How Network Science Can Speed Up Your Success by 10 to 20 Times.

Marshall Thurber, J.D.
**William Seidman, Ph.D.**
Greg Bundy, B.S., P.D.

Recall the most influential teacher you had growing up and then think of the most successful movie actor or actress in Hollywood. Which one added the most value to you? Obviously, the answer is your teacher. Why then do successful actors and actresses make so much more money? They certainly don't add as much value.

The first principle of speeding your success by 10 to 20 times:

Understanding the Theory of Leverage

The answer to why actors and actresses make so much more money than your most influential teacher is leverage. Leverage is a theory. A small force applied **over a long distance** has a greater impact than a large impact applied over a small distance.

The simplest device for creating leverage is the lever. A lever is a stick which rests on a fulcrum near one end. When you push the long end of the lever, the short end (on the other side of the fulcrum) only moves a small distance out, but with a much greater impact. With this device a human can easily lift several times one's weight. Leverage is a universal theory that applies regardless of the type of fulcrum or lever used.
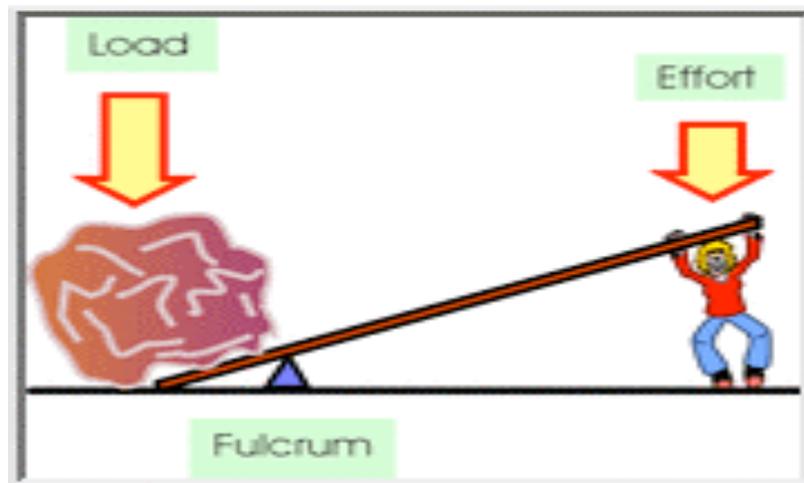
Perhaps Archimedes' most famous quote was: *Give me a lever long enough and a fulcrum on which to place it, and I shall move the world.*

Archimedes (287 BC–212 BC) was an ancient mathematician, physicist, engineer, astronomer and philosopher born in the Greek seaport colony of Syracuse. Archimedes is considered one of the three greatest mathematicians of all time along with Newton and Gauss. As a result of his involvement defending Syracuse against the Roman siege in the First and Second Punic Wars, Archimedes became famous. He is reputed to have held the Romans at bay with war machines he designed; once Archimedes demonstrated the power of leverage by moving a full-size ship complete with crew and cargo by pulling a single rope.

Now, getting back to the most influential teacher you had growing up versus the most successful actors or actresses - despite the fact that your teacher added far more lasting value than the movie star - your teacher had very little leverage. Your teacher stood in front of relatively few students. In contrast, the movie star makes the movie once and thousands of copies are made. It is watched by thousands of movie fans in theaters and millions more on television and DVDs.

The relatively low lasting value of the movie star has far longer reach (a much longer lever so to speak) than the high lasting value of your influential teacher. The leverage of professional athletes is the same. They are watched by thousands live in the stadium andmillions more on TV.

The success formula is quite simple: the higher the value (force on the lever) times the distance of the reach (length of the lever) the greater the impact (financial success). High value without reach produces low financial reward. It may not seem fair; it is however the way the eternal principle of leverage works.

Leverage is the first principle/theory of speeding up your success by 10 to 20 times. You must create leverage. Without it you are destined to emulate your most influential teacher: high value with low financial reward.

The second principle of speeding your success by 10 to 20 times:

Understanding the Theory of Change

The second principle of speeding up your success by 10 to 20 times requires understanding the theory of change.

