Abstract

This paper examines the nature of first mover advantage in high-tech industries, with particular attention paid to Internet companies. First mover advantage theory suggests that first movers into a new industry will gain an advantage such that barriers for new entrants become very high or even insurmountable. This advantage stems from early adoption by users which allows a firm to capture a large percentage of market share early on. Thus, by the time competitors are able to enter the market, the first mover will, ideally, have already established advantages in brand-loyalty or recognition as well as cost advantages of existing infrastructure and distribution systems. However, the first mover advantage theory has not always held water, particularly in the most recent wave of Internet start-ups and “dot-com” companies. The question this paper addresses is why and how late movers have been able to compete with, and even dominate, first movers despite the proposed advantages of being first to market. Through an analysis of the theoretical and empirical literature as well as a case study of Yahoo! and Google’s co-development, we find that the unique characteristics of the Internet economy debunk many proposed advantages of being a first mover, giving way to late mover advantage.
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“The early bird gets the worm... but the second mouse gets the cheese.”
- Unknown

I. Introduction

The value of being first is a concept prominent in a variety of cultural contexts, charmingly summarized by the tale of a bird and his quest for breakfast. In an environment where resources are scarce and agents are competitive, it is well understood that he who is first enjoys the greatest chance for success. Not only does the late bird not get a good worm, he may not even get a worm at all. This drive to be first and the understanding of its importance underlies the economic concept known as first-mover advantage. As the name suggests, the theory of first-mover advantage predicts that a firm who is first to move into a new market, particularly in industries that are subject to network effects, will accrue advantages such that barriers for new entrants become very high, and perhaps even insurmountable. In general, these advantages stem from early adoption by users which allows a firm to capture a large percentage of market share early on. Thus, by the time competitors are able to enter the market, the first mover will, ideally, have already established advantages in brand-loyalty or recognition as well as cost advantages of existing infrastructure and distribution systems. A wide range of theoretical literature has been written on the subject over the years, supplemented also by empirical case studies which examine first-mover advantage in a variety of industries. Though much of this literature explores the theoretical and empirical support for first-mover advantage, there has also been a substantial amount of debate over just how advantageous being first really is. This debate has become especially pertinent in light of the recent boom and bust of many high-tech Internet start-ups, more commonly referred to as “dot-coms.” The expected advantages of being first to market compelled a huge
amount of financial investment in dot-coms, leading to a flurry of companies selling
everything from groceries to pharmaceuticals to pet food online. The top priority of
countless dot-coms was simply to be first, even if this meant providing an
underdeveloped product or operating the company at a loss. Capturing customers quickly
and early was the driving strategy of the day. However, the sudden burst of the dot-com
bubble in the late 1990’s ignited serious doubt over the validity of first-mover advantage
theory and its applicability to Internet industries. A look at the dot-com landscape today
shows that many first-movers have disappeared and that many late-movers have become
market leaders. It would seem, then, that the glory goes not to the early bird and his
worm, but rather the second mouse seeking the cheese. It is these second mice which
motivate the writing of this paper, as I aim to explore how late movers in high-tech
Internet industries have been able to compete with, and even dominate, first movers
despite the proposed advantages of being a first to market.

In order to address this issue, this paper will begin with an examination of the
theory that predicts first-mover advantage, accompanied by a survey of classic case
studies which complement the theory. I will then review the competing literature to
examine the circumstances in which first-mover advantage yields to late-mover
advantage, particularly within the context of Internet industries. The final part of this
paper will be a case study applying the principles extracted from the examinations of both
first-mover and late-mover advantage theory. This case study will examine the dynamic
between Yahoo! and Google and will analyze the factors which have allowed Google, a
late-mover, to enter, compete in, and, arguably, dominate the search engine market over
the Yahoo!, the incumbent.
II. A Survey of First-Mover Advantage in Theory and Practice

Without any knowledge of business or economic theory, one may intuitively suspect that being first to market is generally more advantageous than waiting to enter a market which has already been populated by competitors. A number of papers have been written over the years describing the theoretical mechanisms which underlie this intuition. This section aims to summarize this literature in an effort to gain a systematic understanding of these mechanisms and also to develop a framework within which to analyze the case study which concludes this paper.

A seminal paper on the topic of first-mover advantage was published in 1988 by Lieberman and Montgomery. Though written well before the era of the dot-com bubble, the paper offers a conceptual survey applicable even to an industry which postdates the conception of ideas presented in the paper. Lieberman and Montgomery attribute the elements of first-mover advantage to several categories, each of which I will examine in turn: 1) network effects, 2) consumer switching costs, 3) acquisition of resources, and 4) technological preemption. (Lieberman and Montgomery 41)

Network Effects

Perhaps the industries which are the most likely to confer substantial advantages to first-movers are those that exhibit network effects. Network effects apply to industries where the value of a good or service increases with the number of users. Direct network effects occur when goods are physically linked such that another consumer’s adoption of a good provides a direct benefit to existing users, as is usually the case with telecommunications networks. (Farrell and Klemperer 8) A classic example of this is the fax machine. A fax machine is only valuable insofar as it allows the user to communicate
with other fax machine owners, thus its value is directly proportional to the number of users. Metcalfe’s law suggests that the overall value of a network increases with the square of the number of users. (Shapiro and Varian 184) Thus, a first-mover’s advantage can increase exponentially if he is able to effectively dominate a network early on.

Additionally, indirect network effects can also work to the benefit of a first-mover. These indirect effects occur as a result of compatibility issues and the existence of a complementary goods market. In this case, users’ valuation of a good does not depend explicitly upon other users owning the same good, but rather on the presence of other necessary and compatible goods which enhance the value of the network overall.

Network effects can often be powerful enough to set technological industry standards, as was the case with the battle between the videocassette formats, VHS and Beta. The market for videocassette recorders (VCRs) and videocassette tapes suffers from what can essentially be characterized as a “chicken and egg” problem. Consumers will only buy tapes if there are compatible machines to play them on, but will only buy machines if there are compatible tapes to play. The utility that a consumer derives from owning a VCR is not directly affected by, for example, the consumer’s neighbor also owning a VCR; the two VCRs are not connected nor do they need to communicate with one another. Indirectly, though, as the number of people who own a particular type of VCR grows, the more likely that tape makers will want to produce tapes compatible with those VCRs, thus benefiting the consumers with greater tape selection. At the inception of the VCR and tape industry, the chicken and egg problem was not prohibitively problematic because the initial intended use of tapes and VCRs was not to view commercially recorded entertainment, but rather simply to make and watch private recordings. The two
battling formats of the day were VHS by Matsushita and Beta by Sony. When a
consumer was faced with deciding which format to adopt, he likely did not consider the
potential impact of network effects since his primary intention was probably private
recordings. The consumer is then left to decide on a format based on other attributes
such as price (VHS was cheaper) and capacity (VHS machines could record longer),
which made VHS more popular. Thus, by the time the concept of mass produced
commercial tapes came to be, VHS already had an advantage that proved to be
insurmountable for Beta. Beta did acquire a sizable following during the early years of
the battle, but the introduction of network effects magnified VHS’s early lead into
eventual total market dominance. When videotape retailers and rental stores were faced
with the decision of choosing to stock VHS or Beta tapes, they naturally chose the format
that was more popular amongst consumers, which was VHS. Eventually, the Beta format
disappeared altogether. (Rohlf 105) This tale demonstrates the strength and power that
network effects have in selecting a market winner. Though in this particular tale both
VHS and Beta entered the market at approximately the same time, the price and capacity
advantages that VHS had essentially amounted to a first-mover advantage. Whether
consumers initially choose a product based on superior qualities or because there are no
other products to choose from, the impact of network effects remains apparent and
significant.

