

The 'St Jude' mind virus

STR — We have previously suggested the existence of human information parasites, or, in their simple form, "viruses of the mind"¹⁻³. The St Jude chain letter (reproduced, right) provides an example. It is simple, direct and, by its apparent longevity, very fit. Anecdotal data⁴⁻¹² confirm its virulence and suggest that it is one of a class of postal parasites.

A virus is a piece of code that promotes its own replication. Viruses are parasitic in that the energy and other costs of duplication are borne by the hosts and not by the virus. Conventional viruses propagate DNA or RNA information, through cellular machinery that is already set up to obey their language. Computer viruses succeed because computers are set up slavishly to obey the programming languages in which their 'duplicate me' instructions are written. 'Viruses of the mind' or 'memes'¹⁻³ would also succeed in getting themselves duplicated if human minds were set up to obey them. A piece of paper bearing the words 'Make 10 copies of me and send them to 10 people' would spread its message like a brushfire, if only brains obeyed instructions as slavishly as computers. There seems no obvious reason, however, why people should be so mindlessly obliging.

The phenomenon of the chain letter is a sobering case. (The name is not apt because a chain is normally a linear array of links; the 'chain' letter, on the other hand, forms an exponentially branching tree.) A particularly stark example, the St Jude letter, was received recently by Alison Clarkson, who showed it to her husband (O.R.G.). O.R.G. promptly sent it to R.D. The analogy to biological viruses is clear. St Jude infects potential hosts through the vector of the post. By inducing guilt, fear, greed and piety, it causes susceptible hosts to multiply it 20-fold and transmit the 20 copies to new potential hosts through the postal vector. Each new host then potentially initiates the production of another 20 copies. Whether or not any particular infection is successful, St Jude's hosts can suffer mental distress, as real, in its own way, as the physical distress caused by the common cold virus.

There is anecdotal evidence for the longevity and distribution of the St Jude strain of postal virus. By its own account, which must be viewed with some scepticism, the St Jude strain was in circulation as early as 1903. Paul M. Griffo, national spokesman for the US Postal Inspection Service (USPIS), said in a recent interview: "Ah, the St Jude letter. Nine is a low estimate of how many times that thing has been around the world. It's as old as dirt."⁴ Griffo confirms (personal communication) that it goes back farther than the institutional memory of the US postal

service, and has periodic outbreaks. He reports that the St Jude virus has had various incarnations — for example the "A.R.P." officer in the text of the letter (right) is, in some other versions, referred to as an RAF officer. The present outbreak (which we refer to as St Jude 1) has included members of the news media among its sufferers, with the result that the recent appearance of St Jude 1 or a near variant can be documented or inferred in locations as far apart as Seattle⁴, England⁵ and Dallas⁶.

Many potential hosts must be immune. If all hosts were susceptible to each infection, each successive generation of St Jude 1 would grow by a power of 20. By the end of eight generations, there would be a total of 20⁸ or 2.56 × 10¹⁰ copies in the post. At this rate, every one in the world, on average, would receive approximately 4.5 copies. The fact that this has not occurred is negative evidence of immunity. Previous infection with any kind of chain letter is likely to raise resistance. Furthermore, St Jude 1 is perhaps counterproductive in specifying 20 copies. Many would-be obeyers might be put off by the labour of making and sending as many as 20 copies. Twofold duplication might, paradoxically, show more effective penetration.

We turned out to be immune, although we both admit to experiencing waves of mild, irrational anxiety on deciding not to comply, and we could be said to seek a modicum of good luck by sharing it, on a purely scientific basis, through the medium of this journal. Indeed, this report constitutes a form of meme therapy, for we have attached our own information package to a mind virus of proven virulence.

Other strains of postal virus use slightly different manipulative techniques to engineer their propagation. Some promise money to their hosts⁴. Examples of this have recently appeared on the Internet⁷. Other chain letters currently circulating involve the exchange of women's

With Love All Things are Possible.

This paper has been sent to you for Luck. The original is in New England. It has been sent around the world. The Luck has been sent to you. You will receive good luck within 4 days of receiving this letter pending in turn you send it on. This is no joke. You will receive good luck in the mail. Send no money. Send copies to people you think need good luck. Do not send money cause faith has no price. Do not keep this letter. It must leave your hands within 96 hrs. An A.R.P. officer Joe Elliot received \$40,000,000. George Welch lost his wife 5 days after this letter. He failed to circulate the letter. However before her death he received \$7,775,000. Please send copies and see what happens after 4 days. The chain comes from Venezuela and was written by Saul Anthony Degnas, a missionary from S.America. Since that copy must tour the World. You must make 20 copies and send them to friends and associates after a few days you will get a surprise. This is love even if you are not superstitious. Do Note the following: Contonare Dias received this letter in 1903. He asked his Sec'y. to make copies and send them out. A few days later he won a lottery of 20 million dollars. Carl Dobbitt, an office employee received the letter + forgot it had to leave his hands within 96 hrs. He lost his job. After finding the letter again he made copies and mailed 20 copies. A few days later he got a better job. Dolan Fairchild received the letter and not believing he threw it away. 9 days later he died. In 1987 the letter was received by a young woman in Calif. It was faded and hardly readable. She promised her self she would retype the letter and send it on but, she put it aside to do later. She was plagued with various problems, including expensive car problems. This letter did not leave her hands in 96 hrs. She finally typed the letter as promised and got a new car. Remember send no money. Do not ignor this — it works.

