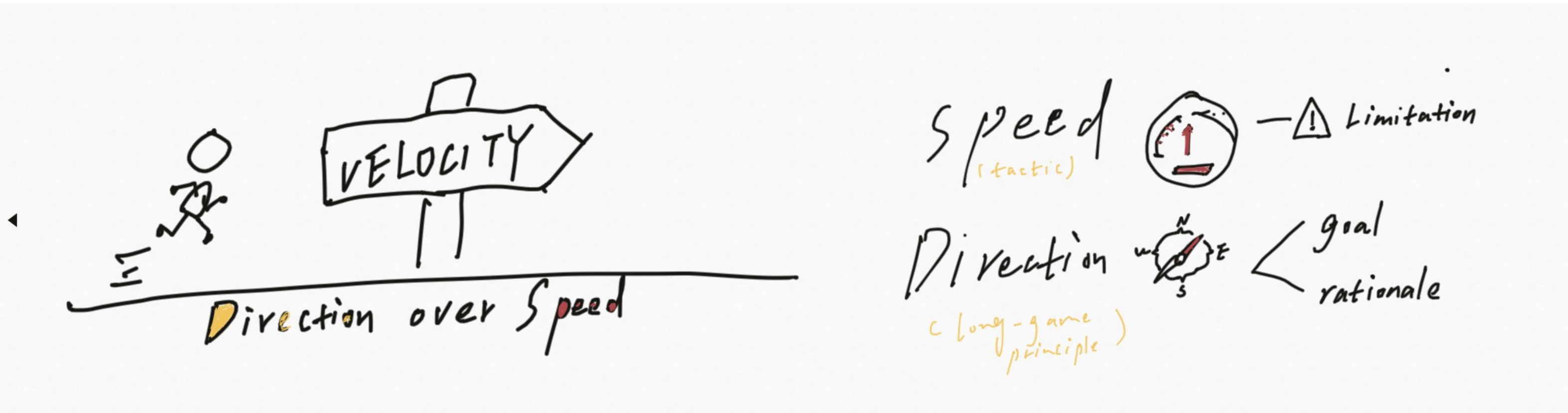

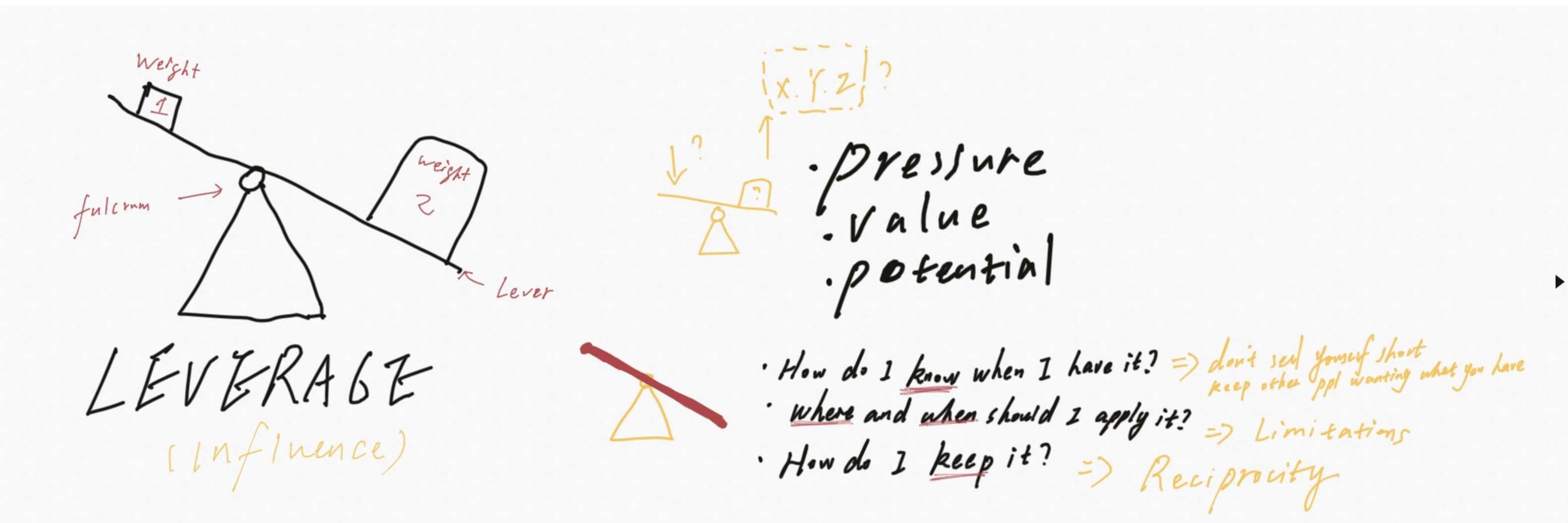

王莎 21:00

in no small part

Anita 21:00

in no small part

kaili啊 21:00

in no small part 主要xxxx

Sicy 21:01

sit on a gold mine

王莎 21:01

sit on a gold mine

Sicy 20:32

cash in on the AI craze

jing 20:32

rationale

May 20:32

cash in on the AI craze

王莎 20:37

scope

May 20:37

take into account/factor in

Sicy 20:37

size up the situation

jing 20:39

frequent

Sicy 20:39

focus on the long game

Anita 20:40

focus on the long game

jing 20:42

find a balance between mass

Jimmy Liu 20:43

kaili啊 20:26

treacherous

剪影 20:26

treacherous

Anita 20:26

treacherous

jing 20:27

occupy

jing 20:31

move fast and break things

jing 20:31

untenable

Sicy 20:19
go for broke

王莎 20:19
go for broke

jing 20:19
go for broke 孤注一掷

Sicy 20:20
rhrow caution to the wind

阿拉伯土著𓃠????𓃠 20:20
throw caution to the wind

jing 20:21
throw caution into wind

jing 20:21
jettison

Sicy 20:25
false dichotomy

kaili啊 20:25
false dichotomy

刘小咪 20:25

catch sb off guard

阿拉伯土著𓃠????𓃠 20:15
catch sb off guard

July 20:16
catch sb off guard 打个措手不及

王莎 20:17
obviate

kaili啊 20:17
obviate

jing 20:17
obviate

May 20:17
obviate/eliminate

jing 20:18 Scantly
poorly clothed

阿拉伯土著𓃠????𓃠 20:18
jettison

May 20:18

sprinkle

王莎 20:10
sprinkle

剪影 20:11
running in place 原地打转

kaili啊 20:11
running in place

高洁Gemma 20:12
rat race

kaili啊 20:12
hamster wheel/rat race

王莎 20:12
hammer wheel

Sicy 20:14
catch sb off guard

Steve is a visionary

虎玲 20:05
detrimental deleterious

虎玲 20:06
through the angle/lens of

jing 20:07
assumptions blind deleterious

jing 20:08
winnow cul

虎玲 20:08
assumptions blind, hypothesis guide

May 20:08
winnow the chaff from the grain

王莎 20:08
winnow

People also ask

What is the hamster wheel metaphor?

Meaning of hamster wheel in English

an activity that involves someone being busy all the time but never achieving anything important or reaching the end of a task: There's always something that needs to be done to the house. It's like a hamster wheel.

Chemistry

Activation Energy

–

Get to the end.

Activation Energy

Activation energy is needed for everything from getting up in the morning to revolutions. It's the ingredient that starts a reaction, breaking apart the current state of affairs and transforming it into something new. When we have enough activation energy, we have the power to finish a reaction, achieving a sustainable result. We know the amount of activation energy is correct when enough new connections form that it becomes impossible to revert back to the way we were. In chemistry, activation energy is the energy that must be delivered to a chemical system in order to initiate a reaction, breaking bonds so that new ones can form. Molecules must collide to react, and movement speeds up when temperature increases. All chemical reactions have a required activation energy, but there is a range. We start with an increase in temperature, which leads to an increase in molecular velocity, resulting in an increase of the frequency of molecular collisions. The more collisions, the more chances of having sufficient energy to produce a reaction.

