



The Three Postal Networks of the United States in the 1830s

Robert Dalton Harris, Jr.

The reorganization of the United States Post Office Department in 1836 changed postal topography, and included a design for the local accumulation of the mail as well as for the dispatch of the principal mails among the hubs. From Congressional documentation, I have compiled the "New York State Postal Route Gazetteer" and an index by post office of all mail service among 1500 offices in New York State in 1837. The design of a local postal network emerges in every detail (including a "power law" relation between local revenues and the frequency of the mails). A principle for the self-organization of intensive postal development also emerges to complement the overall design of the system. Over time, transportation miles, not mail frequency, dominated the scale-free behavior of the system as a whole. The interaction of these incommensurate networks was understood to constitute a zone of perfect freedom for the entrepreneur.

The word "network" is a rather nebulous concept in English, invoked to describe a distribution of effects while remaining uncommitted as to causes. In French, the word that takes the place of network—réseau—is more active, rather like "networking." In the introductory session of the Business History Conference 2004, Bruno Latour proposed that networks should be regarded as passionate. Elsewhere Latour has written: "The word network indicates that resources are concentrated in a few places—the knots and nodes—which are connected with one another—the links and mesh..."¹ This accords with the English distinction (mostly written about by Hungarian mathematicians) between scale-free and random networks.

Post offices and post roads provide the nodes and links, the essential elements of a network. The map of a postal system comprised of these elements appears to be a random network, a haphazard allocation of

¹ Bruno Latour, *Science in Action* (Cambridge, Mass., 1987), 180.

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roads among the offices (see Figure 1).² The U.S. Congress, under Constitutional authority to establish post offices and post roads, provided the map. However, the authority to design a postal system upon this random net was delegated to the Post Master General.

The central device, the characteristic “stitch,” for the design of a modern postal system is the postal route: the weekly schedule of transportation services that specified departure and arrival times at the route termini, the succession of intermediate offices, and frequency of performance (named days per week). The map of the itinerary of a single messenger might be a loop (a circuit, visiting each office just once in the course of a single performance) or a shuttle (visiting the intermediate offices twice). This “way benefit” was a special inducement for the postal development of the intermediate place, the not quite invisible hand connecting the emergence of new centers with entrepôts of capital. The first English map of a postal road in the Americas included a paragraph to emphasize modern features in place by 1715, such as the schedule and exchange of mails in postal shuttles (see Figure 2).³ The mail carriers rode from one end of their routes to the other, exchanged mails, and returned.

Both the scheduled exchange of the mails and the way benefit of the shuttle distinguish the modern postal network from the classical line of posts established to relay the messenger from the center to the circumference of the Empire.

Characteristic Frequency

The annual reports of the Postmasters General routinely recorded yearly total miles of mail transportation (T; integrated from the length and frequency of the individual routes), and the aggregate length of the postal routes (L). The ratio between transportation miles per year and twice the aggregate length of the postal routes (taking the shuttle into consideration) is a characteristic annual frequency of the system (F):