Shortly after the turn of the 20th century the famous American financier J.P. Morgan made one of his infrequent public appearances. He was testifying before a U.S. Congress committee. Nearing the end of his testimony a young congressman asked the elderly genius, "Mr. Morgan, what will the stock market do?" Morgan paused for a moment and calmly replied, "It will fluctuate."

This type of change is called *cyclical* change.

In the desert of Alamogordo in the early morning of July 16th,1945, a blinding flash turned night into day. At that moment, the nature of warfare was permanently altered. There was no going back. Future relations of all nations were irreversibly altered.

This second type of change is called *structural* change.

Understanding and being able to identify these two types of changes are critical to speeding your success. Depending upon the type of change your response needs to be very different. The type of change J.P. Morgan was referring to is cyclical. It refers not only to the stock market but also to many other types of activities.

As the name suggests, cyclical changes fluctuate in patterns that repeat over and over again. The early rotation around the sun that produces day and night; the cyclical beating of the heart; the phases of the moon are all very predicable cycles.

Less predictable, yet still demonstrating the cyclical dynamic are certain types of human behavior. These changes generally fall within certain boundaries. For example, the information that comes from the exterior of the human body provides the necessary data to maintain a body temperature of 98.6 degrees. Similarly, the stock in a grocery store is replenished based on inventory levels. The same is true of interest rates as they fluctuate based upon economic circumstances.

Unlike structural change, these cyclical changes do not create fundamental alterations. Instead, they create adjustments that are almost always temporary. Failing to understand cyclical change can produce costly errors.

Business Cycles are what their name implies: cycles. There has never been a recession without a recovery. In the United States there have been over forty cycles of recession and recovery since 1790.
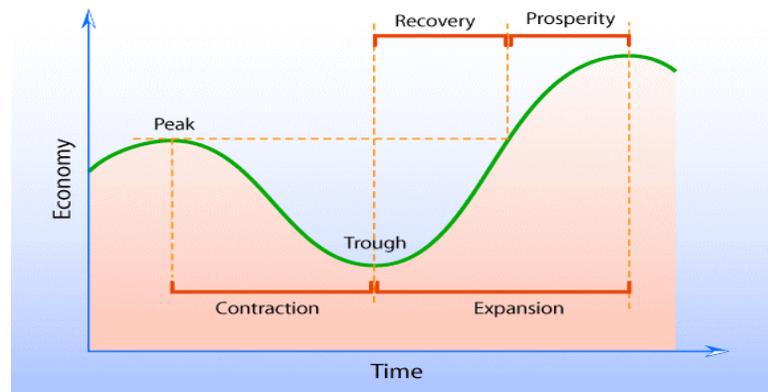
Human behavior also exhibits cyclical change. Enrollment in law schools increases and decreases and the same is true for medical schools and nursing programs. Granted, these demand-supply cycles vary greatly depending on the type of occupation, its size, and the amount of training needed. However, these changes are clearly cyclical.

The same is true for organizations. They cycle between poles of centralization and decentralization. While companies may parrot their desire for stability, the reality plays out differently. Most companies want improvement of some type - one that allows them to be more productive. At some point continued movement in one direction doesn't bring

the desired return. The company leaders (or their successors) begin a counter movement until that direction no longer produces the desired benefits. When that happens the cycle begins all over again.

The same is true of democratic governments. Alternatively, the voters embrace liberalism and then conservatism. Like companies, when democratic policies in one direction fail to bring the desired outcome, political leaders emerge with a counter movement which over time no longer produces the desired result. The cycle then repeats. The same is true of fashions and fads. Men's ties get wider then narrower; women's skirt length moves higher and then lower.

Once you have determined that you are dealing with a cyclical change, your success requires that you evaluate its position within the cycle. Two dynamics are involved in this assessment. The first is *pace*.

Question: from 1935 to 1950 how many times did the prime rate change? Answer: three times. How many times has it changed in the last fifteen years? Obviously, it has changed many more times than three. Hence, the pace of change has increased. The same element (pace) is within all cycles. The cycle has a pace and it is either increasing, decreasing or remaining constant.