Consumer Switching Costs

The cost to consumers of switching brands may benefit a first-mover if the first-
mover is able to effectively capture market share early on. If a consumer has already
made a substantial amount of investment in a particular brand or product by the time a
competing brand enters the market, the late-mover will have to expend more resources than the first-mover and typically offer a superior product in order to compel consumers to switch and choose their product. Investments made by consumers may be both financial and psychological in nature, the extent of which will vary considerably depending on the type of product. Financial investments include the cost of the product itself in addition to any complementary goods that need to be purchased, such as application software for personal computers. For individual consumers, this financial investment may not be as substantial as it is, for example, for a firm purchasing hundreds of computers for its employees. There is also a psychological investment component which in some cases may be the more prohibitive factor when consumers are faced with the option of switching brands. Consumers may develop loyalty to a particular brand if that firm provides quality goods or services and proves to be reliable and trustworthy. A possibly more considerable psychological investment is the cost of learning how to use a product. The consumer invests time and mental energy in learning and becoming familiar with the interface or look and feel of a product. (Farrell and Klemperer 6) The magnitude of the investment and cost of switching is especially magnified in industries subject to network effects. As discussed in the previous section, the value of networks increase exponentially with the number of users. If a first-mover’s product is part a well-established network, users will find it very costly and will have little incentive to switch to a brand which is part of a less extensive, or perhaps even non-existent, network.

A classic case of network effects and switching costs working to propel a first-mover to market dominance is the tale of how the QWERTY keyboard came to be the industry standard. As the story goes, the QWERTY configuration was borne not out of a
desire for ergonomic efficiency, but rather the complete opposite. Due to the mechanics of early typewriters, manufacturers needed to slow down typists in order to prevent frequent key jamming. The QWERTY keyboard is configured such that letters which are frequently used together are spaced farther apart. Thus, the first typewriters featured an ergonomically inefficient design necessitated by technical constraints. However, by the time the mechanics of typewriter design advanced to a stage where key jamming was no longer problematic and supposedly more efficient keyboard designs emerged, such as the one designed by August Dvorak, network effects and switching costs had already begun working to the favor of the QWERTY design. (David 332)

First, network effects ensured that initial adoption of the QWERTY keyboard would swiftly lead to widespread adoption. Manufacturers want to produce keyboards in the configuration that is more popularly known, and users want to learn to type on the configuration which is more popularly produced, leading to the same type of chicken and egg problem previously mentioned. Since the QWERTY design, though purposefully designed to slow typists down, came first, users initially learned and became accustomed to its configuration. The proliferation of QWERTY keyboards reinforced the proliferation of QWERTY typists, and vice versa, leading to a cycle of positive feedback. The extensive adoption and production of QWERTY keyboards meant substantial costs of switching to a new configuration, even if it was ergonomically more efficient. Typing schools teaching QWERTY had already been established, firms were already stocked with QWERTY machines, and the act of learning how to type is not something easily unlearned and re-learned. The QWERTY keyboard has now become standard, showing that
it is difficult for even technical superiority to counter the consequences of network effects and consumer switching costs.

Though the tale of QWERTY has come to be the classic illustration of how “accidents” of history, particular when combined with network effects, can lock us into a technology which is not necessarily that which an open competitive market would have chosen, there still remain those skeptics who prefer to think of this tale as merely a fable. More specifically, Liebowitz and Margolis, in their 1990 paper, argue that QWERTY’s existence as a standard does not represent any sort of market failure and that the evidence suggesting that the Dvorak keyboard is superior to the QWERTY keyboard is tenuous at best. For example, because one of the tests cited in support of Dvorak’s superiority over QWERTY was conducted under the supervision of Dvorak himself, Liebowitz and Margolis assume an automatic bias which, to them, renders the results of those tests unreliable. They further suggest that the QWERTY layout was indeed subject to a sufficient amount of direct competition from other configurations to prove that its adoption into the standard was not some inefficient accident of history. (Liebowitz and Margolis 5) In response to these issues, David appeals back to the facts of history, pointing out that although tests were conducted under Dvorak’s supervision, there is no compelling evidence to suggest that mere supervision translated to experimental bias. David also argues that the outcomes of the typing contests that Liebowitz and Margolis point to as arenas where QWERTY’s efficiency was sufficiently tested were dependent on more factors than simply the layout efficiency of the keyboards. (David with Headley 7) In general, even in light of the objections raised by QWERTY skeptics, the fact remains that the QWERTY keyboard was designed to intentionally slow down typists
and, despite the disappearance of the technical constraints which necessitated the design, network effects and the costs of consumer switching were strong enough to propel QWERTY to standard status.

 Acquisition of Resources and Assets

 Even in the absence of network effects, a first-mover may gain advantages by acquiring resources and assets before its competitors. Such resources may include physical assets, positioning in geographic space, and brand presence in the minds of consumers. Physical assets may include inputs, process equipment or machinery, access to distribution channels, and human labor. Gaining first access to physical assets is particularly important in industries where resources are scarce, such as the natural resources of gas or mineral deposits. Acquiring capital and equipment early on could translate to a cost advantage to the first-mover as these resources may become more expensive as the industry grows. Though labor is a fairly mobile asset, if a firm requires extensive, firm-specific training, then a first-mover firm can capture and train human resources early on thereby making it more likely that these employees will remain with the firm rather than switch to work for competitors when and if they enter the market. (Lieberman and Montgomery 44)

 Being the first to stake out prime geographical locations for the physical placement of the firm or its stores may also be a source of advantage for a first-mover. Manufacturing companies may want to be located near transportation networks, and commercial retail stores would likely prefer to be in highly visible locations near their target customers. Aside from geographic firm location, a first-mover can also incur benefits from having the first product of its kind on the store shelves and by literally
occupying a lot of shelf space. Doing so can bolster acquisition of the non-physical asset of customer recognition, the key component to building brand loyalty. Not only do consumers begin becoming familiar with the pioneer brand sooner, but the pioneer may also be able to shape the user’s expectations for the product. Carpenter and Nakamoto suggest that consumers have what they term “weakly formed” preferences when it comes to new products. (Carpenter and Nakamoto 285) Since the product is new, there is really no precedent to set expectations for attributes. As such, the first-mover is in the unique position of potentially being able to shape and shift consumers preferences towards its own product. If the first-mover succeeds in using its own product to shape consumer expectation, then the first-mover has essentially set the standard against which competitors will be judged.