— Sidebar: Energy and Climate

Naturally, then, reactions requiring greater activation energy usually proceed slower. The inputted energy, usually in the form of heat, breaks the bonds of the reactant molecules and increases their speed, thereby increasing their rate of collision. The state in between the initial and final stages of chemical reactions is the high-energy, unstable transition state. Because the transition state is unstable, the molecules don't stay there long—they quickly

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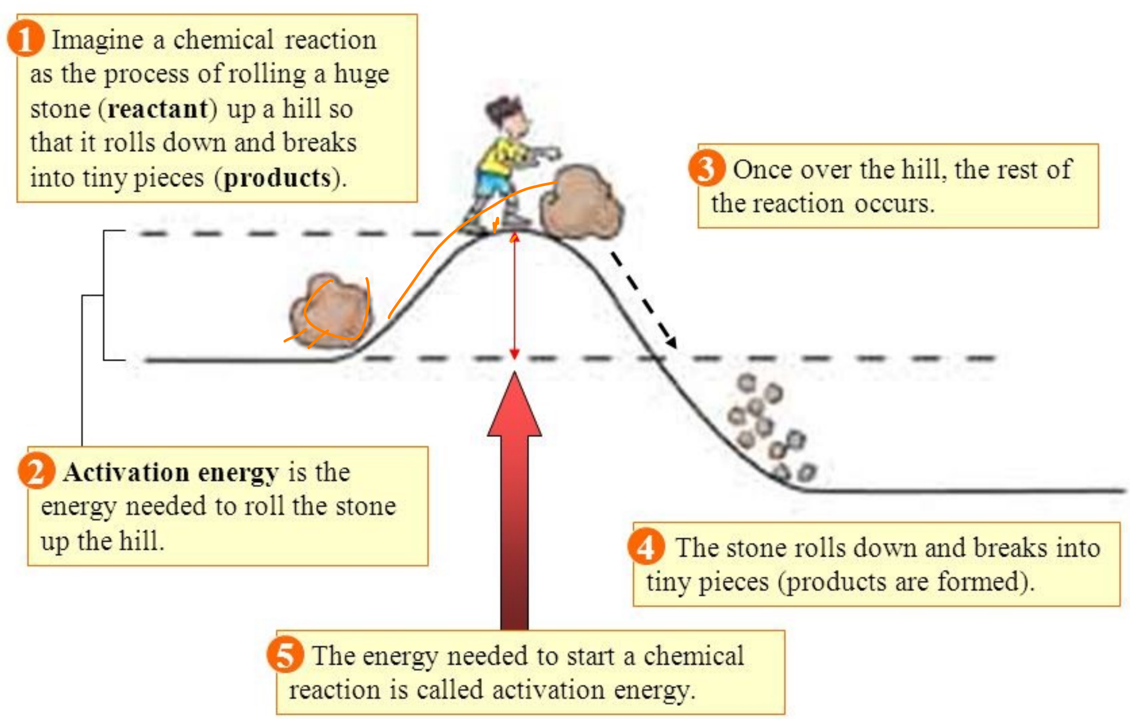
活化能- 维基百科，自由的百科全书

活化能（Activation energy）是化学名词，又称为阈能。这名词由阿瑞尼斯在1889年引入，用来定义起化学反应须克服的能量障碍。活化能可以用于表示起化学反应所需的最少能量 ...