St. Jude

St Jude's letter (above). Small gaps left by repeated photocopying of the hand-written original have been interpolated; otherwise, the text is a verbatim transcription.

underwear^{5,8}, postcards of "naked Asian Girls"⁹, and protests on the disappearance of a young woman¹⁰. It has been reported that one particularly virulent chain, which originally requested get-well wishes and/or business cards for a young cancer patient in the UK named Craig Shergold, has produced more than 70 million responses¹¹. Despite published pleas to stop, "mountains of unwanted business cards" keep arriving daily¹². The Craig Shergold letter has been documented in Hong Kong, where the governor, Chris Patten, is reported to have participated⁹.

St Jude 1 provides confirmation for the existence of human mind viruses. It is, of course, still a leap to a more general theory of more complicated mental parasites and symbionts. It can be argued that crude viruses like St Jude are simply doing on a small, crude, but robust level what culture systems are doing more pervasively and with greater complexity. Whether

1. Dawkins, R. in *Dennett and his Critics* (ed. Dalhomb, B.) 13-27 (Blackwell, Oxford, 1993).
2. Goodenough, O. in *Proceedings of the London School of Economics Conference on Evolution and the Human Sciences*, 12 (LSE, London, 1993).
3. Dawkins, R. *The Selfish Gene* (Oxford Univ. Press, Oxford, 1976).
4. Foster, D. *Los Angeles Times Metro*, Part B, p. 6. (13 February 1994).
5. Bresler, F. *The Daily Telegraph*, p. 6 (26 March 1994).
6. Powell, L. *The Dallas Morning News*, p. 18A (29 March 1994).
7. Burgess, J. *The Washington Post*, Financial, p. F19 (28 February 1994).
8. *Press Association News File*, Home News (6 March 1994).
9. *South China Post*, Business, p. 16 (14 February 1994).
10. Adcock, S. *Newsday*, News, p. 4 (10 March 1994).
11. Downey, M. & Shurling, B. *The Atlanta Constitution*, Section E., p. 2 (28 February 1994).
12. Winter, C. *Chicago Tribune*, Metro Northwest, p. 1 (20 April 1994).

or not this leap is justified, the identification of St Jude 1 helps to move the debate about viruses of the mind from the abstract to the concrete and may lead to the identification of other examples.

We have no intention of launching experimental chain letters into the general population for the purpose of testing hypotheses of quantitative epidemiology, for measuring mutation rates, or for assessing the limits of human gullibility.

Oliver R. Goodenough

Vermont Law School,
South Royalton,
Vermont 05068, USA

Richard Dawkins

Department of Zoology,
University of Oxford, South Parks Road,
Oxford OX1 3PS, UK

Pulsed dynamics of fountains

SIR — The fascination with ornamentation fountains probably goes back to the *quattrocento* of Francesco di Giorgio and later Leonardo da Vinci^{1,2}. The unsteady character of a fountain's flow can reinforce its attraction, and several designs have exploited the intermittency of the flow — for example the so-called Hero fountains³ such as the *Fontana a tempo* of

di Giorgio², or spontaneously fluttering water sheets^{4,5}. Here I show that a vertical water jet undergoes self-sustained pulsations in height, associated with the gravity-induced backflow of the jet on itself.

Consider the first fluid element to emerge from a vertical fountain. The maximum height that it can reach (assuming no frictional losses with the surrounding air) is given by $h = u_0^2/2g$, where u_0 denotes the velocity with which the fluid emerges and g is the acceleration due to gravity. Having reached the maximum height, the fluid element will start to fall, accelerating downwards under the influence of gravity. This gives rise to a backflow in the jet, which initially takes the form of a stationary 'cap' — a fluid packet perched on top of the jet and fed with liquid from below. It then falls under its own weight, flattening out the ascending column of the fluid while deforming under the inertial pressure of the jet. The cap eventually breaks up into a dispersed corolla, the jet re-emerges and a new cycle begins. The overall effect is a pulsating motion of the jet (Fig. 1), which is apparent not only to the eye but also to the ear (the break-up of the corolla is accompanied by a characteristic dripping sound). It can be easily shown that the pressure at the orifice of the jet is related to its instantaneous height. The (mean sub-