It is very difficult to predict the pace of cyclical change exactly; hence it must be looked at in terms of probabilities. You must perform a probability weighted analysis to determine the appropriate pace. The better you can determine the probability that the pattern will repeat, the better you can predict when the cycle will start to reverse.

The second dynamic of cyclical change is *magnitude*. Granted, economic cycles vary considerably, yet these rates are normally within certain narrow boundaries. Even when they go outside of these boundaries, they are never in any sense completely unbounded. Interest rates can only go so high before they must retreat because of economic forces. The same is true for skirts; they can only go so high or so low before the direction must reverse.

While both pace and magnitude are not easy to discern (the best one can do is to deal in probabilities), to increase your success you must ask the questions. To increase your success 10 to 20 times you must constantly assess the position of the cyclical change. What is the pace of this cycle? What is the magnitude of this cycle and how close is the cycle to its upper or lower boundary? Remember: a great answer is no answer to someone who has never asked the question. Understanding cyclical change and assessing both its pace and distance from its boundary will dramatically increase your probability of success.

The mushroom shaped cloud in the desert of Alamogordo in the early morning of July 16th,1945 is an example of a completely different type of change. It's called *structural*.

When this type happens you have no vote. You are forced to embrace it. The world is not going to return to pre-nuclear age no matter how many or how intense the protests.

When the automobile was created, there was violent opposition. Anticar activists tore up roads; they ringed parked cars with barbed wires and organized boycotts of car-driving businesspeople and politicians. There was a huge religious movement against the car. It was called the "devil wagon" in that most were black and the things that could be done in the back seat were clearly immoral.

It doesn't matter what you or anyone else thinks. When a structural change takes place you *must* embrace it. You may love your beautiful horse Bessy. That is fine; keep her *and* learn how to drive. If you don't quickly embrace a structural change you have very little chance for sustained success. The horsepower of the automobile overwhelmed the benefits of Bessy, no matter if she is the most powerful horse on earth.

This is true of all structural changes. They change the future forever. The quicker you embrace a structural change and take a leadership position the more successful you will be. Where are the 78 records? Where are the LP albums? How is the typewriter business? All the king's horse and all the king's men are helpless in the face of a structural change.

Structural changes are only replaced by other structural changes. They never revert to the old method. CDs will never be supplanted by LP albums, just like 78 records could not supplant LPs. Only a new structural change that adds more value will replace CDs.

A quick quiz - are the following changes structural or cyclical:

- The telephone
- The fax machine
- The computer
- Stem cell research
- The Internet

While some may question whether stem cell research is structural, we believe all the above are structural changes. Like all structural changes, the successful strategy is to embrace them and take a leadership position to channel their direction.

Very few would argue with the conclusion that the Internet is a structural change. It has and will continue to change the economic order. Like all other structural changes, those who both understand and embrace this change will prosper. Those who don't will be as effective as those who are still using horses as their primary mode of transportation.

The third principle of speeding your success by 10 to 20 times:

Understanding Network Science

The Internet has three distinguishing characteristics. First, it is global; second it is predominately intangible (it deals with communication, information and relationships); and most importantly it creates networks. Networks are the dominant dynamic of success for the 21st century.

It's not about computers; most of the consequences of stand-alone computers have happened. They have sped up our lives by managing words, numbers and pixels. Where new value is being created is in connectivity. An example is the fax machine. One fax machine is worth nothing. When you have two connected there is some value. Each time another fax machine is added then the value of *all* the machines is increased. This network effect is transformational. Unlike traditional economic theory, which is based upon scarcity (the traditional definition is the allocation of *scarce* resources), the network economy is just the opposite. The more you share the more you value what everyone in the network has!

Traditional economics is based on hard goods. The more scarce the good (e.g. oil) the higher the price. In the new predominately intangible economy, both the value and the quality increase as more intangibles are shared. *Sharing is having more.* This reality may initially seem to violate your natural inclinations. That's what happens when one is introduced to a structural change. It's a similar experience to those who had to learn how to drive a car when they were accustomed to riding a horse.