$$(F) = (T)/2(L)$$

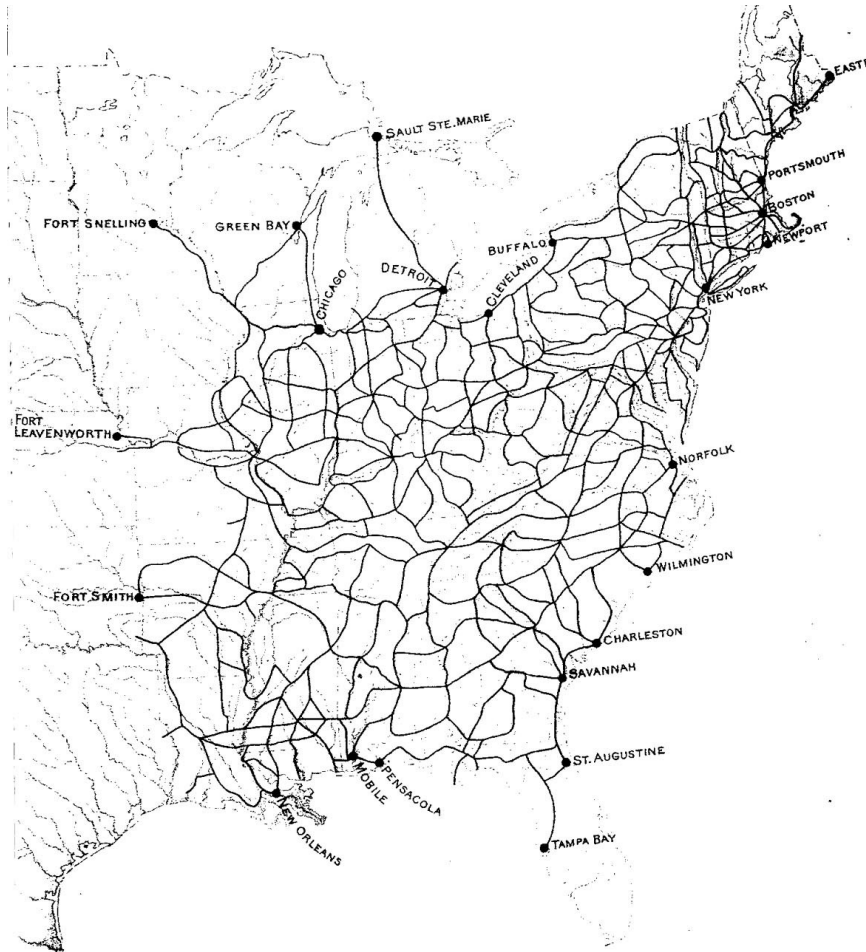
² Most nodes have three or four connecting links, relatively few have but one, or as many as seven. The random network was a favorite model, evidently, until the recent discovery that the Internet is not a random network. Neither was the 1830s U.S. postal system.

³ “A New and Exact Map of the Dominions of the King of Great Britain on ye Continent of North America” by Herman Moll in 1715 featured an inset depicting an industrious beaver in the foreground of Niagara Falls (hence its nickname “Beaver Map”); a road along the coast from Piscataway (Portsmouth, N.H.) by Boston and New York to Philadelphia; and, in a paragraph, “An Account of ye Post of ye Continent of North America.”

The frequency on this iconic postal route, divided by 52 weeks per year would be a weighted average of the mail frequencies as they are prescribed in the contracts [$\langle f \rangle$]:

$$\langle f \rangle = (F)/52 = (T)/104(L)$$

FIGURE 1
Main Post Roads, 1834



Source: "Main Post Roads, 1834" Plate 138K, Charles O. Paullin, *Atlas of Historical Geography of the United States* (New York, 1932).

FIGURE 2
Paragraph inset to the 1715 Moll Map

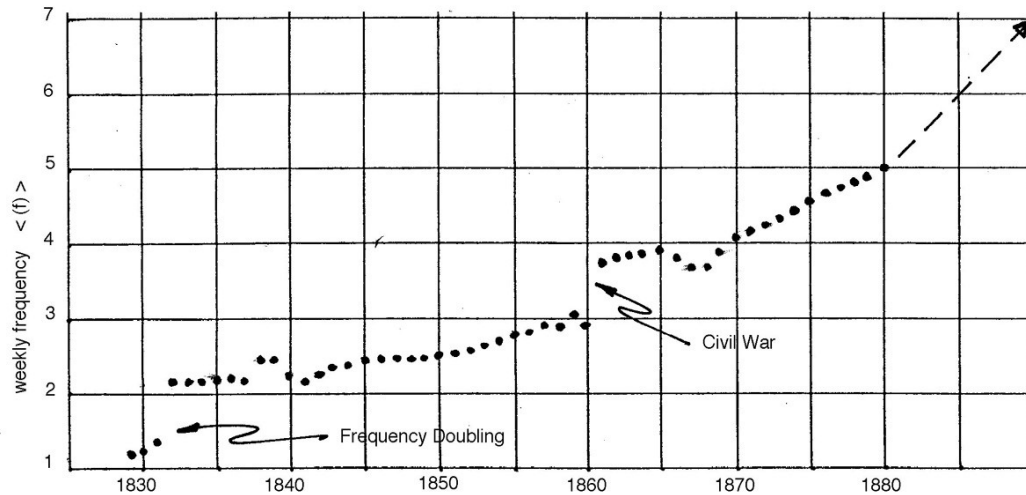
*An Account of y^e Posts of y^e Continent of Nth America.
as they are Regulated by y^e Postmasters Gen^l of y^e Post House.
The Western Post sett^s out from Philadelphia every
Fryday leaving Letters at Burlington and Perth Amboy
and arrives at New York on Sunday night; y^e distanc^e
between Philadelphia and New York being 106 Mit.
The Post goes out Eastward every Monday morning
from New York, and arrives at Seabrook Thursday
noon; being 150 Miles, when the Post from Bos-
ton sett^s out at the same time; the New York Post
returning with the Eastern Letters, and y^e Boston
Post with the Western, Bags are dropt at New
London, Stommington, Rhode Island, and Bristol.
The Post from Boston to Piscataway being 70 Mi-
les leaves Letters at Ipswich, Salem, Marblehead,
and Newberry.
There are offices kept at Burlington, Perth Amboy
in New Jersey, New London and Stommington in
Connecticott, at Rhode Island, Bristol, Ipswich,
Salem, Marblehead and Newberry. and y^e 3 Great
Offices are at Boston, New York & Philadelphia.*