*Technological Preemption*

If a firm is the first in a new industry, naturally it will also be the first to begin developing product and process technology, thereby gaining a head start in learning how to navigate the landscape of the new industry. As the pioneer firm advances down the learning curve, and the longer that pioneer is alone in the market, the harder it will be for potential competitors to catch up. This is due not only to the fact that the pioneer amasses a greater volume of knowledge sooner than his competitors, but also because innovations in either product development or organizational management can translate into cost advantages for the pioneer. (Spence 49) If a firm develops a cheaper, more efficient production process, there will be more output over which to spread lower fixed costs. However, just learning how best to operate your firm or develop technology in the context of a new market before your competitors is not the only component to
capitalizing on learning curve advantages. Early knowledge can only work to the firm’s benefit if the knowledge remains exclusive to the firm. If later firms are somehow able to acquire the knowledge accumulated by the pioneer firm, then early entry would effectively act as a disadvantage as the later entrants benefit from the pioneer’s learning without incurring the initial costs of research and development. Patents are one tool that firms can use to help mitigate this potential disadvantage and retain the financial value of original innovations. Though patents cannot protect inventions indefinitely (in fact, only for 20 years), they can erect substantial barriers to entry, allowing the pioneer patent-holder ample time to establish market presence and dominance. The period of patent monopoly can serve as an invaluable time for a firm to build its base of users and capitalize on network effects. (Cottrell and Sick 5)

One company which held key patents during the infancy of an industry was American Bell Telephone Company (ABT). Originally, Alexander Graham Bell sold his telephones, not as part of a network, but as single units which had to be connected by the users themselves. Since Bell held the patents on telephone technology and essentially had a monopoly on the market, he could maximize his profits by charging high prices, though there were not yet network effects to take advantage of. The invention of the telephone switchboard in 1878 created just that opportunity. The telephone system exhibits classic network externalities, as the a single phone is worthless unless the user has someone to call, but as adoption of the telephone increases, the value of the telephone network increases exponentially according to Metcalfe’s law. Rather than making huge investments in creating his own telephone network, Bell became the exclusive provider of telephones to telephone exchange companies across the country. Considering that
Bell’s patents lasted into the 1890’s, it would seem that ABT had more than a decade to expand its network, capture users, thereby making it exceedingly difficult for competitors to enter the market. Though history did not quite play out this way, Rholfs argues that the combination of patent protection and network effects should have allowed ABT to lock up the market by the time Bell’s patents expired. Instead, ABT chose to extract its monopoly rents and continued to charge high prices throughout the period of its patent monopoly. Consequently, competitors were able to effectively enter the market by the turn of the century. (Rohlfs 69) Though ABT squandered its first-mover advantage by concentrating on short-term profits rather than long-term network benefits, it is not difficult to see, as Rohlfs contends, the crucial role that patents would have played had ABT chosen to take greater advantage of its first-mover position.

III. Enter The Internet

    Much of the theoretical and case study literature on first-mover advantage just discussed predates the advent of the Internet, the inception and proliferation of which has revolutionized the landscape of the economy. The spread of the Internet into mainstream popularity has enabled a mind-boggling amount of information exchange and has also altered, and in many cases enhanced the manner in which we conduct our lives in the home and in the marketplace. Before exploring the relationship between first-mover advantage theory and the new Internet economy, it is worthwhile to briefly discuss its history and background.

    Unlike other networks whose economic implications or commercial uses may have been the driving force behind design or inception, the infrastructure of the Internet
was born out of wholly different motivations. In fact, the popular spread of the Internet for commercial and private use did not begin to flourish until at least 20 years after the first networking technologies appeared. The Internet as we know it today began as an initiative by the Department of Defense to create a computer network through which universities and various other research institutions could reliably communicate. As such, robustness and survivability were among the top priorities guiding the design of the network. (Rohlfs 179) This prioritization makes sense from a defense point of view wherein the reliability of basic functionality is the most important feature in the event of disaster. The architecture of the Internet was designed and developed with little, if any, consideration to its future use in the commercial and business sector. Nevertheless, this economically blind design has had important economic implications.

To the lay user whose interaction with the Internet consists of activities such as web browsing, email, or instant messaging, it may seem like the “Internet” is some entity full of complexities that implement the variety of applications that he or she interacts with. Though the Internet supports this array of applications, the concept of the Internet is essentially based on a set of instructions that standardizes how computers transfer bytes of information to and from one another. From a technical standpoint, the architecture of the Internet is based on a network that uses the idea of a packet switching scheme. This scheme entails breaking the unit of information (be it an email, or a webpage, for example) into a series of small packets which are independently sent to the targeted destination, where the packets are reassembled to form the originally intended piece of information. Essentially, the Internet is an inherently stateless entity which simply offers a means of rapid data transfer to anyone who wishes to disseminate or retrieve
information. (Rohlfs 172) For an entity predicated on such straightforward principles, the Internet has evolved into dynamic and ubiquitous organism whose reach extends into both culture and economy. Though the creation of cyberspace has had a fascinating impact in the areas of social psychology and human-computer interaction, for the purposes of this paper we focus on how the Internet has altered the conduct of business as usual.

In the late 1990’s, the growth of the Internet spawned a sector of business unique and revolutionary enough to merit its own designation, the “dot-com bubble.” The power of the Internet inspired many entrepreneurial souls with an idea and a modem to start up their own online businesses. What ensued in the next several years was nothing short of a frantic mania. Dot-coms sprung up in every conceivable place and for every conceivable purpose. Everyone wanted their piece of the dot-com pie while dreams of becoming a millionaire and retiring all before the tender age of thirty-five occupied the imaginations of Silicon Valley’s newest CEOs. The Internet opened up an untapped marketplace in cyberspace, the vast potential of which inspired the dot-com mania. As it became cheaper and easier to get online, the Internet became an even greater tool for reaching millions of people all around the globe.

To be clear, there are two general forms of online companies that engage in business-to-consumer interactions. First, a company may take advantage of the power to reach millions for the purposes of selling a product or a service. These companies function much like traditional brick and mortar firms, and may even be extensions of them, the primary difference being the space in which the transaction occurs. A second type of firm offers free services or content and, like with the television or radio
industries, acquire value through amassing users or visitors and generate revenue by selling advertising space. Regardless of the business model, many aspects of conducting business online differ notably from the principles which govern business in industrial factories, retail stores, or corporate high rises. More specifically, the dot-com economy exhibits low barriers to entry, low marginal costs, rapid development cycles, and even a unique operational culture.

Low barriers to entry stem from what can essentially be characterized as the intangibility of cyberspace. The products or services that many dot-coms offer often require nothing more than a transfer of data packets over the network. As such, the physical capital required to start up a dot-com is typically far less than that needed to launch an offline business. The latter often requires a substantial amount of initial investment to get going, including acquisition of physical office space, equipment, and human capital. By contrast, dot-coms that provide free content or services, or sell non-physical products such as software, do not need much more than a computer with a connection and have in fact been known to start up and run out of bedrooms, dorms rooms, and other non-traditional places. In addition, many would-be online entrepreneurs already own all the capital necessary to launch an online business, thus making their fixed costs lower than would be necessary to start another sort of business. Aside from the financial aspect of barriers to entry, there is also the issue of a new entrant’s ability to capture enough attention and patronage to be competitive in its market. Though both online and offline firms invest in advertisement to gain popularity, the online firm has the advantage of not being constrained by the barriers of geographic distance. As popular as a company becomes, its ability to reach customers is limited by its physical location and
access to distribution channels. The Internet, on the other hand, breaks down this limitation and allows online companies to reach anyone with access to a connection, which is an ever-growing number of people.