Activation Energy



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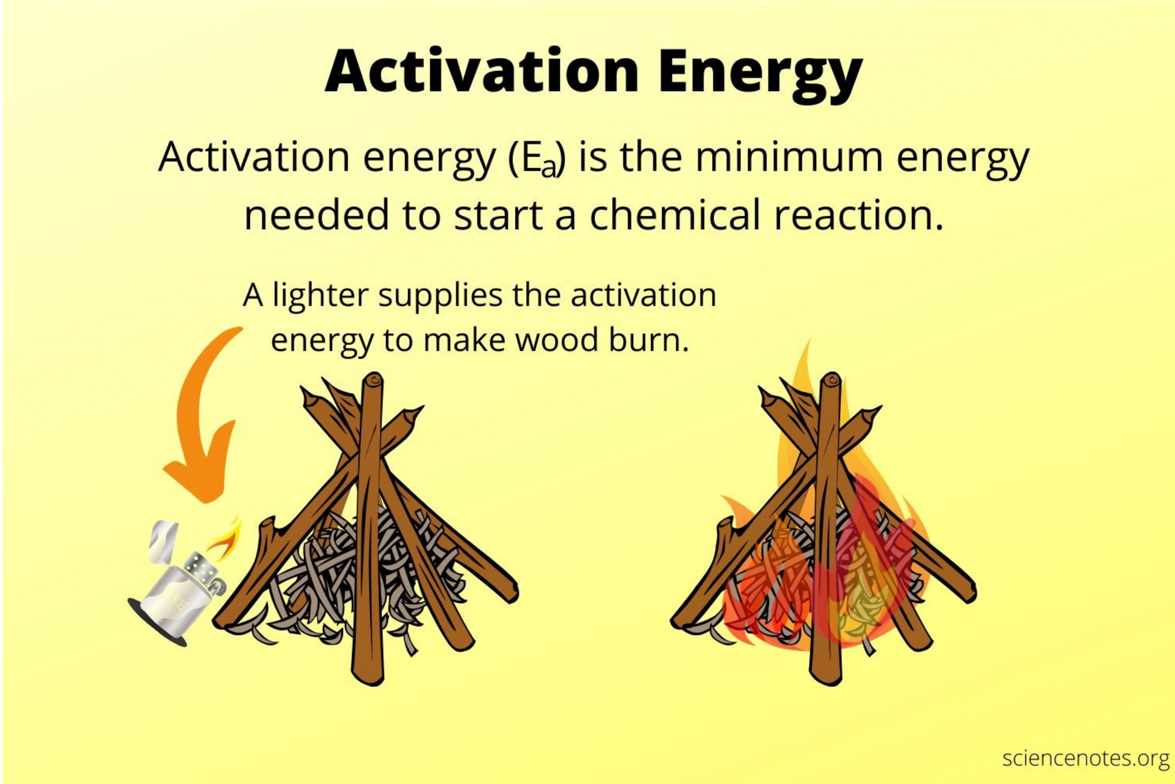
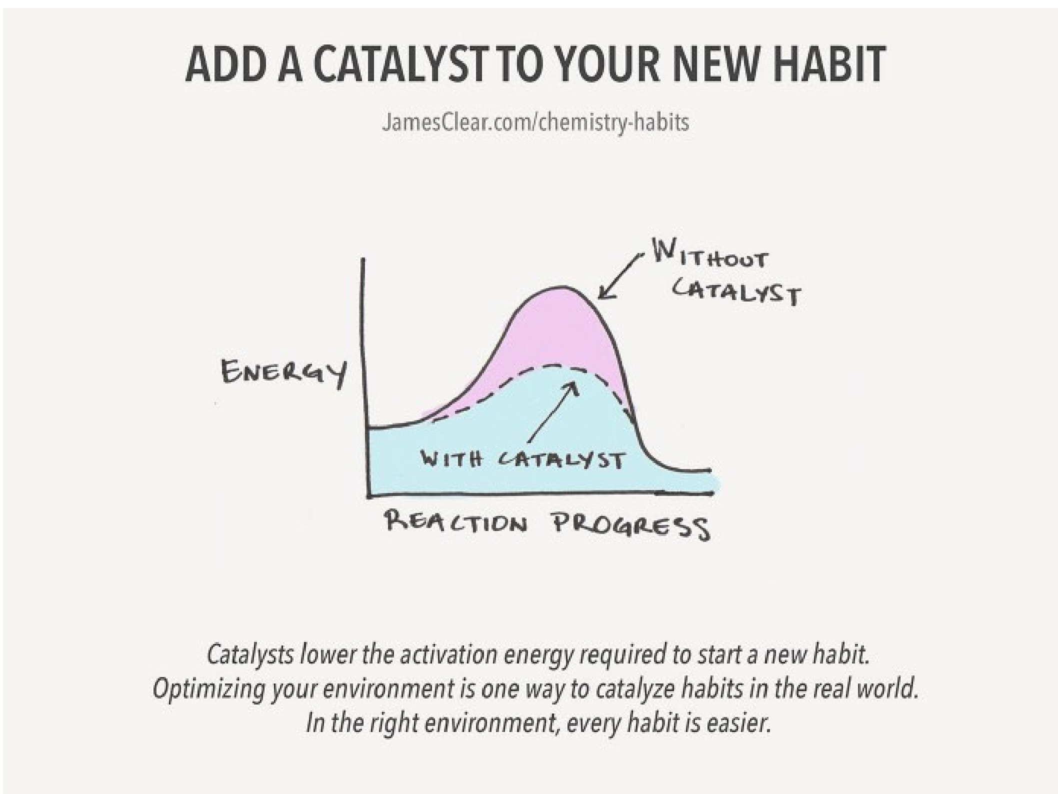

