so on.

Assuming everyone cooperates, and counting steps starting at zero, the number of letters in circulation at step n is 5^n. There is even a formula for the total number of letters mailed through step n:

$\frac{(5^{n+1}-1)}{(5-1)}$

The next thing a mathematician will point out is that any such sequence "blows up" very quickly, reaching millions and billions in just a few steps. A mathematician may take this as sufficient proof that chain letters are a scam: even if we assume everyone cooperates, a chain letter can't continue very long before everyone on the earth will have received a copy. And then who do they send copies to?

Another way of looking at this is to consider the base of the pyramid. Let's say that you have just received a chain letter, and you mail your $5 to the person at the top of the pyramid, putting yourself on the bottom, as the tenth name. That means that, right now, there are 5^{10} or 9,765,625 people sending him money. Now you want to reach the top in just 10 steps. But so do all the other people in your group of 9,765,625. Let's call it 9 million for now! Since each person who reaches the top does so by recruiting 9 million people for the base, it's going to take 81 *trillion* people to get you and all the other people on your level up to the top. We could translate the letter into other languages, mail it to the stars, or hope that some people are so stupid that they will join the chain as many times as they can. Even so, the chances just aren't very good that we're going to see our money. And this is true for the people at the base of the pyramid on the *very first copy of the chain letter!* They will never see any money!

Now it's much more reasonable to assume that most people simply toss the letter into the trash, but some small percentage follow the rules, send the money, mail the copies, and hope. We will look at this case in the section on Computer

Modeling. But we will note right now that this fact has two main effects: the chain can last a very long time, even indefinitely, and the money, if any, that reaches the person at the top tends to be piddling. However, this means that the mathematician's initial assessment of a chain letter as "impossible" is really not very helpful. It's true that chain letters don't work the way they say they do; we know they *can't* work that way. Nonetheless, there's something in a chain letter that doesn't want to die!

12 Computer Modeling

A computer can help us test some simple ideas about chain letters. For instance, chain letters seem to be strangely *stable*. The "Good Luck" letter has been around for decades, so apparently, you could work backwards and find a chain of perhaps several thousand people, each of whom obeyed the instructions and passed the letter on to the next person. This is hard to believe, and at the very least, suggests that there is a fairly large group of "receptive" people.

But there can't be too many receptives, or we'd be swamped with copies of the letters in no time. Why doesn't the chain letter die out, or explosively jam the mail?

Without thinking about it very much, I guessed that the fact that the letter asked for twenty copies to be made meant that the receptive population must be about 5%. To see why, imagine that you are given a handful of dice, and you play the following game. You toss all the dice, and count the number of 6's you roll. Now you figure out how many dice you can throw on your next turn. It's just 6 times the number of 6's you rolled the last time. You keep doing this until you roll no 6's at all, and stop, or perhaps do so well that you win all the dice.

If you start with just one die, or even just a few, it's very likely that you will stop, by rolling no 6's, in just a few throws. But if you have a large enough set of dice to start with, then on average 1/6 of the dice you roll will be 6's, and so the dice you throw away will just be balanced by the dice you add. Such a "balanced" game can last a very long time.

The balance, of course, comes about because each die you roll has a 1/6 chance of being replaced by 6 dice, so you can expect that roughly speaking you will have as many dice on the next roll as on this one.

If chain letters work this way, then we should guess that there is about a 5% receptive audience, so that, on average, the incoming letters are replaced by roughly the same number of outgoing letters; in other words, for every 20 letters that are received, 19 people ignore them, and 1 person makes 20 copies and sends them out.

Let's ask some very simple questions.

- Is it possible for a chain letter to stay in circulation for an extended period of time?

- What happens if we rerun the same problem, but with a smaller or larger percentage of receptives?
- What if we increase or decrease the number of copies requested?
- What if, just at the beginning, we start with lots of copies?
- What if we preserve the relationship between copies and receptives, but look at different pairs, such as 100 copies, and 1%, or 2 copies and 50%.

While the computer isn't going to prove anything for us, it may make us more comfortable with some of the ideas we've had so far. Looking at the first question, let's suppose that the original author of the chain letter has just sent off 20 copies of the chain letter, and that, on average, about 5% of the population chosen at random will obey the request to copy the letter.

Surprisingly, about half the time, the chain dies *immediately*. Nobody passes it on. In almost all the other cases, the letter dies very quickly, in less than 10 steps. However, after trying this experiment 150 times, I saw just two cases that came close to "taking off", one where the chain went for 147 steps, and another of 243 steps.

The results I got were:

When letter died	Cases
Sstep 1	58
Between 2 and 10	67
Between 11 and 100	21
Between 101 and 1000	4
After 1000	0

This is hardly an encouraging result! I realized that the odds weren't very good at all that I would get a chain letter that lasted for 1,000 steps, the point at which I had decided I would declare a chain letter "immortal". Perhaps there was some way of changing the problem slightly, so that it would be more likely that a chain letter could keep going.

The simplest change I could think of was to increase the number of copies made on just the very first step. I imagined this corresponding to the author of the chain letter trying very hard to get it established. So instead of 20 copies, I assumed the author sent out 400, although all the recipients from then on were only asked to make 20 copies, as before.

This makes it likely that about 20 people will accept the request and make copies. Of course it won't be exactly 20, but that's the point. If the number is a little below, say 18 or 15 or even 10, we still have some leeway. For the first experiment, we expected roughly 1 person to accept the request, but anything less was a disaster, killing the chain.