Networks are the gasoline of the future. No matter how beautiful your new automobile may be, without gasoline it goes nowhere. No matter how dynamic your offering is, it will not succeed without a network. The deeper and wider your network, the faster your dynamic value (DyVal) will be accepted and the less likely others will be able to copy it.

If you want to increase your success by 10 to 20 times you must understand:

- what a network is
- how to create one
- how to optimally grow one

To do this you must understand the fundamentals of Network Science.

Looking at network science from a leverage perspective, there are three basic components needed to move a heavy object. You need a fulcrum, a lever and effort exerted at the end of the lever. The longer the lever the less effort is needed to move the heavy object (in this case the heavy object is increasing your success by 10 to 20 times). The further the lever is from the fulcrum the easier it is to move the object.

In the 21st century your network is the lever in leverage. You still need a predictable system (the fulcrum) and the dynamic value (the force) to succeed. However, it is the length of the lever that reduces the effort.

Networks are not Network Science. Just like soup. You know when you are sipping soup and you also know when it tastes good. That doesn't mean you are a great chef. A great chef understands the dynamics within the soup that make it so exquisite. The chef understands food theory. He/she understands how all the ingredients interact and is able to *predict* the extraordinary sensory experience. To succeed in the 21st century you have to become a network chef.

The Internet is a structural change. To succeed in the 21st century you must embrace it. You have no vote; just like you had to learn how to use a computer (an earlier structural change) you now have to learn how to use networks. To predictably increase your success by 10 or 20 times you must, just like a great chef, learn theory. Understanding network theory is the oxygen for success in the 21st century. Only with an understanding of network theory can you predict future performance.

All networks can be quantified and described with the same terms because they follow the same laws. Whether it be a social network of friends, a network of the web's five billion web sites, the biological network of a food chain, a business network, the network of a city, or the intra-cellular proteins network, they all operate with the same theory and follow the same laws.

By understanding network science you will know how networks function and grow. You can then develop strategies to build your network. Remember, the larger your network the longer your lever. The longer your network lever the easier and faster your success will be.

The first step in understanding Network Science is to learn the basic terms. The most fundamental building block of networks is a *node*. A node is a noun; it can be a person, place or thing. For a node to be a network is must be connected by a *link*. Two nodes connected by one link is thus the smallest possible network.
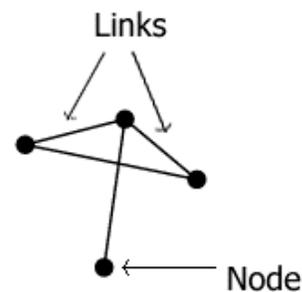
When you have three or more nodes all connected to each other you have a *cluster*. The larger the number of nodes linked together, the larger and more visible the cluster is. A *hub* is similar to a cluster except that a hub has many more links.

If every document on the Internet were linked to your web page, then in a very short time almost everyone would know you and what you offer.   Unfortunately, 90% of all web pages have ten or fewer links.   A few (e.g. Google, Yahoo!, Amazon) have a million or more links.