Low marginal costs for dot-coms arise for much the same reasons that barriers to entry online are low. For an online company selling an intangible product such as downloadable software, there is essentially no cost of providing the software to an additional customer. Once the software is written and available for download, the firm does not need to expend extra resources for producing a new copy of the software or packaging and shipping the product. With online firms that only provide content, the Internet has changed the direction of the relationship between the provider and the consumer. With newspapers, for example, an offline company must print and deliver as many copies as there are customers, whereas an online news service simply posts their news to a website, the “delivery” of which is up to the consumer who need only type in a website address to access the content. In general, most online content can be likened to a pure public good in that it is both non-rivalrous and non-excludable. One user’s viewing of a webpage does not prevent another user from doing so, and, although mechanisms can be put in place to restrict access to websites, the default state is for web content to be available to all that request it at little to no marginal cost to the content provider. This is not to suggest, however, that marginal costs are zero, since a firm may need to purchase more servers or extra bandwidth as traffic to its website increases. Overall, though, the seemingly intangible nature of the Internet works to lower marginal costs for firms conducting business online.
The dot-com bubble seems also to have managed to warp the passage of time, as the product development cycle has become so rapid that the term “Internet time” has been coined to describe its velocity. (Weinberg 2003) Traditionally, a firm will devote a substantial amount of time to the cycle of development and testing before deploying a product into the marketplace. It behooves a company to make sure that its product is refined and will sell before committing resources to producing it in mass quantities. Online software and services, on the other hand, are another story. In an industry where the technology is constantly and rapidly evolving, the push to get a product or service to market before it becomes dated results in sped up development cycles wherein early versions or releases constitute the user testing aspect of development. Also, with intangible products or services, improvements can be made and new versions released without having to worry about the sunk costs associated with previously released products. The increased development cycle period also means that a firm dependent on evolving technology must constantly innovate or it may fall irreparably behind.

Aside from economic characterizations, many dot-coms also operate in a new and unique company culture. In contrast to traditional white-collar corporate culture, Internet start-ups are often staffed by young programmers who prefer jeans and sandals to suits and ties, diet soda to black coffee, and playing foosball during lunch breaks. The youthful atmosphere of many dot-com offices also often corresponds to an unconventional managerial hierarchy and work ethic environment. Many dot-com organizations are decentralized, flexible, and highly participative. Though traditional titles of authority do exist, more emphasis is placed on the innovation and ingenuity of the organization’s individual constituents. In other words, traditional boundaries of
authority are blurred and sometimes even erased. This organizational philosophy stands in stark contrast to firms based on top-down hierarchies wherein barriers of managers and bureaucracy might stand between a worker and a CEO. While it may be too extreme to say that the dot-com industry and firm are revolutionary in form and function, there are certainly notable differences which may influence the impact of first-mover advantage theory, an issue now to be considered in the next section.

**IV. When First Mover Advantage Moves to Cyberspace**

Although first-mover advantage appears to have solid support in both theoretical and empirical literature, late-movers also have a number of countervailing advantages which, when considered in the context of the Internet, may be sufficient to debunk the purported wonders of first-mover advantage. The particular context of the Internet also adds a potentially damaging dimension to the analysis of the four elements of first-mover advantage discussed earlier. There is a subtle distinction to be made between the disadvantages of being first and the advantages of being late. Though the former often translates into the latter, there are certain factors which disadvantage the first-mover, but do not necessarily explicitly help the late-mover succeed. The theoretical literature offers three factors in the area of first-mover disadvantage, two of which translate directly into late-mover advantages: 1) free-rider effects, 2) resolution of uncertainty, and 3) first-mover inertia. (Lieberman and Montgomery 47)

_Free-Rider Effects_

As previously discussed, a pioneer may benefit from being the first to start gaining knowledge about a new market and advancing down the learning curve. If a firm
has developed product or process technology and is able to protect those innovations with patents, late-movers may find it difficult to catch up and compete. However, in the absence of patent protection or barriers to knowledge diffusion, this would-be first-mover advantage becomes a late-mover advantage. Knowledge can leak between firms by way of a highly mobile labor force, reverse engineering of products, or a general transparency about the industry. If firms do not take specific precautions to guard information, late-movers can free-ride on the technologies, processes, or organizational practices already developed by pioneer firms, as imitation is often easier and cheaper than innovation. On the issue of patents, the speed at which technology is evolving may render a patent useless if it is protecting a process or product which has already been improved upon or, at worst, become obsolete. The value of patents, therefore, depends on how innovative and bullet-proof the technology or product is. In some cases, the diffusion of information may benefit the development of a product more so than its intellectual protection would benefit a single firm. Open-source software projects, for example, champion the notion that letting users improve upon software directly by making the source code public is the best way for software to develop into its most robust and reliable form. (Cottrell and Sick 6) Overall, a late-mover may benefit from a wait-and-learn approach and by letting a first-mover explore the new market first.

Resolution of Uncertainty

Free-rider effects are closely related to the resolution of market uncertainty, as pioneer firms also occupy the sometimes unfortunate position of market guinea pig. Not only can a late-mover free-ride on knowledge from earlier firms, but can also learn from their mistakes and failures. This may even be a more valuable advantage to late-movers
if the mistakes and failures of the first-mover cause the firm to become unviable. The uncertainties of a new market can apply to both technology as well as unformed consumer preferences. As mentioned earlier, when a product or service is brand new, preferences for attributes are “weakly formed.” Producers and users alike are not yet fully sure how the product will be best used and what attributes will be the most useful. Although a first-mover does have the opportunity to shape these weak consumer preferences toward its product brand, if it fails to do so, a late-mover will then have a better picture of what consumers do want and thus be able to better serve them. In new markets, late-movers also need to expend fewer resources than the first-mover on educating users on how and why to use a new type of product or service. As an uncharted market grows, consumers needs and demands on a product may shift as well. A late-mover may even be able to shift those needs by offering a superior product, particularly if advances and innovations have been made in relevant technology that can aid the late-mover in improving the product. At the very least, a late-mover is able to observe any preferences shifts and alter their product accordingly.

First-Mover Inertia

If an aforementioned shift in consumer tastes or needs does occur and a late-mover is able to accommodate and capitalize on this shift, a first-mover will be disadvantaged if it is unable to do so due to organizational or operational inertia. A firm that cannot adapt to a changing and dynamic market will, at best, make itself vulnerable to competition by a late-moving firm that can respond, or, at worst, become unable to compete in the market at all. This inertia can result from the fact that a firm has already made substantial financial investments in specific physical capital and labor training. In
this case, the sunk costs of investment may justify continuing to produce its current product if switching costs are greater. Even if a firm could convert its existing assets without substantial loss, it may choose not to due to an organizational type of inertia. A firm may be hesitant about abandoning its products because it has already established certain procedures, standards, and a general organizational infrastructure that would be cumbersome to rearrange.