Source: "A New and Exact Map of the Dominions of the King of Great Britain on ye Continent of North America" by Herman Moll in 1715.

Between 1829 and 1833, while the length of the postal routes remained relatively constant, transportation miles doubled, a feat accomplished (under Postmaster General W. T. Barry) chiefly by increasing the frequency of the mails on selected routes. The postal system, of course, did not respond instantly; it took some time for revenues to catch up with expenses, and Barry was sacked for improprieties. However, it is surprising (but should not be) that it responded at all. The average weekly frequency of the U.S. mails increased from once weekly before 1829 to daily by the end of the century (see Figure 3).⁴

⁴ The frequency increases from weekly (1) to daily (7) in 60 years. The frequency was doubled during Andrew Jackson's first term as President with W. T. Barry as his Postmaster General. The system frequency was buoyed up during the Civil War while the Southern routes were excluded from the system. The frequency inflation after 1880 reflects the preponderance of railroad routes.

FIGURE 3
Characteristic frequency of the U.S. postal system.



Source: “Characteristic Frequency of the United States Postal System” compiled from data recorded in the annual reports of the Postmasters General.

Counting the Mails

Following its reorganization in 1836, the Post Office Department began publishing postal route contracts in sufficient detail that the design of the system could and would be characterized in local terms.

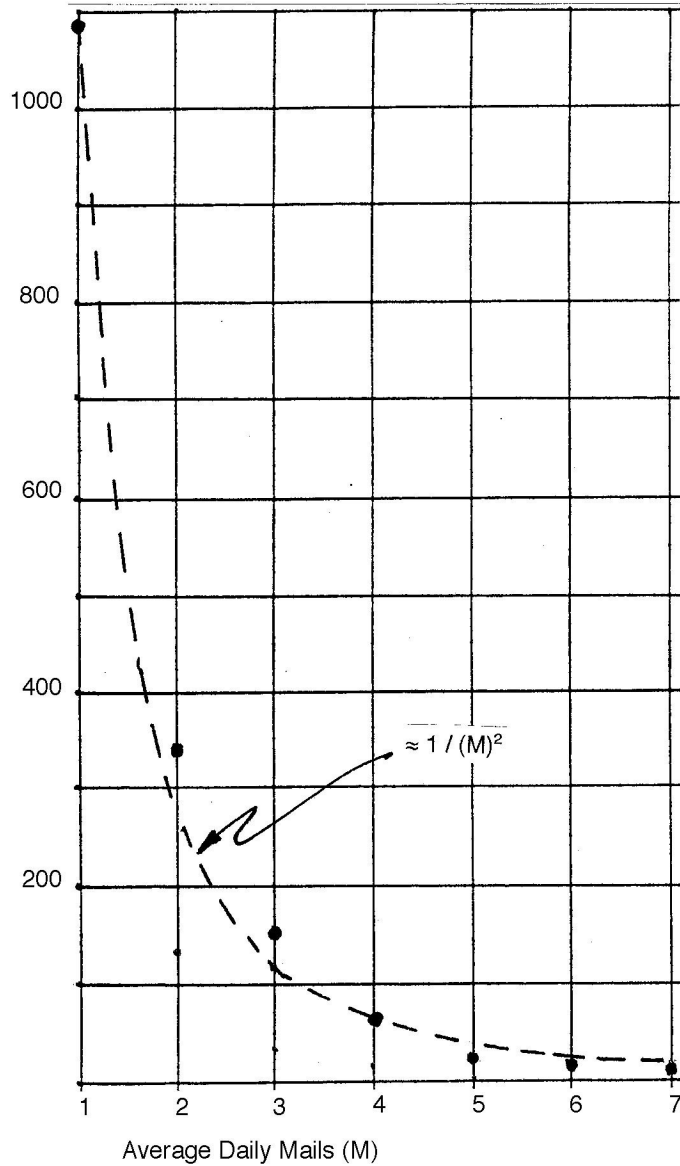
At the time of this reorganization, New York State had some 1700 post offices served by some 500 mail contracts.⁵ I have indexed the mail contracts to the post offices and from this have counted (doubling the frequency of the mails for intermediate offices) the number of mails (M) with which each office was provided each week; 1092 of New York’s post offices had at most an average of one mail a day (7 a week); another 342 no more than an average of 2 mails per day; 161, no more than 3 mails and so on. Albany had an average of 15 mails daily, the most frequently supplied post office within the state. This distribution implies that the number of post offices (PO) receiving a certain number of mails is inversely proportional to the square of the number of mails (see Figure 4):