Hubs
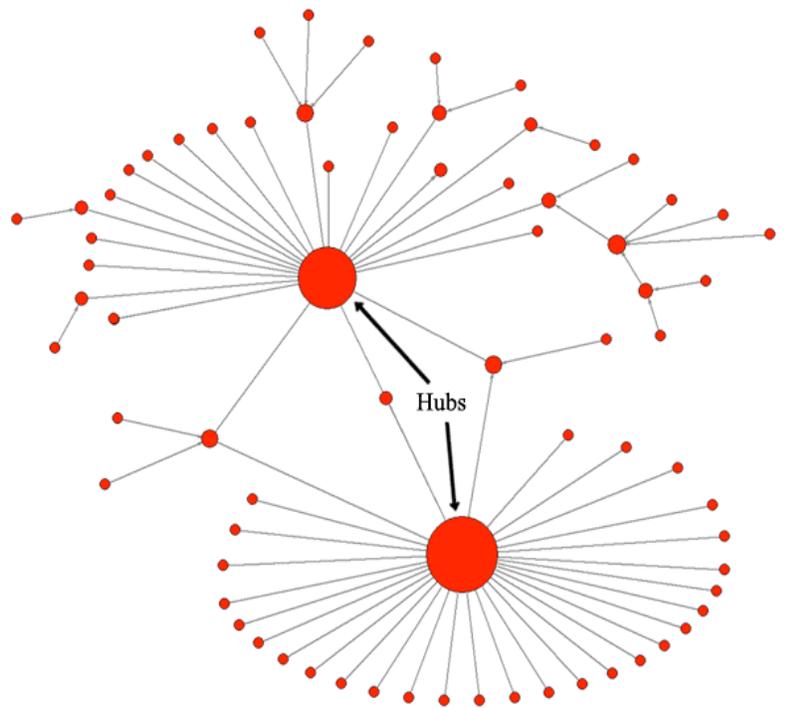
Increasing Returns

It is a mathematical fact that the value of your network increases as the square of the number of its members. In other words, as the number of nodes in your network increase arithmetically, the value of the network increases exponentially.

For example, there are 14,857 airports in the United States. If someone gave you a choice: You can receive $10 for every passenger landing at 20% of all the US airports (assuming these airports are chosen randomly) or you can take $10 for every passenger at the top twelve US airports? The choice: 2,971 airports chosen randomly or the top twelve airports rated by passenger volume.

Take the top twelve (Atlanta, Chicago, Los Angeles, Dallas/FT Worth, Denver, Las Vegas, New York [JFK], Minneapolis/St Paul, Houston, Detroit, San Francisco and Newark). On average you would receive 2,200% more income by picking the twelve hubs. Why? They are hubs. The impact and power within a network is found in the hubs. All networks that are created by preferential attachment (as opposed to random networks) create hubs and they can only be understood after you have learned the power curve theory of Network Science.

The power curve is very different than the standard bell curve commonly used in statistics. In a power curve there is usually one large hub. This one hub is closely followed by two or three somewhat smaller hubs that are then followed by dozens that are even smaller. The size of these clusters diminishes very quickly.

Preferential attachment is what creates power curves. The Internet is a power curve (because people choose to attach themselves to one site over another). So are the equally intricate webs of chemistry that underlie the workings of a cell. They show precisely the same architecture as that of the Internet and the World Wide Web.

The same power curve is found in food webs, where species link up with one another by virtue of predatory-prey relationships. Businesspeople create a power curve by virtue of sitting together on the boards of directors of major corporations.
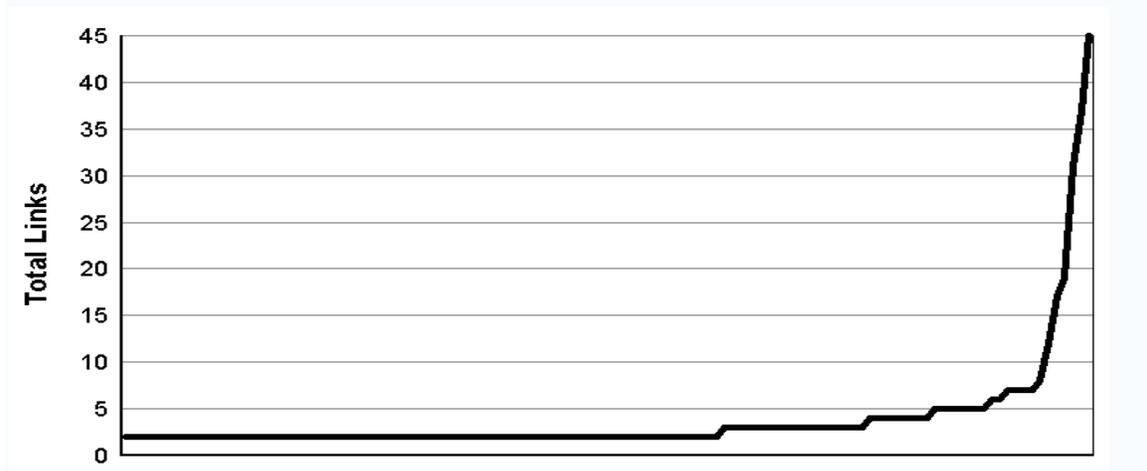
Power Curve for the Hub Network

Power curves even show up in the structure of human language. The British National Corpus has a 100-million-word collection of samples of written and spoken language. These samples come from a wide variety of sources. Recently they studied the linking relationships between 460,902 words in the English language (they considered the words "linked" if they appeared close to each other in the English language). The same power curve was discovered. The words *a, the*, and *at* are the English language's "word hubs."