Here's the results with the new rules:

When letter died	Cases
Step 1	0
Between 2 and 10	6
Between 11 and 100	102
Between 101 and 1000	38
After 1000	2
1000 copies	2

All of a sudden, it's very unlikely that a chain letter will die early, not unlikely that it will last into the hundreds of generations, and not impossible for it to get to the thousands. One of the letters that was still going at 1000 had just been copied by 1,687 people!

It looks like, if you give a chain letter a big enough initial "kick", it will keep going for a long time. So the *initial condition* is an important determinant of the expected lifetime of a chain.

What about the receptivity probability? We can make several simple experiments, where we repeat the first two, but use a receptivity of 0.049 and 0.051. That's quite a small change in the probability. Is it likely to have *any* effect on the outcome?

Here's the results if I drop the probability to 0.049:

When letter died	Cases
Step 1	0
Between 2 and 10	3
Between 11 and 100	126
Between 101 and 1000	21
After 1000	0
1000 copies	0

Here's the results if I raise the probability to 0.051:

When letter died	Cases
Step 1	0
Between 2 and 10	5
Between 11 and 100	55
Between 101 and 1000	5
After 1000	0
1000 copies	85

It really looks like we are in an unstable situation here. A probability of 0.049 means most letters die before the 100th step, a probability of 0.050 means just a very few make it to 1000 steps or 1000 copies, and a probability of 0.051 means suddenly that most letters reach 1000 copies. This is reasonable evidence for the hypothesis that, given enough copies to start with, the key to the behavior

of our chain letter is the product of the probability of copying and the number of copies requested.

We won't go into this matter any further in this paper. However, it's clearly easy to generate a few more test cases for this hypothesis.

On the other hand, it's hard to see how a chain letter could work quite the way we have described here. Is it really plausible that the "Good Luck" letter picked 20 copies which just hapens

13 A Simple Computer Program

Here is a rough draft of the computer program used to get the results in the Computer Modeling section. This program doesn't try to look at some of the more interesting aspects of chain letters, such as drawing a "family tree", or computing the money that is mailed to earlier participants.

Input:
  Nzero, the number of people about to send out copies as
    the program begins.
  Ncopy, the number of copies each person is asked to make.
  Prob, the probability a person receiving the letter will
    agree to make copies.
  Nstep, the number of steps to calculate.
Define:
  Nlet, the number of letters in circulation at this time.
  Receptive, the number of people who receive a letter and
    are willing to make copies.
Start:
  Set **Receptive** to **Nzero**.
  Do Loop #1 **Nstep** times:
    Set **Nlet** to **Ncopy***Receptive**
    Set **Receptive** to 0.
    Do Loop #2 **Nlet** times:
      Get a random number, **R**, between 0 and 1.
      If **R** is no greater than **Prob**, then
        increase **Receptive** by 1.
    End Loop 2.
    Print **Nlet** "letters were sent out."
    Print **Receptive** "people were receptive."
  End Loop 1.
Stop.

14 Philosophic Issues

If we try to take the letter seriously, it raises some strange questions of self reference. Take the simple statement *"It has been around the world nine times."* Assuming the letter started its journey at some fixed time, this sentence could not have been in the original. How did it get there? Even if we assumed that recipients are allowed to update the letter, no recipient could know that the letter had been around the world even once, unless we imagine absurd or contrived circumstances.

Perhaps the most amusing way to explain this sentence is to assume that *the letter itself* is talking to us, telling us its history and powers. Another satisfying thing about such an explanation is that then we could expect that the letter would be able to update itself at the appropriate time: *"It has been around the world* **ten** *times."*

The letter must have a consciousness of itself. How else can we explain that it describes the actions of a young woman in California, and what happened to her *after* she sent the letter out?

The letter makes a famous philosophic joke: *"This is true whether or not you are superstitious."* A similar joke, with the same point, was attributed to Niels Bohr, who is supposed to have been asked why he kept a lucky horseshoe in his laboratory.

15 This Is A Joke

Chain letters are so widely known and easily recognized that they have provided humorists with a handy form for phrasing jokes. A "joke" chain letter is really a joke, and not a chain letter. The stern warnings about making the right number of copies and not breaking the chain are not the main point of the joke, but simply set the chain letter scene. Within this scene, some humorous situation or punchline is developed.

The simplest takeoffs involve minor changes to the text of the original letter, or to the general idea.

Some of the takeoffs include:

- *"Make Roubles Fast"* is a version of the Dave Rhodes letter as told by a Russian. The letter begins

  > My name is David Senovich. In August 1989, the kommunist government was overthrown, my Lada was repossessed and the KGB were hounding me like you wouldn't believe...

- *"Make Enemies Fast"* suggests that if the recipient would like to make a lot of enemies, simply pass on this chain letter!

- *"Make Money Fastest"* pokes fun at the Dave Rhodes letter by exaggerating the opening story:

  > Hi! My name is Mark Jason Dominus and in 1934 I was UNEMPLOYED and out on the STREET. I had a bad case of SCURVY and nobody would talk to me because I was constantly FLAKING and SPITTING BLOOD...

  The letter mocks the magic operation of the Dave Rhodes letter by directing the recipient to mail all their valuables to Mr Dominus. In a funny ending, the author warns that *Craig Shergold* broke the chain, and came down with terminal cancer, then found the letter again, followed the instructions and was cured. This last little joke represents a bizarre crossing of three separate chain letters!

- *"Make It Happen Fast* is written by Bill Clinton, and tells about a magical way for success:

  > Twenty years ago, I was a hopeless loser with no money, a disfunctional marriage, and a 1962 car with a big hole in the oil casing...

  If you're interested in success, vote for the person at the top of the list in the next election, and add your name at the end.