$$(\text{PO}) \approx 1/(\text{M})^2$$

Such an exponential relation is characteristic of scale-free networks.

⁵ *Contracts—Transportation Mail U.S.—1837* (Hdoc 139 [25-2] 31 Jan 1838) reports the first annual letting of the reorganized Department, 4-year contracts for mail transportation in New York and New England (1 July 1837 to 30 June 1841).

FIGURE 4
 Distribution of the number of New York State Post Offices.
 Average number of Daily Mails 1837-1841.



Source: "Distribution of the Number of New York State Post Offices with Respect to the Average Number of Daily Mails 1837-1841" compiled from data recorded in the annual reports of the Postmasters General.

Scaling the Network

Scale-free networks have a few very highly connected nodes among a welter of sparsely connected sites.⁶ The scale-free pattern of the postal network in the U.S. is the combination of two designs, the district and the “tree,” and both have their antecedents in the development of the posts in England during the seventeenth century.⁷

The district pattern was installed in 1800, providing distribution offices in each state for handling interstate mails, distributing and receiving as well as exchanging among themselves (twice daily after the 1836 reorganization). These were the offices that Richard R. John especially remarked “as a notable turning point in American postal policy.” He also mentioned that they intruded upon republican notions of federation, against the diffusion of power, which suggests that network design was evidently a political matter.⁸ The riverine geography of New

⁶ Albert-Laszlo Barabasi and Eric Bonabeau, “Scale-Free Network” *Scientific American* 288 (May 2003): 60-69, explained: “Hubs are simply forbidden in random networks. When we began to map the web, we expected the nodes to follow a bell-shaped distribution, as do people’s heights. Instead we discovered certain nodes that defied explanation, almost as if we had stumbled on a significant number of people who were a hundred feet tall, thus prompting us to coin the term ‘scale-free.’” See also: Albert-Laszlo Barabasi, *Linked: How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life* (New York, 2003).

⁷ “Probably the earliest contemporary description of the ‘Post Office’ established in 1635 appeared in a survey prepared by Thomas Gardiner, Controller of the Inland Office in 1677. He set out in the form of a ‘Tree’ the separate details of each of the six great post roads, showing the secondary roads branching from the main Post Towns.” See Alan W. Robertson, *Great Britain: Post Roads, Post Towns and Postal Rates 1635-1839* (Pinner, England, 1961), 7. William Dockwra, who had begun a penny post in London in 1680, “had worked out a surprisingly capable system. The urban areas were divided into districts ...”; Howard Robinson, *The British Post Office: A History* (Princeton, N.J., 1948), 71.

⁸ “... because it marked the moment at which postal officers began to differentiate the transmission of information from sender to recipient from its physical conveyance from place to place...its regular transmission from sender to recipient depended far less upon the speed...than upon the administrative coordination...by the middle-level postal officers who managed the mail.... In visual terms, this scheme can be depicted as a constellation of rimless spoked wheels each joined at the hub, with the distribution centers as the hubs and the branch depots as the spokes.... The scheme was briefly opposed by Granger, who only slowly came to appreciate its role in simplifying the sorting of the mail.” Richard R. John, *Spreading the News: The American Postal System from Franklin to Morse* (Cambridge, Mass., 1995), 74-5. But Paul Starr is nebulous about the subject of networks; see his *The Creation of the Media: Political Origins of Modern Communications* (New York, 2004). John, *Spreading the News*, 169-205 is perhaps best known for his elaboration of the meaning that the Sabbatarian controversy gave to the daily expedition of the mails.