What does this all mean? It means that to speed up your success by 10 to 20 times you must make you or your organization a hub. You do this by connecting yourself or your organization with other hubs.

To become a hub you must first create or align (which is often faster and easier) with unique dynamic value. How this is done is the subject of another paper. What we are assuming here is that you have done this. To become a hub you must feed the web. Networks are nurtured by making it as easy as possible to participate. The more the network is used, the more it grows and the more demand there is for it.

What is the most cost effective way to become a hub? Give dynamic value away for *free*.

Microsoft gives away its Internet Explorer web browser for free. Qualcomm gives away its popular email program. Thomson, the eight billion dollar a year publisher, gives away its precious high-priced financial data to investors on the web. Millions of copies of McAfee's antivirus software are distributed free each month. Java was passed out free by Sun Microsystems.

Why do they do this? It is the quickest way to create a network hub.

Apple Computer's superior operating system lost to Windows because it did not share its operating system. Sharing it freely would have created Apple as the hub instead of Microsoft.

Another example is Citibank, which pioneered the use of 24-hour instant cash at ATMs. Citibank blanketed New York City with their proprietary machines. At first it was highly successful. Smaller competing banks started their own proprietary ATM networks, yet initiallyfound that they couldn't compete.

Then the smaller banks changed their strategy. Led by Chemical Bank, these smaller banks banded together to form an *open* ATM network called Plus. It didn't matter what bank you used. If you had a card from any bank (except Citibank) you could get money.

The "sharing is having more" network theory kicked in. Suddenly, any ATM was your ATM. This handy Plus offering attracted more and more customers. Quickly the sharing team overwhelmed the once dominant Citibank ATM system. Citibank had no choice; they were forced to jettison their proprietary machines and join the "sharing is having more" network.

Important Network Science principle: *a small piece of a rapidly expanding pie becomes a much bigger piece.* Remember, with each new link the value of your network increases exponentially.

Companies that embed themselves into the social network of an industry by creating lots of contacts (links) to other companies, suppliers, industry magazines, customers, government, and workers grow quickly. The bigger their network the more likely new nodes entering will link to them. This feedback loop gives preference to the large nodes. What happens is the successful become even more successful. The node with the most links gets even more links.

At some point, the network will undergo a phase transition from "just a bunch of separate companies" into an industry. The core companies become institutionalized. Their internal standards become the industry's standard. When this happens they own the industry.

In a network economy (which the structural change of the Internet has created), companies that pursue a "business is war" or "win/lose strategy" are now at a tremendous disadvantage. They are focusing on winning rather than creating links. As a result newcomers don't link to them. When the business cycle downturns these "business as war" companies have a very difficult time; it doesn't matter how much dynamic value they may have.

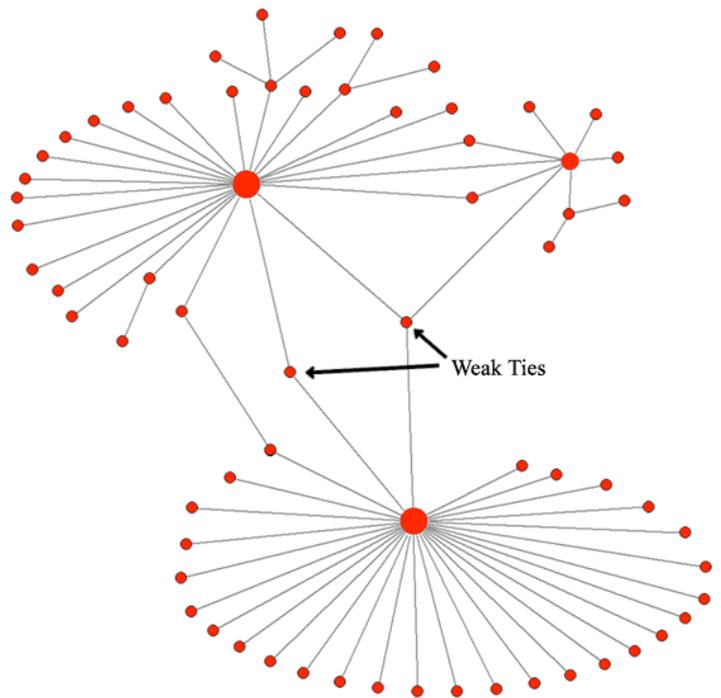<center>**The Strength of the Weak Tie**</center>