- *"Make Money"* suggests that the easiest way to make a dependable living is to go to college. By amassing a Pell grant, a federal loan, and a supplemental loan, you can get $8,000 a year, plus your summer and part-time income. The author points out that he has used this method for six happy years.

- *"Make Money Sucker"* involves an endless chain in a different way. It's a version of the old "cat ranch" story. You are asked to invest in an operation which skins cats, for which there is supposedly a market. What do cats eat? Why, they eat the rats that are being raised on the same ranch. And the rats? They get to eat after the cats are skinned. Eventually, they hope to cross the cats with snakes so they will cast off their skins automatically.

Other takeoffs try to achieve a humorous effect by moving the chain letter idea to a very unusual situation.

- One common letter suggests that you send your wife or husband to the person at the top of the list, in expectation of receiving thousands of women or men in a short time.

- Another letter offers to fertilize your lawn. You have only to defecate on the lawn of the person at the top of the list, add your name to the end, and send on the letter.

The more imaginative parodies do more than simply play with the words of the letter. They really try to make a new point.

- *"Make Tenure Fast"* is a letter to be sent to academics seeking tenure at a university. It promises the recipient tenure, if only they will cite each of the listed people in their own publications, and add their name to the end. Tenure is guaranteed to the recipient because the case for tenure is often decided not just on how many papers one has written, but on how often they have been cited.

16 The MST3K commentaries

One of the most annoying features of the UNIX mail program is its ability to allow a respondent to quote your words back to you, preceded by a right caret sign. While this might have struck some as a good idea, I find that this encourages snotty comments and turns an offhand communication into a document to be annotated beyond recognition. This same feature has been included in the USENET news groups, so that if one person posts a comment to the group, other persons can reply to that comment by annotating the running text. Often, the person being commented upon will, in turn, comment the comments. This sometimes goes to ludicrous degrees. A whole class of postings on **rec.humor** is devoted to so called "cascades" where each person adds a single line to a posting, and reposts it.

An odd parallel to this UNIX running commentary feature occurs at the famous Gizmonics Institute, the setting for *Mystery Science Theater 3000* or **MST3K**. This television show presents bad old movies, with the heads of several audience members visible at the bottom of the screen. Throughout the movie, the audience heckles, mocks, and subverts the movie.

Thus, it is hardly surprising that some Internet users have taken on the role of the MST3K creatures, and produced mock versions of postings which have been snickered at by Tom, Crow and Joel. The Dave Rhodes chain letter has been a target of this sort of dissection at least twice. Perhaps the most extraordinary feature of these two commentaries is their great length. Both versions I have, which are completely different, go to 17 pages.

Here is the beginning of the version attributed to Jeffrey Shaffer:

Dear Friend,

Tom: Anyone's friend in particular? Or just generally well disposed?

My name is Dave Rhodes.

All: Hello Dave.

In September 1988 my car was repossessed

Crow: Sorry Dave.

and the bill collectors were hounding me like you wouldn't believe.

(Crow and Tom make barking noises.)

Joel: Big dogs. Jumping on my head.

I was laid off and my unemployment cheques had run out.

Tom: They made some comment about not spelling something right on the form, I don't know.

Joel: No, I think he's from England.

Crow: Oh? Well lookie what we have here boys! We got ourselves an alien!

The only escape I had

Tom: Was through a small trap door, and into the ventilation system. That night I was to board a boat just off the coast.

from the pressure of failure was my Apple computer and my modem. I longed

Joel: For an IBM?

to turn my advocation into my vocation.

Crow: What? Writing poor fiction? Sorry pal, Wood's dead.

This January 1989

Tom: As opposed to how many other January 1989's?

Joel: January 1989 BC?

Crow: Well, he did mention that he had an Apple computer...

my family and I went on a ten day cruise to the tropics.

Tom: And with some quick action the IRS was able to apprehend them before they arrived at their first port of call.

I bought a Lincoln Town Car for CASH

Joel: What a deal! Some guy named Vinny was in a parking lot selling it for $50!

in February 1989. I am currently building a home on the West Coast of Florida,

Tom: Because the bank foreclosed on my previous home.

with a private pool,

Crow: That's not a pool! That's a puddle in the street out front!

boat slip,

Joel: And that's an old, collapsed dock!

and a beautiful view of the bay

Tom: Out all four sides of the box!

from my breakfast room table and patio. I will never have to work again.

Tom: Because now **I** eat the government cheese!

17 Kill David Rhodes

The Dave Rhodes chain letter epitomizes some of the stranger features of the Internet. The Internet has a very faulty memory. New users log in for the first time each day, stupid users are eager to share their idiocies with everyone, and

irate moralistic sophomores are ready to redirect their own frustrations at any bumbler or annoying person they find.

Thus, every so often, the Dave Rhodes chain letter is reposted to several of the USENET news groups. It's not hard to spot; it's got the subject "MAKE.MONEY.FAST" just like in the directions.

And then the terminally righteous begin pouring out invective at the poster. Frequently, someone who has "just had it" will suggest that everyone send mail to the poster, ironically creating a sort of reverse chain letter.