Activation Energy
Activation energy (Ea) is the minimum energy needed to start a chemical reaction.
A lighter supplies the activation energy to make wood burn.
sciencenotes.org


ADD A CATALYST TO YOUR NEW HABIT
JamesClear.com/chemistry-habits
WITHOUT CATALYST
ENERGY
WITH CATALYST
REACTION PROGRESS
Catalysts lower the activation energy required to start a new habit.
Optimizing your environment is one way to catalyze habits in the real world.
In the right environment, every habit is easier.

proceed to the next step of the chemical reaction without requiring any further input of energy.

Without an initial input of sufficient energy, however, the molecules stay the same and a reaction does not occur. In some cases, this is positive, as without the requirement for activation energy our world would be a chemically unstable place. For example, we would be at serious risk if propane combustion occurred spontaneously at room temperature or if the hydrogen and oxygen in air had sufficient activation energy to yield water.

Energy and Climate

The concept of activation energy comes in large part from the Swedish chemist Svante Arrhenius (1859–1927) He proposed the Arrhenius equation, which calculates the relationship between temperature and reaction rates. In the simplest terms, the equation shows us that higher temperatures lead to faster reaction rates because the molecules of the reactants involved have more energy. They move around more, having more collisions with greater force. Arrhenius realized that reactions cannot happen without a minimum level of activation energy. Oddly, no one had codified this intuitive idea before. People have known for millennia that higher temperatures make things happen faster—hence food kept somewhere cool lasts longer than food left out in the sun. For physical chemists, the Arrhenius equation is of great importance, because it helps calculate the amount of activation energy required for different reactions to occur at the desired rate.

But his eponymous equation arguably wasn't Arrhenius's greatest contribution to science. He was also the first person to establish the link between atmospheric CO2 levels and global temperatures as part of an attempt to understand the cause of ice ages.[1] While he wasn't the first to posit the connection, he was able to calculate the relationship. Double the atmospheric CO2 levels and temperatures rise by 5–6°C, probably more like 2–3°C per modern estimates. Arrhenius even recognized the possible role of fossil fuel burning, except he didn't see it as much of a threat, figuring that later generations would just have nicer weather to look forward to.

Activation energy is part of our daily lives. We heat eggs to reform bonds into a cooked product. We boil water to make our tea, reforming some of the molecules into a gas in the process.

One of the most important aspects of activation energy is that you need enough of it to power a reaction through to its conclusion. We all know that one sheet of newspaper won't start a fire in our fireplace. It looks like a real fire for about ten seconds. Then it burns out, and we're left staring at the minimally charred logs we've stacked in the grate.