In addition to speed, networks thrive when they focus on making their links as diverse as possible. In the late 1960s, Granovetter, a sociologist now at Stanford, studied how people found jobs. Until then, it was generally assumed that society was homogenous.

Granovetter discovered that society is not homogenous; it is made up of groups of closely linked people (clusters), who are linked by one or two weak connections.

Granovetter's paper entitled "The Strength of the Weak Ties" is recognized as one of the most influential sociology papers ever written. It demonstrates that weak contacts are twice as effective (28%) as strong contacts (17%) when a person is finding a job.

This may seem counter-intuitive. It would seem that close friends would be better at providing job leads. However, humans tend to gather within groups of similar interests. For example, if a tennis instructor wants new students, there's no point in asking his network of friends who are tennis instructors. He will find more students by asking people in clusters that have nothing to do with tennis: church groups, knitting clubs, and so on. Those clusters have a much higher probability of needing a tennis instructor.

Each weak tie brings you into an almost virgin network. When you link into the weak tie network it expands your network rapidly. Remember: the speed of network growth is at least as important as dynamic value.

Strength of the Weak Tie

Threshold Theory

If you are going to start a new religion you probably would not attempt to launch it in Rome. The threshold (how easily the person can be influenced) is too high. Creating a hub quickly requires finding networks that 1) need your dynamic offer and 2) are easily influenced.

Watts Wacker, in his book *The Deviant's Advantage,* points out that all new hubs start at the fringe (i.e. those with the lowest threshold). They then move to the edge and then to the realm of the *cool*. After the realm of the cool it moves to the *next big thing* and finally the network moves to *social convention*. Important point: not every network that starts at the fringe makes it to social convention. However, every network that does make it to social convention started at the fringe.

High Threshold Networks

How does one link with those who have high thresholds? How does one entice them to join your network? The answer: use an *influencer*. An influencer is an individual who has a strong link to someone within the targeted network. If that influencer makes the request instead of you the high threshold is reduced.

For example, if I wanted to meet a certain head of a hub who was a devout Catholic, I would probably get a meeting if the Pope called and recommended that this be done. As a general rule, the higher the threshold, the fewer influencers there are to the hub of that network.

The Summary

If you want to speed your success 10 or 20 times you must rapidly create leverage. Leverage has three components: 1) the lever (in this case the network), 2) the effort (your dynamic value) and 3) the fulcrum (the predicable system). Neither dynamic value nor the predicable system is addressed here. For purposes of this article, we focused on Network Science.

- For optimal results, make an offer that embraces a relatively new structural change. It works best if the structural change is either at the "fringe" or the "edge" of adoption.
- Decide what part of your offering you are going to feed your potential network for free (or as close to free as possible). Remember, with each new link the value of your network increases exponentially.
- Identify the networks you want to create links to
- Identify the hubs within that network
- Start making your free or near fee offer to the networks with the lowest thresholds (usually on the edge or fringe). Feed them immediately.
- Find the weak ties into as many diverse networks as you can identify and feed them.
- Should you need to link to a "high threshold" network then find an "influencer" who can reduce the threshold within that network.
- Focus attention on the hub(s) of your identified networks. Share with them freely.
- When you do the above, the speed of your success will be 10 to 20 times faster than following traditional 20th century methods.

To learn more about the power of network science, positive deviance, and other Success Secrets of the 21st Century join us at:

www.positivedeviantnetwork.com