It would seem that the existence or extent of first-mover disadvantages depends on how dynamic a market is. If a market remains relatively stable from its inception, then there is no great uncertainty to be resolved and inertia no longer acts as an inhibiting factor for the first-mover, although the free-rider problem still remains. However, it would be difficult to characterize the Internet as a stable environment for business growth, as the bursting of the dotcom bubble demonstrates. Technologies which harness the power of the Internet are constantly being born and developed, making cyberspace a site of constant change. The source of much, and arguably most, of this change comes from the ingenuity of computer programmers who may or may not even realize the commercial value or economic implications of their innovations at the time of development, rather than the entrepreneurial businessmen who may drive change in other industries. Because of the public nature of the Internet, anyone with a connection is free to test his innovations online. As such, many of the most popular and prominent dot-coms today had humble beginnings, starting out as student projects working out of college dorm rooms. In fact, this scenario fairly accurately describes the genesis of two of the most well-recognized names in the search engine industry today, Yahoo! and Google. The following case study aims to narrate the relevant history of and between
these two dot-com giants and analyze their development within the theoretical framework discussed in this paper.

V. A Tale Of Two Engines

Before delving into the tale of two engines, it is first worthwhile to discuss the role of search engines in today’s cyberspace. Since the Internet is not any single entity, but rather an ever-growing network of individual computers, its capacity for information is virtually limitless. The Internet is populated with everything from personal webpages and online communities to virtual marketplaces and corporate websites. The amount of raw data available through the Internet is measured into the terabytes and the number of available websites is upwards of three billion as of this writing. It would take an almost unthinkable amount of time to even begin to have a grasp of the depth and breadth of information that resides in hundreds of millions of servers around the world. It is because of this daunting abundance of information that search engines have become so crucial to our ability to make best use of the Internet. For the purposes of this paper, the term “search engine” will refer to any service which aids the user in searching for particular information or resources on the Internet. Without search engines, the Internet would be nearly impossible to navigate in any meaningful or useful way, not unlike a library that did not have a catalogue system. As mentioned, the two companies which provide two of the most popular and powerful tools for making sense of cyberspace are Yahoo! and Google, both of which, interestingly, were founded by Stanford University graduate students. Both companies have come to play prominent roles in users’ online
experiences, and we now turn our attention to their stories, beginning with the first-mover, Yahoo!.

*Do You Yahoo!?!*\(^2\)

As one of the Internet’s most recognizable brands, Yahoo! today stands as a highly successful leader in Internet communications and commerce. A quick glance at Yahoo!’s homepage reveals a bustling collage of email service, news headlines, a website directory, advertisements, webpage hosting, and a cornucopia of other online services. The Yahoo! website now receives millions of hits per day, but this now famous and globally popular web portal began as a personal project by a pair of students who wanted an easier and better way to use the world wide web. The time was February 1994, and the place was Stanford University. The Internet as we know it today was still relatively young, but rich enough in content to inspire two electrical engineering graduate students, Jerry Yang and David Filo, to try to make sense of the cyber-mess. In an effort to make their daily navigations through cyberspace more organized and manageable, the two began compiling a list of their favorite and most frequently visited websites and used it as their online starting point. Initially entitled “David and Jerry’s Guide to the World Wide Web,” this ever-growing list also became an online portal for a small community of friends, family, and other Stanford students as well. This list-making hobby soon evolved into a full-time passion as the pair began spending more time building their online guide than working on their PhD dissertations. As the list became longer, sites were organized and accessed by categories and then sub-categories. Usage of their guide quickly spread by word-of-mouth and it soon became renamed into its current

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\(^2\) Details of Yahoo!’s history and development gathered from Angel, AKA Marketing, Yahoo! Media Relations.
incarnation, Yahoo!. Though the term “Yahoo!” stands for “Yet Another Hierarchical Officious Oracle,” the founders attribute its choosing to its definition which refers to something which is raw and uncouth. Not a year after its inception, Yahoo!’s webpage, which at the time was being served from a computer in a trailer on the Stanford campus, had already amassed more than a million hits and nearly one hundred thousand unique visitors. Clearly, people were interested in how Yahoo! was organizing the web and were finding it useful enough to keep returning. The immense and growing popularity of Yahoo!, while unexpected, was enough to convince Yang and Filo that their once personal guide to the web had the potential to become a successful business. The pair spent the next year, 1995, incorporating their business, securing start-up funds from venture capitalists, and assembling a management team of professionals with extensive experience in the business world. In April 1996, Yahoo! went public with a very successful initial public offering, giving the company the resources to become the Internet media giant that we know today.

Upon becoming a public company, Yahoo! began to expand its range of services in an effort to become a one-stop-shop for web surfers around the world, though the directory remained the focal point of its services. Much of the value of the Yahoo! directory lies in the fact that it is organized by actual humans, providing some baseline assurance of site quality. Every site that Yahoo! lists in its directory has been personally reviewed by a member of its editorial staff for content relevancy and usefulness before being entered into the database. This editorial staff surfs and reviews hundreds of sites every day in order to maintain the high quality of sites listed in the directory. The directory currently features fourteen top-level directories ranging from Society and
Culture to Business and Economy. Each of these top-level directories contains several levels of sub-directories, each of which may contain anywhere from tens to hundreds of website listings. The company decided, however, that its directory, though extensive and popular, would not be enough to sustain the firm’s success. Not long after its IPO, Yahoo! began launching a variety of new features, beginning with the expansion of its services into foreign countries. Yahoo! began with the launch of Yahoo! Japan less than one month after its IPO, and has since developed specialized Yahoo! portals for more than twenty countries. Also quickly following on the heels of IPO was a national television advertisement campaign that gave birth to the tagline, “Do You Yahoo!?” Yahoo! became the focus of much media attention and their website hit the one billion page view mark by year’s end.

Since its founding, Yahoo! has regularly launched an impressive array of services and has acquired a number of small companies and made partnerships with many corporate allies along the way. Yahoo!’s arsenal of services includes specialized portals for travel plans, sports news, computers, movies, real estate, employment, shopping, auctions, virtual greeting cards, and even a portal specifically designed for pet owners. Yahoo! also provides e-business solutions for small businesses and large corporations. Yahoo!’s other sources of revenue include sale of advertisement space, paid premium content and extended services, commission from sales made through its online stores, and paid link placement. In other words, a client can pay Yahoo! to have its link appear higher in the directory or in search results. In terms of free services, Yahoo! offers web based email, online calendars, address books, photo galleries, streaming radio, instant messaging, web page hosting, secure money transfer, advice columns, stock quotes,
weather reports, and maps. The company believed that in order to continue capturing regular users, its site had to span a wide range of services that encompassed interests as diverse as its users—indeed, it had to be as many things as possible to as many people as possible. Because Yahoo! focused most of its energy on its flagship directory and then on its expanding set of services, the company never devoted resources to developing its own proprietary technology. The directory, though vast and constantly growing, is simply a database of links that does not require a substantial amount of innovative technology. One feature that does, however, is the pure search engine. The directory allows users to manually search for web content by navigating categories, but the search engine prompts users to enter in keywords and, using a search algorithm, returns a list of relevant links. The relevancy of the search results depends on the quality of the search algorithm, which can always be improved in terms of both efficiency and efficacy with continued efforts in innovation. Instead of developing its own search tools in-house, however, Yahoo! chose to license search technology from outside companies to support the search feature of its site. Yahoo!’s search partners have included AltaVista and Inktomi, and beginning in 2000, Yahoo! partnered with a company that has proven to be one of its most threatening competitors, Google.

Are You Feeling Lucky Today?