England and New York State provided a natural template for the districting and the branching of the mails as well as the water to power the development of a manufacturing economy: the way, as well as the means to industrialize.⁹

However, the network was not only a political matter and not only spatial: the “tree” and district could be given temporal as well as geographic scale. Once the great mails were running daily amongst the distribution centers, the subsidiary mails could be matched by mode and frequency in conjunction with the timing of the schedule for the efficient service to the hinterlands.

Even as frequency and mode were explored under successive Postmasters General Barry and Kendall, it is evident that the system design was most likely the work of Selah Hobbie, who had been in charge of mail contracts since 1829, with his topographer David H. Burr. Burr had just finished his *New Universal Atlas* when he produced for publication *circa* 1839 a suite of maps of the entire U.S. postal system, keying each post road according to its length and mode of transportation.¹⁰ Hobbie’s distinctive acumen shows in his contributions to the annual reports of the Postmasters General: the tables of modes and frequencies by state, the schedules of mails (see Figure 5).¹¹ The numbered arrangement of the mail contracts in generations or blocks of successive branchings (arrivals and departures clustering in the emergent centers) is evidence of a temporal design, an abstraction of the daily grind, extending over the country.

⁹ The numbered mail contracts of New York State (#501-880) are sequenced in blocks: the first block (#501-539) carries up the Hudson from New York to Albany with branches west and into New England; the second block (#540-606) branches from the routes of the 1st block; the 3rd block (#607-698) branches from the 2nd; the 4th (#699-796) from the 3rd; the 5th (#797-848) from the 4th; the 6th (#849-871) from the 5th; the 7th, (#872-879) branching into the western reaches of the state on the Pennsylvania line, from the 6th; and #880 branching from a route originating out of state. The tabulation includes cross-references to demark this structuring.

¹¹ Philip Lee Phillips, *A List of Geographical Atlases in the Library of Congress with Bibliographic Notes* (Washington, D.C., 1909), No. 1379a (vol 1) publishes a circular to accompany and describe the Postal Maps. They were not supplied to the post offices and correspondingly are rare. From a photographic negative taken from the Library of Congress set I have reproduced the “Map of New York” from this series as well as the postal data covering postal revenues and contracts in *Postal Route Gazetteer, Part I: New York State 1839* (New York, 1992).

¹¹ It is evident from this that the modes and frequencies were allocated by postal route. Burr keys the post roads according to the superior mode among the routes using the particular road.

FIGURE 5
1937 tabulation provided by Hobbie of the Contract Office.

STATES.	1.—HORSE AND SULKEY MAI LS.									
	LENGTH OF ROUTES.									
	Weekly.	Semi-weekly.	Tri-weekly.	4 t. a week.	6 t. a week.	Daily.	12 t. a week.	13 t. a week.	Twice, daily.	Total.
	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>	<i>Miles.</i>
Maine - - -	1,251	460	64	-	2	4½	-	-	-	1,781
New Hampshire - -	454	194	10	-	-	18	-	-	-	676
Vermont - - -	362	191	27	-	-	-	-	-	-	580
Massachusetts - - -	100	75	105	-	30	-	-	-	-	310
Rhode Island - - -	89	-	-	-	-	-	-	-	-	89
Connecticut - - -	156	282	85	-	6	-	-	-	-	533
New York - - -	3,644	1,330	450	-	87	21	-	-	6	5,538
	6,056	2,532	745	-	125	43	-	-	6	9,507

2.—STAGE AND COACH.										
Maine - - -	76	339	1,082	12	50	367	-	-	-	1,926
New Hampshire - -	51	147	1,142	-	284	220	-	-	-	1,844
Vermont - - -	97	309	851	39	145	*388	-	-	-	1,829
Massachusetts - - -	60	77	2,420	21	904	276	7	61	2	3,828
Rhode Island - - -	15	37	104	-	30	-	-	-	-	186
Connecticut - - -	-	137	880	-	359	70	-	73	-	1,519
New York - - -	+ 187	485	3,569	-	457	2,459	-	-	-	7,157
	486	1,531	10,048	72	2,929	3,780	7	134	2	18,289

3.—STEAMBOAT AND RAILROAD.										
Massachusetts - - -	-	-	-	-	113	25	-	44	77	259
Connecticut - - -	-	-	-	-	-	40	-	-	-	40
New York - - -	-	-	38	-	197	**288	-	-	**152	675
			113	-	310	353	-	44	229	974

Source: From *Report of the Postmaster General 4 December 1837*, tabulation provided by "S. R. Hobbie, Contract Office" of the post routes just let to 4-year contracts in New England and New York to commence 1 July 1837.