18 Branches of the Tree of Dave

```
One branch of the mighty tree, on which Hugh MacMullan and Scott
MacFarland seem to be showing up just a bit too often.

(Dave Rhodes)
(Charles Kust)
(Mark Garner)
(Ernest Goyette)
(Darryl McGinnis)

Steve Prester
Nua Nicej
Talib Khan
David Parcel
Von Merritt
Paul Marks
Kevin Quinn
Hongkuan Li
Mary Hu
Elisha Landman     Elisha Landman
Dmitri Linde       Gregor Dodson                                  Dmitri Linde
Claude Suddreth    Paul Rollo                                     Pablo Camarena
Lirong Chen                                                       Sergio Martinez
Angel Negron                                  Angel Negron        Hugh Macmullan
Hugh MacMullan                                Paul Zimmerman      S Andres Camarena
Scott MacFarland   Scott MacFarland           Scott MacFarland    Hanne B Grotkjaer
Brian Gregory      Kevin Trigger              Mike Hissey         Jakob Priess-Sorensen
Philip Bauer       Rich Wood                  Shane Sewell
Anthony Priest     Fong Tsui                  Seungpil Kim
                                              Kara Yarnot
                                              Jay Pardee
```

Yet another twig from Elisha Landman, which suggests that someone is altering the letter and moving their name upwards:

```
Elisha Landman
John Frei
Slaude Suddreth
Lirong Chen
Angel Negron
Paul Zimmerman
Scott MacFarland
David Nilles
W Compitello
```

This next tree seems to be growing in a circle!

```
(Dave Rhodes)
(Charles Kust)
(Mark Garner)
(Steve Prester)
(Nua Nicaj)
(Stephanie Kemach)
(John Gibbs)
(Jurgen Kreisel)
(Sanjay Purswani)

Lombrano Antonio
Kok-Wah Liew
Jason Mathews
Kiel Wilson
Filiberto Farini
Sanna Nivalainen
Stanley Marrder
Joe Wargo
Robert A Decker      Robert A Decker     Robert A Decker
Olivier Hopp         Robert Quijalvo     Lian Fang         Lian Fang
Darren Govoni                            Ty Tran           Rob Nauta
Lombrano Antonio                         Ted DeCastri      Peter Jansen
Kok-Wah Liew                             Victor Wong       Victor Wong
Jason Mathews                            T Qian            T Qian
```

Kiel Wilson
Filiberto Farini
Sanna Nivalainen
Stanley Marrder

Ian Verhaegen
Robert Arles
Indra Gunawan

Robert Arles
Cindy Dewitz
Viggen Galus
Sean Davila
Jeremy Farnh
Stuart Kessl
Adam Sutherl
Ira Cotton

Another branch

(Dave Rhodes)

Hector Diaz
Mark Durante
Fredric Claude
Patrick Toohey
Matt Rings
Michael Miller
Ed Stastny
Manof McBrown
Nick Ali
Rod MacDonald

Another branch

(Dave Rhodes)
(Charles CST)
(Mark Garner)
(Ernest Goyette)
(Darryl McGinnis)
(Steve Prester)

Kalen Schulteis
Anthony Mazzola
Andy Orion Grum
R DeFrancesco
Brent Smith
Andrew Shanahan

Anthony Mazzola
Brian Lipman
Fred Calhoun
Hong Yang
Paul DeFranco

```
Sean Dourlain       Farhan Ahmed
Nathan Heck         Sreekanth Nandagiri
J B Madamba         Eman Isadiar
Tony Couch          Craig Holland
                    Neal Swearer
```

19 A Typical Plea for Craig Shergold

The following note was posted as message 111470 on the USENET bulletin board **rec.humor** on 7 June 1994:

> Dear Friends,
>
> I have received a special request asking for business cards to be sent to Craig Shergold at the address listed below. Craig Shergold is a seven year old child who has a brain tumor. He has little time to live. He submitted a request to the Children's Make a Wish Foundation to have an entry placed in the Guiness Book of World Records for the largest business card collection received by an individual. If you can, please act as quickly as possible. Thank you for caring, and for taking the time to do this.
>
> Craig Shergold
> c/o Make a Wish Foundation
> 3200 Terimetera Center East
> Atlanta, GA 30346

20 The Synoptic Good Luck

I submit the text of several chain letters, line by line, to help with comparison.

```
A:  With love all things are possible.
B:  With love all things are possible.
C:  With love all things are possible.
D:
E:  With Love All Things Are Possible
F:  WITH LOVE ALL THINGS ARE POSSIBLE
G:
```

A: This paper was sent to you for good luck.
B: This paper has been sent to you for good luck.
C: This paper has been sent to you for good luck.
D: This message has been sent to you for good luck.
E: This paper has been sent to you for Luck.
F: This paper has been sent to you for good luck.
G: This message has been sent to you for good luck.

A: The original is in New England.
B: The original is in New Zealand.
C: The original is in New England.
D: The original is in New England.
E: The original is in New England.
F: The original luck was started in New England.
G: The original is in New England.

A: It has been around the world nine times.
B: It has been around the world nine times.
C: It has been around the world nine times.
D: It has been around the world nine times.
E: It has been sent around the world.
F: It had been around the world nine times.
G: It has been sent around the world nine times.

A: The luck has been sent to you.
B: The luck has now been sent to you.
C:
D: The luck has now been sent to you.
E: The Luck has been sent to you.
F: The luck has now been sent to you.
G: The luck has now been sent to you.

A: You will receive good luck in the mail.
B: You will receive good luck within four days of receiving
   this letter provided you, in return send it on.
C: You will receive good luck within the next four days of
   receiving this letter provided, in turn, you send it on.
D: You will receive good luck in the mail. But no money.
E: You will receive good luck within 4 days of receiving
   this letter pending in turn you send it on.
F: You will receive good luck within four days of receiving
   this letter providing you in turn send it on.
G: You will receive good luck within four days of receiving
   this message - Provided you, in turn send it on.

A:
B: This is no joke.
C: This is no joke.
D: Send copies to people you think need good luck.
E: This is no joke.
F: This is not a joke.
G: This is no joke.

