

## Curing Spam: Rights, Signals & Screens

*Forthcoming in the Economists' Voice*

Marshall Van Alstyne, *Visiting Professor, MIT Sloan School of Management*

### Introduction

Not all email is created equal. Is there a way to separate unsolicited but valuable communication from the nuisance of worthless spam? The right answer would solve a \$50 billion problem [4], but the two most common approaches – technology and law – have had little effect [5, 7, 11]. Of technology: Until computers comprehend language and metaphor, the arms race in filter patching versus filter penetration is not winnable; spammers simply convert their messages to new formats only humans recognize. Of law: criminalization requires a clear definition of the crime and an ability to catch the criminal. Neither is possible with spam. Laws lose efficacy on an anonymous borderless Internet. Taxes curb waste as well as welcome messages [12]. Even if it were possible to ban or tax specific content, recipients themselves do not agree on what constitutes “spam.” [7]. Different people have different views on advertising, friends, and family, as well as on religion, politics, pornography, and philanthropy.

### Seeing Spam as an Economic Problem

Solution prospects improve if we focus on spam’s economic properties. Spam is information pollution [6]: it represents the waste product of senders trying to reach those few recipients who actually want what they’re offering.

Ironically, although spam produces a glut of unwanted information, it is caused by an absence of information about senders and recipients. Without prior contact, recipients cannot judge sender quality, and senders do not know recipient tastes. This incomplete information encourages mass mailing because mistargeting has almost no cost.

A solution for spam then must address two related problems: that (1) spam is information pollution (2) resulting from incomplete information.

The first insight provides considerable leverage because we already have pollution control mechanisms: technological, regulatory, and market-based. Experience tells us that pollution control works best when applied to the lowest cost point of intervention. For smokestack exhaust or pipeline effluent, this means placing filters at the source. In contrast, technological spam controls are backwards. If a handful of spammers can create a \$50 billion problem for everyone else, it is because current interventions place filters at the high-cost destination. Each recipient needs the equivalent of a water filter and gas mask to drink and breathe. We know this is wrong, and have known it for nearly half a century.

### Attention Rights

Ronald Coase’s work examining market failures [2] points to a solution. We should allocate property rights to either senders or recipients in the best way that encourages trade. Who should have such a right? And, how might it work?

The answer for spam is to grant recipients a right to allocate their own valuable time, without interruption. A need to respect this right can force senders to decide whether their

messages merit intruding, as distinct from the free-to-pollute case that forces recipients to decide what merits discarding. Senders have content knowledge that recipients cannot know beforehand. As the filtered drinking water analogy suggests, let senders choose what to send, and stop forcing recipients to choose what to clean up.

In operation, the idea is to ask for a simple promise as follows. No stranger can reach a communications inbox unless he will promise not to waste the recipient's time. This promise binds because the inbox returns all messages from strangers that do not provide a sender guarantee, literally a tiny bond of say 2 – 5¢. Recipients can set the amount arbitrarily small or large depending on their opportunity costs. It should neither be so large as to discourage valuable interruptions nor so small as to encourage interruptions that waste time. If a sender breaks his promise, the recipient simply claims the bond. Otherwise, the sender's message is costless. Similar guarantees have long been recognized as a means to distinguish high quality from low [1].

Interestingly, firms in California, Massachusetts, and New Jersey have implemented a straightforward protocol.<sup>1</sup> A recipient posts an interrupt price [3] or "attention bond", [6], with her Internet Service Provider (ISP). For unrecognized senders, the ISP either verifies incoming bonds or bounces the message. For recognized senders, messages pass through freely. If, on reading the message, a recipient finds the stranger sent spam, she can report him with the click of a mouse, and her ISP places the bond in her account. This exercise of attention rights shifts the recipient burden away from *ex ante* classification, which is difficult, toward *ex post* verification, which is easy.

<sup>1</sup> cf. Boxbe [www.boxbe.com/](http://www.boxbe.com/) ; Vanquish [www.vqme.com/](http://www.vqme.com/) ; and AT&T prototype "SHRED: Spam Harassment Reduction via Economic Disincentives." Krishnamurthy, B. & Blackmond, E. (2004), Working Paper: <http://www.research.att.com/~bala/papers/shred-ext.pdf> .