The tale of the genesis of Google is not unlike that of Yahoo!, a great idea born out of the minds of two Stanford students pursuing graduate degrees. For this story, the pair was Sergey Brin and Larry Page, and the time was 1995, one year after Yang and Filo began their list-making from a Stanford trailer. Both were PhD candidates in the computer science department, and, as legend has it, neither were very good friends at the
start. In fact, the two argued quite a bit on a wide range of subjects, except the one that would ultimately pave their way to success: how to build a better search engine. They ruminated over their ideas on how to develop this better engine over the next year, and by early 1996 had a working prototype they playfully named “BackRub.” This name refers to the algorithm they developed to perform searches which analyzes the “back links,” or pages that link to the page in question, in order to determine page relevancy. Brin and Page continued to develop their search algorithm throughout 1996, buying extra hard disk space where they could find bargains and saving money by building office supplies out of Legos. BackRub was tested on a large scale in 1997 when it was used as a search engine restricted to the Stanford domain. The pair were convinced that they had the best searching algorithm of any available at the time, a belief bolstered by the interest and buzz that was steadily growing around them. By early 1998, their passion for BackRub evolved into more than just a hobby, prompting them to purchase a fifteen thousand dollar terabyte of disk space with their credit cards and to set up shop in each of their dorm rooms. Page’s room housed their servers and Brin’s room served as their first headquarters. They also renamed their venture to “Google,” a re-spelling of the number googol and allusion to the daunting magnitude of data available on the Internet. Because Brin and Page began this venture as a purely academic exercise in trying to create the best search algorithm possible, they initially had little interest in starting up their own business based on the technology they had developed. Instead, they intended to try to license their search technology to the major web portals of the day, including Yahoo! which, by this time, had already successfully become a public company and a dominant player in the web portal industry. There were no takers, however, and one CEO’s refusal

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3 Details of Google’s history and development gathered from About Google and Google Weblog.
was even accompanied by the explanation that the portal’s users were not really all that interested in pure search capabilities. One vote of confidence did come from Yahoo! founder and personal friend, David Filo, who recognized the ingenuity of their search engine and encouraged the two to continue perfecting their technology, to start up their own business, and to re-visit the possibility of partnership with Yahoo! when both the technology and business were more developed. Brin and Page took this advice and, in September of 1998, became the latest graduate school dropouts to pursue a dot-com dream. With a collection of computers “borrowed” from the Stanford computer science department and a credit card bill of fifteen thousand dollars, the two went in search of financial support and found it first in Andy Bechtolsheim, co-founder of Sun Microsystems and friend of a Stanford faculty member. Google’s potential was so immediately and abundantly clear to Bechtolsheim that he quickly wrote them a check for one hundred thousand dollars after a short demo given to him on his front porch. Along with their first employee and fellow Stanford PhD dropout Craig Silverstein, who is now their directory of technology, the company spent the next few months in a makeshift office in a friend’s garage and managed to round up nearly one million dollars in investment funds from just friends, family, and colleagues. Even at this early stage when Google was still in beta, their search engine answered over ten thousand queries per day. The buzz surrounding them was sufficient to land them at the center of much media attention and garnered them the recognition of PC Magazine’s 1998 honor of being one of the top one hundred websites and search engines. The quantity of queries and buzz only grew from there. Eventually, Google secured twenty five million dollars from venture capitalists, the same ones who also originally funded Yahoo!, raised their
employee count into the double digits, and, after a quick stint in a cramped Palo Alto office, moved into their current headquarters in Mountain View, now lovingly known as the Googleplex.

The driving force of Google is their dedication to providing the best search engine possible. Quite simply, they are in the business of search. This focus is readily apparent on their website which, aside from a colorful company logo and a few administrative links, features only a solitary search box operated by two buttons, “Google Search” and “I’m Feeling Lucky.” The first one will return a list of links in order of relevancy to the search query, but the latter button will take the user directly to the page that the search algorithm has determined to be the most relevant, a testament to Google’s confidence that it “knows” what the user is looking for. This button is also the origin of one of Google’s mottos, “Are You Feeling Lucky Today?,” a clever irony since search has nothing to do with luck, and, in fact, has everything to do with the complete opposite, a carefully designed deterministic algorithm. The algorithm originally named BackRub has now evolved into a patented technology named PageRank. The key insight of Brin and Page was in recognizing that a page’s relevancy can be determined not only by its content, but also, and equally importantly, by the number of pages which link to it. In the PageRank algorithm, for example, page A receives a vote if page B links to it, and also receives a vote if page C links to page B. In essence, PageRank is a popularity contest. Because algorithms are deterministic and page relevancy is never directly evaluated by a human being, PageRank does the next best thing by using the back links as proxy for human-determined popularity and relevancy. The number of back links effectively shows how many other web users found a particular page useful enough to link to. The search
technology also analyzes page content and position of search terms in the page, but core of its efficacy lies in harnessing the networked nature of the Internet. Google is not only interested in improving the relevancy of its search results, but also the efficiency of their retrieval. Upon entering a search query, the results page announces the time it took to perform the search, which is typically less than half of a second. As the amount of content on the web expands and the amount of information to search through grows, the speed of retrieval will become a more salient issue, but, interestingly, the growth of the Internet actually will improve the relevancy of search results since a popularity contest becomes more accurate as more people vote. Google prides itself on being a company dedicated solely to the problem of search and may be the only online company whose expressed goal is to have users spend as little time as possible on their site.

Though the intellectual interest in solving the search problem is the core of Google, the company must also make money in order to survive and thrive. Google derives its revenue from two sources: sale of its search technology to other companies and sale of advertisement space on its search results pages. As mentioned, Google technology drives the searches on the Yahoo! portal as well as a number of other highly trafficked websites such as CNN.com, WashingtonPost.com, and MarthaStewart.com. Google’s 2000 deal with Yahoo! was a key moment in legitimizing Google’s reputation as a leader in both technology and business. Google’s sale of advertisement space comprises the other source of its revenue and, like the Google homepage itself, is very streamlined. Advertisements contain only text and only appear as they are relevant to a given search query, a departure from the colorful pop-ups that seem to litter the rest of the web. Today, Google stands as successful, profitable, private company that boasts the
largest number of people working exclusively on how to make searching better and faster.