Counting the Money

The postmasters at each office were given a percentage commission of the gross postages they collected, the remainder of the postal revenues going to pay the mail contractors. The system, sustained in this way upon its own revenues, either expanded or contracted according to the aggregate gross revenues. Postmaster compensations are tabulated in the biennial *Official Registers*, and provide a basis for determining the local postal

revenues (\$) at each office. The local postal revenues prove to be roughly proportional to the square of the number of mails, for the post offices of New York State in the late 1830s:

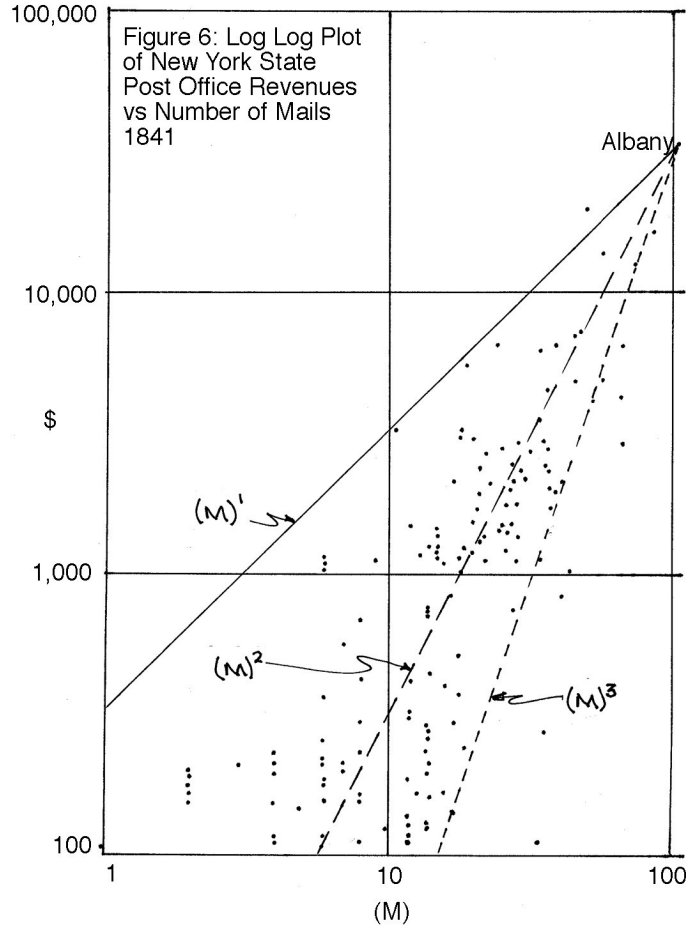
$$(\$) \approx (M)^2$$

The “scatter” of this plot is widespread, (see Figure 6 in which the finely-dashed line corresponds to the dollars varying as the cube of the mails while the coarsely-dashed line corresponds to the dollars being proportional to the square of the mails) and it would provide no basis for quantitative prediction in the case of a particular office.¹² However, local postal revenues, when normalized against the aggregate, can be used as an index of postal activity indicating threshold events in the local economy, just as the aggregate postal revenues may be found to correlate with the global economy.¹³

¹² “Log Log Plot of New York State Post Office Revenues vs. Number of Mails 1841.” The exponent is a straight line on a log log plot: that of the short dashes (+3), of the long dashes (+2). Seventy-seven post offices in New York State had gross revenues exceeding \$1000. Of the more than 1500 earning less than \$1000, the first 77 in the alphabet earning more than \$100 were used; note the discontinuity in the scatter at \$1000.

¹³ Robert Dalton Harris, Jr., “The Official Registers,” *P.S.: A Quarterly Journal of Postal History* (July 1980), 11-18. In which the postal revenues of an upstate mill town dry up during a drought.

FIGURE 6
Log Log Plot of New York State Post Office Revenues vs. Number of Mails,
1841.



Source: Compiled by the author from *Official Register*, 30 Sept. 1841 and Congressional Information Series, vol. 326, Hdoc 139, 25th cong., 2nd sess., 31 Jan. 1838.