A:
B: You will receive good luck in the mail.
C: You will receive good luck in the mail.
D:
E: You will receive good luck in the mail.
F: You will receive good luck in the mail.
G: You will receive good luck in the mail.

A: Send no money as faith as no price.
B: Send no money.
C: Send no money.
D: Don't send money as fate has no price.
E: Send no money.
F: Send no money.
G: But no money.

A:
B: Send copies to people that you think need good luck.
C: Send copies to the people you think need good luck.
D:
E: Send copies to people you think need good luck.
F: Send copies to people you think need good luck.
G: Send copies to people you think need good luck.

A:
B: Don't send money as fate has no price.
C: Do not send money as faith has no price.
D:
E: Do not send money cause faith has no price.
F: Don't send money as fate has no price.
G: Don't send money as fate has no price.

A: Do not keep this letter.
B: Do not keep this letter.
C: Do not keep this letter.

```
D:  Do not keep this message.
E:  Do not keep this letter.
F:  Do not keep this letter.
G:  Do not keep this message.

A:  It must leave your hands within 96 hours.
B:  It must leave your hands within 96 hours.
C:  It must leave you hands within 96 hours.
D:  This message must leave your hands in 96 hours.
E:  It must leave your hands within 96 hrs.
F:  It must leave your hands within 96 hours.
G:  This message must leave your hands in 96 hours.

A:  An R.A.F. officer received $470,000.
B:  An RAF officer received $47,000 while in the Philippines.
C:  An R.A.F officer recieved $470,000.
D:  A United States Air Force Officer received 470,000 Dollars.
E:  An ARP officer...
F:  An R.A.F. officer, ...
G:

A:  Joe Elliot receive $40,000 and lost it because he broke
      the chain.
B:
C:  Joe Elliot received $40,000 and lost it because he broke
      the chain.
D:  Another man received 40,000 Dollars and lost it because he
      broke the chain.
E:  ...Joe Elliot received $40,000,000.
F:  ...Joe Elliot, received $470,000;and then lost it because
      he broke the chain.
G:

A:  While in the Phillipines, George Welch lost his wife 50 days
      after receiving the letter.
B:  Gene Welch lost his wife 51 days after receiving this letter.
C:  While in the Philippines, George Walsh lost his wife six days
      after recieving the letter.
D:  Whereas in the Philippines, Gene Welch lost his wife 51 days
      after receiving the message.
E:  George Welch lost his wife 5 days after this letter.
F:  While in the Philippines, Gene Walsh lost his wife 51 days
      after receiving the letter;
G:
```

A: He had failed to circulate the letter.
B: He had failed to circulate it.
C: He failed to circulate the letter.
D: He failed to circulate the message.
E: He failed to circulate the letter.
F: he failed to circulate this letter.
G:

A: However, before her death, he received $7,775,000.
B: After her death he received $7,775,000 after circulating it.
C: However, before her death, he received $7,775,000.
D: However, before his death, he received 7,555,000 dollars.
E: However before her death he received $7,775,000.
F: However, before her death he received $7,775,000.
G:

A: Please send 20 copies and see what happens in four days.
B: Please send 20 copies and see what happens in four days.
C: Please send twenty copies and see what happens in four days.
D: Please send twenty copies and see what happen in four days.
E: Please send copies and see what happens after 4 days.
F: Please send twenty copies and see what happens to you in
four days.
G: Please send ten copies and see what happen in four days.

A: The chain comes from Venezuela and was written by Saul
Anthony Degrow, a missionary from South America.
B: The chain comes from Venezuela and was written by Soul
Anthony De Group, a missionary from South Africa.
C: The chain comes from Venezula and is written by Saint Anthony
Da Grou, missionary from South America.
D: The chain comes from Venezuela and has written by Saul
De Groda, a Missionary from South America.
E: The chain comes from Venezula and was written by Saul
Anthony Degnas, a missionary from S America.
F: The chain comes from Venezuala and was written by Saul
Anthony DeCamp, a missionary from South Africa.
G: The chain comes from Venezuela and has written by Saul
De Groda, A Missionary from South America.

A: Since this copy must tour the world, you must take twenty
copies and send them to friends and associates.
B: Since the copy must tour the world, you must make 20

```
      copies and send them to friends and associates.
C:  Since this copy must tour the world, you must make twenty
      copies and send them to friends and associates.
D:  Since the copy must tour the world, you must make twenty
      copies and send them to friends and associates.
E:  Since that copy must tour the World.  You must make 20
      copies and send them to friends and associates...
F:  Since the copy must tour the world you must make twenty
      copies and send them to friends and associates.
G:  Since the copy must tour the world, you must make ten
      copies and send them to friends and associates -

A:  After a few days, you will get a surprise.
B:  After a few days you will get a surprise.
C:  After a few days you will get a surprise.
D:  After a few days you will get a surprise.
E:  ...after a few days you will get a surprise.
F:  After a few days you will get a surprise.
G:  After a few days you will get a surprise

A:  This is true, even if you are not superstitious.
B:  This is true even if you are not superstitious.
C:  This is true even if you are not superstitious.
D:  This is true, even if you are not superstitious.
E:  This is love even if you are not superstitious.
F:  This is true.  Even if you are not superstitious,
G:  This is true, even if you are not superstitious.

A:  Do note the following:
B:  Do note the following:
C:  Do note the following:
D:
E:  Do Note the following:
F:  note the following:
G:

A:  Constantince had received the chain in 1933.
B:  Constantine Dine received the chain in 1985.
C:  Constantina Die, received the chain in 1983.
D:  Constantina Dias received this chain in 1958.
E:  Contonare Dias received this letter in 1903.
F:  Constantine Dira received the chain in 1963.
G:
```