VI. The Late Engine That Could

Armed with an understanding of each company’s basic history and operational foundation, we now turn our attention to analyzing the factors which helped Google come into prominence having entered the industry nearly two years after Yahoo! had already become a well-established brand name and into a market which was already overflowing with competitors in the war for web-surfers’ attention. This analysis will proceed by addressing each issue discussed in previous sections regarding the factors which predict both first-mover and late-mover advantage within the context of the history just depicted. It is important to note that although much of the previously discussed case history tell the tales of winners who take all, or at least a lot, the tale we seek to explore here is not one of such drastic measure. Unlike the ill-fated stories of the Dvorak keyboard or the Beta videotape standard, both of whom have now become only interesting footnotes in the annals of history, Yahoo! has in no way faded into the ranks of obscurity because of Google. Yahoo! continues to be a major force in the Internet economy. The interest and motivation of this writing is not so much in analyzing the failure of a first-mover, but rather the impressive ability of a late-mover to become a credible threat to the first-mover. In fact, the most recent statistics show that Google has now surpassed not only Yahoo!, but also all other search engines in terms of both site traffic and overall time spent on their website.
Since 2000, when Google began experiencing enough traffic for it to comprise a notable percentage of all search engine traffic, its statistics have steadily increased while Yahoo!’s have been on a marginal decline. Nielsen/NetRatings, a leading provider of a variety of Internet usage statistics, defines a parameter called “audience reach” as the percentage of unique visitors to a given search site in a given month. Visits are restricted to search specific visits so as to eliminate counting users who, for example, visit Yahoo! only to check their email. Nielsen/NetRatings compiles its information based on surveys of over sixty thousand Internet users. To give a brief idea of how the search engine tides have shifted over the past several years, Yahoo! had 46% audience reach in June 2000 when Google first showed up on the audience reach radar. (StatMarket 2003) Statistics from January 2003 show that Google has now exceeded Yahoo! in audience reach, having edged out Yahoo! with 29.5% audience reach to Yahoo!’s 28.9%. (Search Engine Watch 2003, Figures 1, 2) Aside from counting unique visitors, tracking the amount of time spent on each site is also a useful statistic. Audience reach numbers indicate overall popularity, while numbers on time spent can give a better indication of usefulness. Though it may be argued that users will spend a lot of time on search sites that produce poor results because of having to sift through all the unwanted results, users are also not likely to return to that site for future search needs. A useful and effective search engine, on the other hand, may not keep users on their site for very long per visit, but will likely keep users coming back, increasing the user’s overall time spent on the site. Thus, the time spent statistic adds a useful dimension to gauging a search engine’s overall popularity and effectiveness. Figures also from January 2003 put total number of search hours for Google at 18.7 million, compared to 7.1 million for Yahoo!. (Search Engine
Watch 2003, Figure 3) It would seem, then, that Google has indeed made its presence
known in the search engine industry and has become a formidable competitor. In order to
understand how this came to be, we now explore how the proposed advantages apply to
the first-mover in our story, Yahoo!.

Network Effects and Switching Costs

As discussed, a substantial advantage is likely to be enjoyed by a first-mover in an
industry which exhibits network effects. The stories of QWERTY and VHS demonstrate
this phenomenon. Because the Internet is, conceptually, a network, one might reasonably
assume that it is indeed subject to network effects. One must be careful, though, in
defining the nature of the network when considering the potential for first-mover
advantage. The key factor to consider is the issue of compatibility. In the case of the
video formats, for example, VHS’s early lead worked to its benefit because users needed
to choose one format to adopt and was thereafter locked into that initial choice. Here,
there are two incompatible, competing networks, and the first-mover derives advantage
from being the first to develop its network. This type of network effect does not really
apply to the Internet network as a whole, since there is no element of network
competition. A company that is first to set up shop online gains access to an existing
network of consumers, rather than the opportunity to build one from nothing.

There is, however, a familiar network effect at work in Yahoo!’s web directory.
Because Yahoo! acts as a gateway between consumers and content providers, each party
derives more value from the directory as the size of the other party increases. Consumers
find the directory more useful the more content it provides access to, and content
providers value the directory more as it allows them access to a larger audience. In this
sense, there is a network effect in that the value of the network is positively correlated with its size. However, this effect fails to confer an advantage on a first-mover because there is no exclusivity about the network. If a consumer chooses to use Yahoo!’s directory, he is not thereafter constrained to that choice by, for example, the compatibility factor that effectively locks a VCR user into only using one format. This occurs because the user need not acquire any physical goods in order to be compatible with and derive value from the Yahoo! network. The same is true for the content providers as well. Unlike VCR or tape manufacturers who must choose one format to produce in, content providers are not limited to having access to only one network, their content can be listed in as many directories as they choose. The role of switching costs is also an important factor contributing to lock in that is not applicable in this case. With traditional network goods, a consumer may be reluctant to abandon his initial choice of network because the cost of switching to a new network, be it financial or psychological, is too high. With the Yahoo! directory, though, there is no cost to the user of using another directory, as there is nothing preventing him from perusing more than one directory. Users need not pay to use the directory, nor is navigation of the directory skill that is difficult to learn and cumbersome to then un-learn in order to use a different directory.

Even if content provision and directory use by consumers were somehow made exclusive such that network effects did benefit the first-mover, Google likely would still have grown into a formidable competitor because it offers consumers and entirely different means of surfing the web. Yahoo! operates by scouring the web for what it deems to be valuable content, and then letting the user browse through it. Google, on the other hand, does the browsing for the consumer and draws its results, not from hand-
picked content, but from the entirety of the Internet. For Google, every searchable website is by default a content provider in its network. In effect, Google’s service maximizes the value of the Internet network for both parties; consumers have access to all content on the web, and all content providers can be found by the appropriate query search by any and all users on the web. Therefore, Google circumvented any possible network effects enjoyed by Yahoo! by offering a service that takes advantage of the whole of the Internet, rather than creating its own exclusive network.

Acquisition of Resources and Technology

Without the benefit of network effects, first-movers might still benefit from having first access to both physical resources and consumer attention. It is clear from the narrative that acquisition of resources for online companies is effectively non-competitive. Both Yahoo! and Google began with just the founders’ personal computers and the access to the Internet provided to them by the university. Neither party is competing for any scarce physical resources, nor is the geographical location of their operations of any importance to its users. The one factor discussed earlier which may be advantageous is the first-mover’s opportunity for building brand recognition and loyalty before anyone else. Yahoo! certainly made concerted efforts towards this end by launching a national television ad campaign not long after it became a public company. The Yahoo! moniker has become extremely well known and perhaps even emblematic of the dot-com era. Again, though, because there are no real switching costs associated with use of Yahoo!’s services, capturing early recognition will do little to keep the user locked into the first-mover’s service if the user is later presented with a superior service.
One non-physical resource which may be crucial to acquire early on is patents for protecting technological processes. As the tale of Yahoo! tells, however, the company did not develop any proprietary technology and instead concentrates its efforts on providing its directory and a variety of services, none of which require innovative technological processes that necessitate patent protection. The one area of its site that is subject to improvement by technological ingenuity is their search engine, though Yahoo! depends on external services to support this feature. By contrast, the driving force of Google’s success is its focus on the one area that Yahoo! failed to develop on its own. Google’s PageRank system is patented, so although they are technically a late-mover in relation to Yahoo!, they could arguably be considered a first-mover of sorts in the pure search engine industry since they were the first to develop a truly innovative and effective process for addressing the search problem. Armed with a patent, Google is able to take advantage of its technology by licensing it out to firms such as Yahoo!.

Another factor which had the potential to benefit the first-mover was the fact that, by the time Google had gotten on its feet, Yahoo! was already a firmly established company in terms of organization and management. Yahoo! had already gone public when Google was still an as yet unrealized research problem in the minds of Brin and Page. Google’s ability to quickly get on its feet can be attributed to a combination of both luck and having a technologically sound product. The luck factor derives from Brin and Page’s personal network, which connected them with their first substantial investor who was convinced by the ingenuity of their product. The birth of Google also occurred in the midst of the dot-com craze when venture capitalists were more than eager to fund the next big thing, whereas the same great idea may find more resistance from investors
now that the dot-com bubble has burst. Also, because Brin and Page are computer scientists by training, they hired a team of people with extensive experience and knowledge of business to run the non-technological side of the company. Thus, Yahoo!’s head start in setting up operational and managerial infrastructure was mitigated by the fact that late-movers do not start from nothing and can call on existing professionals to help them make up lost ground.