The number of the mails now has been implicated with respect not only to the scale-free network, but also to a systematic potential of frequent mails, at the local level. The combination of (PO) and (\$) may be thought of as the generator of postal revenues, whose currency gives scale to the patterns.

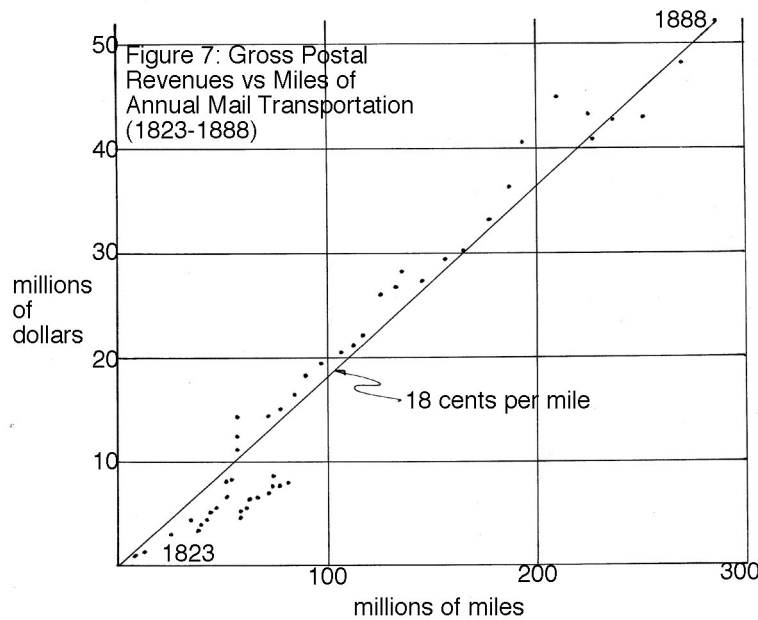
Network Measures

The postal network has its definitive expression at the level of the system, of the whole that is equal the sum of its parts. There are three elements here: the number of post offices (PO); the miles of mail transportation (T);

and the gross postal revenue (Σ), which is the sum of all the local gross postal revenues (\$).

For the first 100 years of the U.S. postal system the ratio of gross postal revenues to annual miles of mail transportation remained about 18¢ per mile (see Figure 7). When reduced by incidental expenses and the commission of the postmaster, this would leave about 10¢ per mile for the compensation of the carrier (the average length of postal routes declined to 25 miles during this period). These rates, of speed, of frequency, of postages, and of commissions translated miles of carrying the mail into an industrial wage that made riding over the road much more remunerative than laboring upon it.

FIGURE 7
Gross Postal Revenues vs. Miles of Annual Mail Transportation, 1823-88.



Source: “Gross Postal Revenue vs Miles of Annual Mail Transportation (1823-1888)” compiled from data recorded in the *Official Registers* and the annual reports of the Post Masters General.

Three Networks

The postal system then might be thought of in terms of three manifestations of network: a) the random web of the post road map; b) the scale-free designs of district and “tree”; c) the network of scheduled transportation for the mails. The system is comprised, then, as a manifold of elementary networks: of contingency, pattern, and scale.

Special Effects

The fiscal principle of a self-sustaining postal service became a principle of self-organization: the provision for “special post offices” and “special postal routes” went beyond the map provided by the dictates of Congress as well as beyond the design by the Post Master General. Special offices and routes were permitted (upon application for scheduling with the regular or public offices and routes) “for the revenues”; the postages collected at the special offices, discounted by the postmaster’s commission, became the pay for the special messenger.¹⁴

Special postal routes had always been an option: explicitly to limit the government monopoly, not to intrude upon the right to dispatch a special messenger on one’s own behalf. However, special post offices were not especially encouraged until the systematic developments referred to here began to extend and explore the potential of frequent mails.

Conclusion

The general idea of the network as an element in cultural history, with respect to the development of the modern postal system, accords as well with the history of the topographic map, combining the traveler’s itinerary with the plan, according to grid and scale.¹⁵ Two thousand years ago, the Chinese named the grid of their maps warp and weft (from weaving); postal systems and map-making may both owe their patterns to the loom. Indeed, the industrialization of both the loom and the postal system were related by common resort to frequency as their measure of speed.

¹⁴ Amos Kendall carried this principle (branching “for the revenues”) into his management of the development of the telegraph network in the United States.

¹⁵ P. D. A. Harvey, *The History of Topographic Maps: Symbols, Pictures and Surveys* (London, 1980).