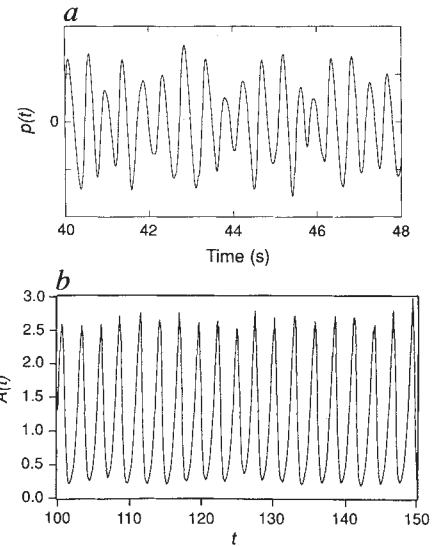


FIG. 2 *a*, Fluctuation of the pressure at the nozzle of the fountain shown in Fig. 1. *b*, Solution for the amplitude $A(t)$ of the nonlinear delayed model equation with $r = 2$, $\tau = 0.6$, $\mu = 1$. The delay has been allowed to fluctuate at each time step: $\tau(t) = \tau + \delta\tau(t)$. The fluctuating part of the delay $\delta\tau(t)$ is distributed according to a uniform probability density function whose width is such that $|\delta\tau|/\tau = 1/2$.

tracted) temporal variation of this pressure displays a dominant period (Fig. 2*a*). For fountains with moderate aspect ratios (height/diameter, $h/d \leq 50$), this oscillatory behaviour develops before the onset of the Rayleigh capillary break-up instability, which would otherwise cause the liquid column to fragment.

The role of gravity-induced backflow in this oscillatory behaviour is readily demonstrated. If a flat, horizontal object is used to obstruct the top of the liquid column, the fluid spreads outwards towards the edges of the obstruction, before falling as droplets away from the main jet (Fig. 1). The backflow is thus removed and the oscillations disappear. Similarly, if the fountain is oriented slightly away from the vertical, backflow is no longer possible and the jet describes a parabola with a fixed maximum elevation.

It has been argued^{6,7} that for unsteady recirculating flows the existence of oscillations derives from the interplay between linear growth and delayed nonlinear saturation^{6,7}. This mechanism can be represented as an evolution equation for the amplitude $A(t)$ of the disturbances in the flow, equivalent to the fluctuating height of the fountain:

$$\frac{d}{dt} A(t) = rA(t) - \mu|A(t - \tau)|^2 A(t)$$

where τ is the transit time through the recirculation loop. This time-lag represents the interaction time of a fluid packet initially topping the fountain during its deformation until its break-up in dispersed droplets. It is of the order of the time for the packet to fall by a distance of

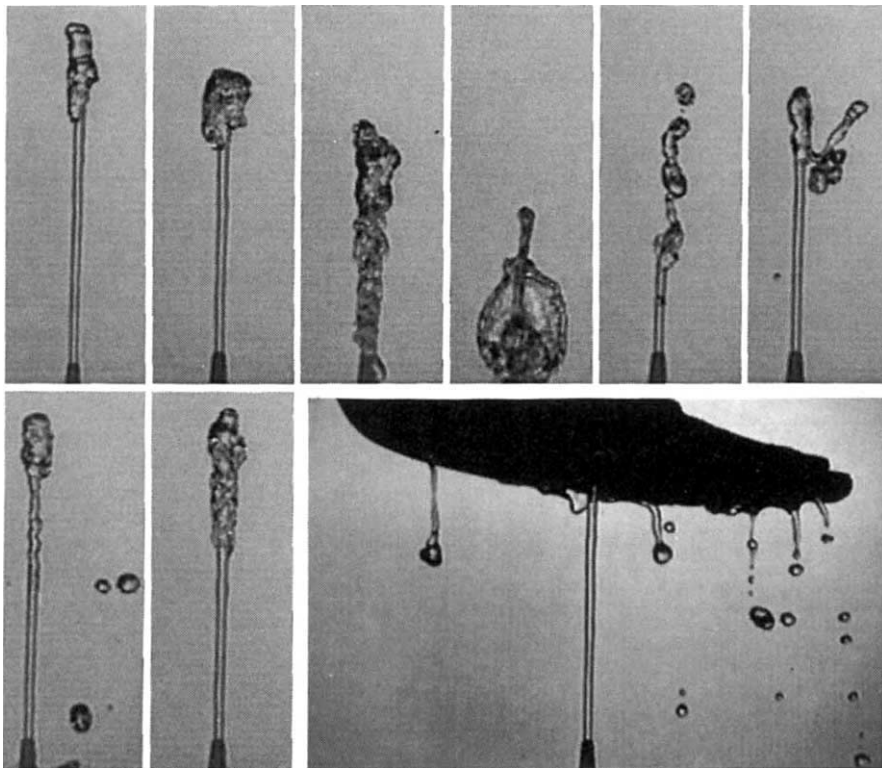


FIG. 1 From left to right and from top to bottom: a period of the pulsation of a vertical fountain. $d = 3$ mm, $u_0 = 1.5$ m s⁻¹. The pictures are spaced by 2/25 seconds and the oscillation frequency is about 2 Hz. Note the corolla break-up of the gravity-induced backflow. The Weber number $We = (\rho u_0^2 d)/\sigma$ is 96, the Froude number $Fr = u_0^2/(gd)$ is 76 and the Bond number $Bo = (\rho g d^2)/\sigma$ is 1.26. Bottom right: Suppression of the oscillations by deflection of the gravitational backflow.