**Late-Mover Advantage**

The issues of free rider effects, resolution of uncertainty, and first-mover inertia also played a role in helping Google come into prominence. Yahoo!’s development was not based on any specialized technology or process, so the free rider effects in this case are more closely related to resolution of uncertainty. At the time of Google’s development, the explosion of the Internet was still relatively new and the question of how users could best take advantage of the Internet was still largely unanswered. Yahoo! found enough interest in their directory approach to justify starting a business, but this was not say that theirs was the only way. Other pure search engine companies such as AltaVista did exist at the time, but Brin and Page were dissatisfied enough with their performance and the current state of search technology in general that they decided to tackle the search problem on their own. Though Google’s late entrance into the search industry was not the result of any deliberate, strategic planning, it did allow them time to observe what they perceived to be the shortcomings of existing search services.

Google offers a method of navigating the Internet much different from the directory approach of Yahoo!, but the question of whether Google’s current popularity over Yahoo! was a result of Google tapping into a changing consumer preference or
whether the emergence of Google initiated that shift is an ambiguous issue. In either case, statistics on site traffic and time spent on the Google and Yahoo! sites indicate that Internet users now prefer to have search results brought to them rather than hunting through a hierarchy of collected links. This would seem to indicate that, when using the Internet, people tend to know exactly what they are looking for, whereas the directory scheme works on the principle that users know the general categories of what they are looking for, but not the specific sites. Even if a user only had a vague idea of what he was looking for, Google may still be able to offer him more efficient results than through a directory. This shift toward consumers knowing what they want also helps to explain why Google has remained prominent despite Yahoo!’s continually expanding plethora of services and specialized portals. This stands in stark contrast to one of Google’s company mantras, which is to do only one thing and to do it well. Fortunately for Google, the one thing they choose to do well is aligned with how users have come to use the Internet and is a service that will remain useful to all Internet users so long as there exists content to be found. On the other hand, Yahoo!’s strategy of offering specialized services is dependent upon having to constantly keep up with consumer tastes and needs. Even their directory, which serves the same purpose as a search tool, must be maintained by humans. The human factor limits the pace at which the resource can grow, whereas Google is limited in no such way and, in fact, its service becomes more valuable as the Internet grows in content.

Clearly, Yahoo! and Google take two very different approaches to the same task of helping users navigate the vast expanse of cyberspace. Because Yahoo! has already devoted itself to being a services rich web portal and directory, it may be said that they
face some first-mover inertia, and, in fact, it would be economically unjustifiable for them to convert their resources to becoming a direct search competitor for Google. Instead, Yahoo! chose to do the next best thing by licensing Google’s search technology. However, even despite incorporating Google’s search into its portal, Yahoo! still falls slightly short of Google in terms of site popularity and usage.

The tale that has been told here, however, would not be entirely complete without putting both Yahoo! and Google into the larger search engine industry context. Though both companies have emerged as prominent figures, the industry is by no means solely dominated by them. In early 1996, before Yahoo! had become a public company, a war was beginning to brew that would later become known as “the portal wars.” (Angel 123) By this time, households were jumping onto the Internet bandwagon at an impressive rate, compelling many companies to race to become these users’ first-stop Internet portal. The early years of the war saw a plethora of portal sites vying for user attention, but the major players of the day were Yahoo!, Excite, Lycos, Infoseek, and AltaVista. As the war heated up, surviving the competition meant keeping up with the number of ever-growing number of new features and services that were constantly being added to portal sites. Because many of these portals relied on advertising as their main source of revenue, it was imperative to keep users on the portal site for as long as possible. The war thus became a race to amass an arsenal of services, such as web-based email, that capture the user’s attention for an extended period of time and keep the user on the portal site. In the end, it seems that Yahoo! had emerged the victor. By September 1999, one statistic showed that ten portal sites, including Lycos and Excite, combined, only
comprised a mere five percent of all web traffic, while Yahoo!, along with AOL and MSN, comprised fifteen percent. (Schlosberg 2003)

In the framework of first-mover advantage theory, the race to provide more and more services falls under the category of early acquisition of assets and resources. Yahoo!’s ability to continually offer services has been in large part due to its purchases of small companies that develop these services, such as its 1997 acquisition of the company Four11 to offer its email services (Angel 130) Thus, a firm that can acquire services more quickly, be it through acquisition of smaller firms or in-house development of the service, will gain an advantage over its competitors. Yahoo!’s ability to effectively broker deals with small service providing firms and its mentality of adopting services even before they knew exactly how useful they would be, just to preempt competitors, proved to be a successful formula. One non-tangible resource that Yahoo! recognized as essential to capture early on was that of consumer perceptual space. Yang himself noted that “people attach an emotion to our service. If we don’t have that emotion, we’re just like every other service... We had to invest in brand so that people could see us as more than just technology.” (Angel 125) This attitude compelled an enormous marketing campaign that gave birth to its now famous slogan, “Do You Yahoo!?”. For Yahoo!, its early footholds and attention to brand marketing results in positive feedback; that is, as the firm gains more recognition, its site traffic increases, it is able to command more advertising revenue, giving the firm more resources with which to continue expanding its services and growing its brand. For competitors, the feedback is negative: as its traffic decreases, its revenue sources dwindle, and the firm is unable to expand its offerings, driving site traffic even lower, making the firm less and less financially viable.
Though Google entered the picture at the tail-end of the portal wars, it by no means entered an environment populated only by a few dominant players such as Yahoo!. A gander at, for example, SearchEngineColossus.com quickly reveals that there are easily thousands of search sites available on the Internet, many of the region-specific, yet Google still remains the most used search engine on the Internet. Google’s dominance over all other search engines sites can be attributed to the same factors which have explained its ability to effectively compete with Yahoo!.. The vast majority of other search engine sites, in addition to being region-specific, offer a directory in addition to a search service. As the analysis has shown, much of Google’s appeal and success results from its sole concentration and dedication to the area of search. Also, Google’s lack of geographic specificity makes it effectively an umbrella engine to all others in that a site found from a region-specific search site could also be returned as a result of a Google search. Though a myriad of engines do populate the Internet, Google leads the pack on the search front.

V. Concluding Remarks

We learn from the tale of two engines that the purported advantages of being first to market, though they well explain the outcomes of some industry competitions of days past, are by no means steadfast rules which dictate the outcomes of all industries. Particularly in the context of the Internet, which created a new virtual space for market interaction, principles which govern the patterns of traditional brick and mortar industries seem especially vulnerable. This paper began with a survey of first-mover advantage theory and highlighted some classic case studies which demonstrate the principles of the
theory in practice. We then introduced the Internet into the analysis and explored how the characteristics of the new Internet economy interact with ideas derived from the “old” economy. Through a case study of Yahoo! and Google, two majors players in the search engine industry of this new Internet economy, we see that in an unexplored realm, such as the Internet was in the early 1990’s, the advantages of being first were not as potent as perhaps expected. Although Yahoo! has far from yielded its market power to Google, we find that the factors which helped propel Google to prominence include lack of traditional network effects or consumer switching costs, and, more importantly, a technologically innovative and useful service which resonated with, and perhaps even caused, a shift in users’ relationship with the Internet. Thus, although the early bird may fetch a worm good enough to keep it alive and healthy, the second mouse may have found a tastier and longer lasting delectable in cheese.