## Signals & Screens

"Attention bonds" accomplish two things. They serve as both signal and screen [9, 10]. As signal, a recipient's bond choice indicates the value of attention, putting a "price" on this scarce resource. The price discourages senders from polluting the resource. Senders consume attention only when value exceeds cost. As screen, a sender's willingness to offer an attention bond reveals his private knowledge that this must be true. The message author knows its content, knows too whether he is a spammer, new friend, or long lost colleague, and can separate himself from the crowd by his ability to keep a promise that a spammer never will. On a large scale, the spam sender's costs rise disproportionately because ISPs either reject his unwarranted communication or they constantly cash his bonds.

So why not cash the bond every time? Obviously you can, but with each decision to punish a sender, you signal what type of person you are. If you value 5¢, more than messages from your friends and family, you tell them so with your behavior. Don't expect to hear from them again if you take their bonds. Visible records of bond-taking rates can also help check opportunistic behavior even among strangers. Reputation mechanisms have proven so effective at e-Bay that 99.1% of feedback is positive despite the fact that 89% of transactions occur between complete strangers interacting at a distance [8].

For legitimate companies, like Citibank, LL Bean, and Dell, giving you an attention right is very attractive. To send a postcard, direct mail costs roughly 35-60 cents due to costs of design, printing, and postage; glossy letters can cost more than a dollar. So, even if you cash their spam bonds, legitimate companies can typically reach you for less than the cost of direct mail. In fact, legitimate companies spend nearly \$1,000 per capita to reach you now,<sup>2</sup> but they spend it on broadcast, print media, and mail.

<sup>2</sup> Based on 2005 U.S. Statistical Abstract Table 1261 advertising expenditures of \$276 billion and a population estimate of 300 million.

Instead, they could spend it on you or your designated charity – your favorite college or cause could even benefit. Plus, your bond choices voluntarily give advertisers useful feedback. If you cash the bond, you're effectively telling them, "I don't want to hear more about this kind of product," but if you don't cash the bond, you're telling them, "OK, I'm still listening." This choice helps them learn whether you want to hear about sporting goods, digital cameras, or investment planning, which they almost never learn from broadcast advertising, print media, or direct mail.

Recipient choice informs the market which messages match individual preferences. This improves targeting. If a recipient's choice indicates she thinks the diet ad was spam but not the ad for mutual funds, then senders will learn not to send this person diet ads. They learn to respect the wishes of each individual they contact.

Early in the 20<sup>th</sup> century, department store magnate John Wanamaker famously quipped "Half the money I spend on advertising is wasted. The trouble is I don't know which half." Early in the 21<sup>st</sup>, Wanamaker may finally have his answer.

### Beating the Perfect Filter

A key advantage of an economic approach to spam is that it facilitates decentralized matching on both sender and recipient sides of the market. It stimulates legitimate transactions, as opposed to shutting them down. In fact, my coauthors and I show in an article in *Advances in Economic Analysis & Policy* that consumer benefits can be great enough that, in some cases, they exceed even those of a "perfect" spam filter that knows a person's individual preferences, has no false positives, and has no false negatives [6]. This occurs whenever sidepayments or more complete information increase transaction surplus.

How can an imperfect market beat a "perfect filter?" The reason is that filters merely give recipients veto power, like important speech whose content could be filtered. They don't let senders signal truly important messages. They don't help recipients report to the market which messages were and were not welcome. They provide no useful means to transfer value. The depth of problem is more readily apparent in a macroeconomic context: trade creates more wealth than quotas.

Giving consumers the right to safeguard their own time will make them less apt to get unwanted messages and significantly less apt to get them more than once. They and their favorite charities can also directly benefit from advertisers' expensive efforts to reach them. Advertisers with legitimate offers can purchase a moment of consumer time, learn about consumer preferences, and possibly reduce distribution and media costs.

Technology and governments have both tackled the spam problem with only limited success, failing in part because neither laws nor filters reveal enough information for the *other* side to improve its decisions. Market mechanisms have the potential to generate useful information in signaling the value of time, screening low value content, and revealing what consumers prefer to hear. The time has come to give people the right to handle their own communications without unnecessary interruptions.