A: He asked his secretary to make twenty copies and send them.
B: He asked his secretary to make 20 copies and send them out.
C: He asked his secretary tio make twenty copies and send them.
D: He asked his secretary to make twenty copies and send them
   out.
E: He asked his Sec'y to make copies and send them out.
F: He asked his secretary to make twenty copies and send them out.
G:

A: A few days later he won a lottery of two million dollars.
B: A few days later he won the lottery of over 20 million
   dollars.
C: A few days later he won a lottery of $2,000,000.
D: A few days later he won a lottery of two million dollars.
E: A few days later he won a lottery of 20 million dollars.
F: A few days later he won the lottery of two million dollars.
G:

A: Carlo Daddit, an office employee, received the letter and
   forgot it had to leave his hands in 96 hours.
B: Carlo Daddit, an office employee, received the letter and
   forgot it had to leave his hands within 96 hours.
C: Cario Daddit, an office employee who received this letter,
   forgot it had to leave his hands within 96 hours.
D: Carlos Daddit, an office employee, received the message and
   forgot that it had to leave his hands in 96 hours.
E: Carl Dobbit, an office employee received the letter +
   forgot it had to leave his hands within 96 hrs.
F: Carlo Daddit, an office employee received the letter and
   forgot that it had to leave his hands in 96 hours.
G:

A: He lost his job.
B: He lost his job.
C: He lost his job.
D: He lost his job.
E: He lost his job.
F: He lost his job.
G:

A: Later, after finding the letter again, ...
B: Later he found the letter and mailed 20 copies.
C: Later, after finding the letter again, he mailed
   twenty copies.

D: Later, after finding that message again, he mailed twenty copies.
E: After finding the letter again he made copies and mailed 20 copies.
F: Later finding hte letter again, he mailed twenty copies.
G:

A: ...he got a better job.
B: Within a few days he got a better job.
C: A few days later, he got a better job.
D: A few days later he got a better job.
E: A few days later he got a better job.
F: A few days leater he got a better job.
G:

A: Dalen Fairchild received the letter and not believing, threw the letter away.
B: Dalan Fairchild received the letter and, not believing, he threw the letter away.
C: Dallan Fairchild received the letter and, not believing, threw the letter away.
D: Dalan Fairchild received the message and, not believing, threw the message away.
E: Dolan Fairchild received the letter and not believing he threw it away.
F: David Fairchild received the letter and not believing threw it away.
G:

A: Nine days later, he died.
B: Nine days later he died.
C: Nine days later he died.
D: Nine days later he died.
E: 9 days later he died.
F: Nine days later he died.
G:

A: In 1987, the letter was received by a young lady in California.
B: In 1967 this letter received by a young woman in California ...
C: In 1987, the letter was received by a young woman in California.

D: In 1987, the message received by a young woman
in California,
E: In 1987 the letter was received by a young woman in
Calif.
F: In 1987 the letter received by a young woman
in California ...
G:

A: It was very faded and barely readable.
B: ...was very faded and barely readable.
C: It was very faded and barely readable.
D: it was very faded and barely readable.
E: It was faded and hardly readable.
F: ...was faded and barely readable.
G:

A: She promised herself she would retype the letter
and send it out ...
B: She promised herself that she would retype it
and send it on.
C: She promised herself she would retype the letter
and sent it on, ...
D: She promised herself that she would retype the letter
and sent it on, ...
E: She promised her self she would retype the letter
and send it on...
F: She promised herself she would retype the letter
and send it on, ...
G:

A: ...but she put it aside to do it later.
B: She put it aside to do later and forgot it.
C: ...but she put it aside to do later.
D: ...but she set it aside to do it later.
E: ...but, she put it aside to do later.
F: ...but she put it aside to do later.
G:

A: She was plagued by various problems, including expensive
car repairs.
B: She was plagued with various problems including expensive
car repairs.
C: She was plagued with various problems including expensive
car repair.

D: She was plagued with various problems, including expensive
car repairs.
E: She was plagued with various problems, including expensive
car problems.
F: She was plagued with various problems including expensive
car repairs.
G:

A: The letter did not leave her hands in 96 hours.
B: The letter did not leave her hands within 96 hours.
C: The letter did not leave her hands in 96 hours.
D: The letter did not leave her hands within 96 hours.
E: This letter did not leave her hands in 96 hrs.
F: The letter did not leave her hands in 96 hours.
G:

A: She finally retyped the letter as promised and got a
new car.
B: She finally typed the letter and within days she won a brand
new car.
C: She finally typed the letter as promised and got a
new car.
D: She finally typed the letter as promised and got a
new car.
E: She finally typed the letter as promised and got a
new car.
F: She finally typed the letter as promised and got a
new car.
G:

A: Remember, send no money.
B: Remember, send no money...
C: Remember, send no money.
D: Good Luck but please remember: 10 copies of this message must
leave your hands in 96 hours.
E: Remember send no money.
F: Remember, send no money...
G: Good Luck but please remember: 10 copies of this message must
leave your hands in 96 hours...

A:
B: ...and do not sign this.
C:
D: You must not sign on this message.

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E:
F:
G:  You must not sign on this message...

A:  Do not ignore it.
B:
C:  Do not ignore this.
D:
E:  Do not ignor this ...
F:  ...and do not ignore this letter.
G:

A:  It works.
B:  It works.
C:  It works.
D:
E:  ... - it works.
F:
G:

A:
B:  St. Jude.
C:  St. Jude
D:
E:  St. Jude.
F:
G:

A:
B:  Help me to remember Lord that nothing is going to happen
      to me today that you and I cannot handle.
C:
D:
E:
F:  EXPECT A MIRACLE  GOD BLESS YOU  ST. JUDE WORKS
G:
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21 Related Get-Rich Quick Schemes

Many chain letters require their recipients to send money to an earlier recipient, and promise, in turn, a much greater amount of money in due time. The 1935 Denver chain letters asked for a dime, and promised $1,562.50, while the 1989

Dave Rhodes letter asks for $5 and promises $50,000 or more, meaning the cost has multiplied fifty-fold, and the payoff roughly thirty-fold, which certainly beats the rate of inflation!

While chain letters don't have to be money making schemes, that's surely a strong element of their background. Interestingly enough, a number of other such schemes share some features with chain letters.

For instance, in the seventies, there was a ludicrous craze going around called an "Airplane Party". You might be invited to attend such a party, and hear testimonials from people about how the airplane has made them rich. One person would be identified as the captain. There were also two co-pilots, four flight attendants. There was room for eight passengers, but these slots weren't taken yet, and the plane wouldn't "take off" until eight people in the party volunteered to take the flight.

If you were tempted to take a seat, you would be informed that you would have to pay $100. This money went straight to the pilot, who promptly retired. Everyone else on the plane was now promoted one level, meaning that there were now two planes, needing 16 new passengers. Depending on the size of the crowd and the duration of the party, perhaps another plane would take off that night, or both. More typically, the participants would disband, agreeing to meet again in a week, at which time the new flight attendants were urged to bring several potential passengers so that everyone could move up. It's amusing to wonder if the party actually involved, say, setting up chairs to make a mock airplane. And I imagine many observers were mightily pressured by people already on the plane to "come on board so we can take off!" On the other hand, an airplane party seems to be an awful lot of work, with a pretty small profit, and a waiting period that might last a couple weeks.

Another kind of chain is associated with a financial fraud dreamed up by Charles Ponzi, so brilliant that all such schemes are known by his name. He started off by claiming to have discovered a reliable source of money, total legal by international agreement, so that he only needed money from willing investors to make a guaranteed profit. The ridiculous story involved postal reply coupons, guaranteed by the International Postal Union, which allowed someone to mail a letter that enclosed an envelope with the postage necessary to pay for a reply, no matter what country the letter was sent to. Ponzi claimed to have discovered that, because of discrepancies in postal rates, it was possible to buy such coupons in one country and sell them in another and make a significant profit. This explanation was sufficient to convince investors, even though the total profit that could practically be raised in this manner was negligible.

But the secret was that the first investors in Ponzi's scheme were few, and cautious. He was able to pay them their "guaranteed profit" as promised and on time, after an agreed interval. Some reasoned that having doubled their money, they should immediately pass it all back to Ponzi for another increase; at the same time, other investors, hearing that the improbable scheme seemed to have paid off, began to insist that Ponzi take their money as well. And

for a while, Ponzi took in an ever-increasing amount of investor money, while dutifully paying the promised returns that came due. However, one day Ponzi disappeared with whatever cash he could take and it was revealed that his scheme had never actually made any profit for the investors - he had simply been paying the few old investors with some of the new money that came in. Aside from Ponzi's thievery, the scheme worked very much like a chain letter, so that the people at the initial links of the chain made money, but only because the people below them sent it on; when the chain was stopped, the people on the lowest levels had enriched the upper levels, and were left with nothing.

Similar dubious propositions thrive as "multilevel marketing" or MLM, and include the well-known Amway, as well as groups called "Circle of Gold" and "NuSkin". These companies get their respectability from the fact that they actually have a line of products to sell, such as household goods or cosmetics. The chain-letter feature comes from the fact that the company is composed of agents, each of whom both sells products, and attempts to recruit sub-agents. A sub-agent is required to pass a percentage of his earnings back to the agent who recruited him; a sub-agent is motivated both to sell as much product as possible, but also to recruit sub-sub-agents from whom he will in turn receive a percentage (while a percentage of this percentage will also pass further up the chain to the parent agent.) Depending on the percentages of kick-back (or perhaps "kick-up" is a better term), such a company can be legitimate or a true scam; but it should be obvious that, like all chain schemes in a finite population, eventually, there must come a time where no more recruits can be found.

22 More Chains

It is likely that the observer will be able to spot chains of one sort or another as long as chaos does not rule the universe! It seems that the world is richly blessed with instances of chains of one kind or another.

In the 1980's, Faberge Organics shampoo presented a television commercial whose text ran:

> If you tell two friends about Faberge Organics shampoo with wheat germ oil and honey, then they'll tell two friends, and so on and so on and so on."

The screen began with the image of a single woman (Heather Locklear) with gorgeous hair, but then split to show the same image twice, then four times, then (incorrectly) 16 times, as the words "and so on and so on" echoed.

This advertisement suggests in a way the process by which a rumor, if sufficiently interesting or compelling, can spread exponentially through a population.

A disease is not a rumor, but, given a population in which each person has but a few acquaintances, it is still possible for a disease to spread at an explosive rate, starting with a single infected person, and exhibiting a chain-like pattern

of transmission. In fact, in some cases, in which the virus or bacterium carrying the disease gradually evolves, these changes can be recorded, and used to walk backwards along the chain of transmission towards the originating patient.

In the snowy lands of North America, the winter is a time when schoolchildren pray for the cancellation of classes. The decision to cancel classes is often made by the school officials, early in the morning, and it is necessary to alert families quickly. For this purpose, so called "telephone trees" have been set up, in which the school calls a single person, who then calls two (or more people), who in turn pass the message along a predetermined list of recipients so that everyone is quickly notified.