### References:

- [1] Akerlof, G., (1970). The Market for Lemons: Qualitative Uncertainty and the Market Mechanism. *Quarterly Journal of Economics*. 84(3); p. 488-500.
- [2] Coase, R.H. , (1960) "The Problem of Social Cost," *Journal of Law and Economics* 3, p 1-44.
- [3] Fahlman, S. (2002) "Selling Interrupt Rights: A Way to Control Unwanted E-Mail and Telephone Calls"; *IBM Systems Journal*. 41(4), pp. 759-766.
- [4] Ferris Research (2005) "The Global Economic Impact of Spam, 2005" Feb.; San Francisco, CA; Report #409.
- [5] Libbey, M. (2004) "Learning from 2003: Spamming Trends and Key Insights." MIT Spam Conference; Cambridge, MA.  
<http://spamconference.org/talks2004.html>.

- [6] Loder, T. Van Alstyne, M. & Wash, R. (2006) "An Economic Response to Unsolicited Communication," *Advances in Economic Analysis & Policy*:: Vol. 6 : Iss. 1, Article 2. , pp 2-36.  
<http://www.bepress.com/bejeap/advances/vol6/iss1/art2>
- [7] Rainie, L. & Fallows, D. (2004) "The CAN-SPAM Act has not helped most email users so far;" PEW Internet Report: [www.pewinternet.org/report\\_display.asp?r=116](http://www.pewinternet.org/report_display.asp?r=116).
- [8] Resnick, P and Zeckhauser, R. (2002). "Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System." *The Economics of the Internet and E-Commerce*. Michael R. Baye, editor. Vol. 11 of *Advances in Applied Microeconomics*. Amsterdam: Elsevier.
- [9] Spence M. (1973), "Job Market Signaling," *Quarterly Journal of Economics* 87(3), p 355-375.
- [10] Stiglitz, J. (1975), "The Theory of Screening, Education, and the Distribution of Income" *American Economic Review*; 65(3); p 283-300.
- [11] Stone, B. (2006) "Spam Doubles, Finding New Ways to Deliver Itself" *New York Times*; Dec. 6.
- [12] Van Zandt, T. (2004) "Information Overload in a Network of Targeted Communications" *Rand Journal of Economics*; v35, n3 p 542-560.

**ABOUT THE MIT CENTER FOR DIGITAL BUSINESS**

Founded in 1999, the Center for Digital Business is the largest research center in the history of the Sloan School. We are supported entirely by corporate sponsors whom we work with closely in directed research projects. The Center has funded more than 45 Faculty and performed more than 60 research projects. Our mission is to join leading companies, visionary educators, and some of the best students in the world together in inventing and understanding the business value made possible by digital technologies. Our interactions are a dynamic interchange of ideas, analysis, and reflection intended to solve real problems.

**Examples of Current Focused Research Projects:**

- Implications of e-Commerce for New Services and Structure of Logistics Systems
- How Do Intangible Assets Affect the Productivity of Computerization Efforts?
- Wireless and Mobile Commerce Opportunities for Payments Services
- Benchmarking Digital Organizations
- Security and the Extended Enterprise
- Pricing Products and Services in the High-Tech Industry

The Center for Digital Business is completing its Phase II, focusing more explicitly on business value, while at the same time including technologies beyond the Internet in its purview. Our goal, in part, is to reduce that timeline through basic and applied research, engagement with industry sponsors, and the sharing of best practice, and the MIT's credo of combining rigor with relevance is well served.

We are co-located with MIT Sloan's Center for Information Systems Research and the Center for Collective Intelligence to facilitate collaboration. Our cross-campus collaborations include work with the Media Lab, AutoID Center, Computer Science and AI Lab, and Communications Futures Program.

Please visit our website for more information.



We are organized into five areas of expertise – or Special Interest Groups:

1. **IT and Productivity**
2. **Trust and Customer Advocacy**
3. **Communications Futures**
4. **Interdependence of Security and the Extended Enterprise**
5. **IT Products and Services**

**Founding Sponsors**

BT  
Cisco Systems  
CSK Corporation  
France Telecom  
General Motors  
SAP  
Suruga Bank  
UPS

**Research Sponsors**

Hitachi  
Liberty Mutual  
University of Lecce

**Member Sponsors**

Intel  
Institute for Innovation and Information Productivity  
SAS

**CONTACT INFORMATION**

MIT Center for Digital Business  
MIT Sloan School of Management  
3 Cambridge Center, NE20-336  
Cambridge, MA 02142  
Telephone: (617) 253-7054  
Facsimile: (617) 452-3231  
<http://digital.mit.edu/>

David Verrill, Executive Director  
Erik Brynjolfsson, Director  
Glen L. Urban, Chairman  
Carlene Doucette, Executive Assistant  
Jean Danek, Financial Assistant