Apostolic succession is a doctrine of Christianity that suggests that the original 12 apostles (after swapping out Judas for a backup!) were particularly blessed by Jesus Christ by a ceremony known as the laying on of hands. This ritual is repeated when a bishop ordains a new priest, and it is a cherished claim of various Christian churches that this apostolic succession links them in an unbroken chain back to Jesus.

As a somewhat macabre and fantastic example, let us suppose what would happen if umbilical cords were unbreakable. To keep this thought from becoming maudling, let's also suppose that no one who is born ever dies. In that case, we may imagine that the entire human population, assembled on a somewhat roomier stage than earth, would consist of just two objects, namely: Adam, all by himself, and Eve, emitting a cluster of umbilical cords that terminate at her sons, but continue at her (unrecorded but necessary) daughters. Every male descendant of Eve is what in computer science would be called a "terminal node", while every daughter with children is connected by one umbilical cord to her mother, and by one or more umbilical cords to her children. Note that there is a kind of mitochondrial DNA that is passed down to children exclusively from the mother, unlike the genetic DNA that is a scrambled present from both father and mother, and that this acts as a sort of implicit marker of the maternal family tree in a way that this ghastly umbilical cord image suggests physically.

Paul Dukas's symphonic poem called "The Sorcerer's Apprentice"[1897] was based on a ballad by Goethe, "Der Zauberlehrling"; its music appeared in Walt Disney's movie "Fantasia", accompanying a cartoon in which Mickey Mouse acted out the story of the apprentice who tries out the magical spells he watched his master employ. He is able to bring a broom to life, and have it carry buckets of water from the well. When he finds he can't stop it from bringing more and more water, he splits it with an axe, only to see that he has now to face two animated brooms, both eager to bring even more water. In Goethe's poem, the trouble proceeds no further, and the sorcerer returns to set things right. In Disney's "Fantasia", however, the splitting process is repeated, so that the landscape is quickly crawling with an army of brooms bringing a deluge of water before help arrives.

There is a famous collection of stories describing the twelve labors (dodekathlon = dodek + athlon = 12 labors) of Heracles/Hercules, a series of

challenges, some difficult, some seemingly impossible, that he was required to carry out as penance for having killed his wife and children during a fit of madness. One of these challenges was to kill the Lernaean Hydra. He wielded a sickle to cut its head off, but two grew back. Each swipe of his sickle only made the problem worse, and he seemed to face defeat. Instead, he enlisted the help of his nephew, who used a burning torch to cauterize each new wound after Hercules cut off a head. And because of the way magic works, this was enough to keep the Hydra's heads from growing back.

This bizarre doubling story was striking enough that it resulting in the naming of a real biological creature, now known as the Hydra. It does not seem to age at all and it does not die naturally. But what most surprised the biologist who studied it closely was that if you cut a hydra in half, you got two viable hydras, whose wounds quickly healed, eventually forming two copies of the original creature. You can take it from there.

Both an avalanche and a nuclear chain reaction can be regarded as examples in which a tiny first cause creates an enormous final effect by a chain of steps in which more and more objects become activated. Occasionally, the dynamics of a nuclear chain reaction are suggested by imagining a room filled with mousetraps with a hair-trigger action. Instead of a piece of cheese, each mouse trap has a ping-pong ball resting on it. The room can remain quiet and inactive, but it is obviously unstable - any tiny disturbance is going to cause big trouble. Because we can see the structure of the objects in the room, we know how this trouble will evolve: first one mousetrap will go off, flinging a ping-pong ball into the air, which will bounce around several times, each time probably exciting another mousetrap. In seconds, the whole ping-pong-atorium will have been unleashed. If it is reasonable to think of a mountain snowbank in terms of the individual snowflakes, we might suppose that an avalanche can be triggered by a tiny disturbance that displaces a few snowflakes, which each disturb several more, in a chain of increasing magnitude.

In some of the examples we have discussed here, we might suppose that, given the final effect, it is possible to travel backwards and infer, one at a time, the entire chain of steps back to some tiny initiating event. A much discussed result commonly called "the butterfly effect" asserts that, for many physical processes, in which the steps are presumed to be instaneous, or more precisely, continuous functions of time, traveling the chain backwards is essentially impossible.

23 Practical Implications

Would it pay to put your name first? Or early? Or replace all the names?

Model a chain letter with p percent chance of reproduction.

The chain letter reproduces exponentially. That is, if we suppose that everyone follows the rules exactly, and for convenience assume that it takes a week for the copies to be made and received by the next person, then every week

the number of chain letters added to the total increases by a factor of 20. This would mean that if someone received a single chain letter in the first week, then at the end of a year there would be 20 to the 52 power chain letters arriving in the mail. This is an absurdly enormous number. That many chain letters would weigh more than the entire earth, for instance.

I think it is reasonable to assume that a person either ignores a chain letter completely, or follows its rules, making twenty copies (in the case of the "Good Luck" letter) and passing them on. We might assume that the interval from when one recipient gets the letter until the next one does is at most a week. In that case, the chain letter has reproduced more than 1,000 times in 20 years.

Thus, if you hold a chain letter in your hand, its family tree is enormous. Your chain letter had 19 siblings. Its parent had 19 siblings, and so on backwards to the very first copy of the letter. I know for a fact that I got this chain letter 20 years ago. And that means that if we trace back the direct line from a chain letter today to 20 years ago, and count only the "immediate siblings", we are talking about 20,000 copies.

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