What we need is enough paper to get those logs burning. We pile it in. We add kindling, smaller pieces of wood that will sustain the reaction until the big pieces really take off. We touch the match to the paper in a few different places. And we monitor and adjust the logs for optimal exposure to the flames and sufficient oxygen flow until the reaction takes hold and things are burning nicely.

Sustaining significant change requires the same effort. You have to plan for not only the initial flame, but all the energy required to get and sustain the fire you want.

Finishing what you start

In trying to achieve lasting change, forming new bonds is critical. If the new bonds don't form, the reaction will not complete and the old whatever will return. The activation energy you employ must move reformation of bonds along to such an extent that it becomes hard, if not impossible, to revert to the way things were. Successful reactions demand a new way of doing things.

The bigger and more challenging an action is, the more activation energy required. And it's important to remember that the buildup to doing something is part of the activation energy required —this build up includes everything on the camel, not just the straw.

Figuring out the right amount of activation energy is pertinent to quitting some addictions. It's not just the moment you decide to quit, it's everything that had to happen, every crisis you had to face, in order to enact that decision. When considering how much activation energy will be required to finally stop the negative behavior, you likely need enough energy to propel the action through the breaking of your current bonds that facilitate addiction through to building new bonds that are completely different.

Evaluating both your internal and external environment to identify the situations and suggestions that compel you to want to re-engage in the addiction is an important step. These are triggers, and they require energy to resist, and so you must try to change them up. Otherwise, with no new structure to replace the old one, the old bonds will reform.

Change that doesn't last is easy. Where a lot of people miss the mark on what is required to produce real change is figuring out the initial investment of energy needed to not only start the reaction, but to finish it. When we don't put in enough activation energy, we fail to produce the results we want. After enough attempts, this failure is discouraging. We think we are doomed to fail or the situation is impossible to change. We rarely consider if we are putting in enough effort to support the formation of a new structure when the old one breaks apart. The reason why so many revolutions fail is that it takes a completely different set of skills to fight than to govern. Most revolutions focus on the energy needed to break apart the existing structure. In most cases the energy requirement to start change is not insignificant: Physical strength in terms of weapons, and ideological strength in terms of support from a significant amount of people. If you were planning a revolution, these two requirements are likely the two areas you would focus on. Who needs to be removed, and where do my opportunities to facilitate that lie? How much firepower and how many supporters do I need? The activation energy required to start the reaction must take leadership changes and weapons capacity into account. But the model of activation energy suggests that you can't stop there because removing the leadership is not the full reaction. Revolutions are aimed at changing the structure of a society, so the planning must involve the steps needed to make that happen.

Therefore, you also must anticipate what's required to form a new structure once you break the old one apart. How do you keep the support of the people? What can you put in place that will allow your revolutionary goals to cement themselves? And how long will it take? Everything you need to do, right to the end of your goals, is the real activation energy required to finish the reaction. Success isn't going to happen overnight. Plan for the amount of energy required to see you through to the end. Let's look at an example of an actual revolution to explore the idea of creating sustained change.

Burkina Faso is a small, landlocked country in western Africa. Formerly a French colony, it became independent from France in 1960. Then called Upper Volta, it nonetheless was dependent on French support. Thomas Sankara * was a revolutionary in Upper Volta in the 1980s. He was born and raised there and grew up solidly middle class in a country that was quite poor, doing military service that took him around his country. He witnessed firsthand the detrimental effects of the existing political leadership on his country. He developed into a revolutionary motivated by the suffering and corruption he saw and what he believed was the vulnerability created by his country's dependence on the West. [1] He helped stage a successful coup, changed the name of the country and then led it for four years. His story, and the story of those years in Burkina Faso, teaches us a lot about the effort required to sustain change.

Sankara recognized that bringing down the existing government would not be enough to implement sweeping changes, including increasing literacy and the availability of education and health services. As Ernest Harsch chronicles in *Thomas Sankara: An African Revolutionary*, he did not join earlier coups because he didn't see them as being able to address the systemic corruption and inequality in Burkina Faso. Sankara, and the junior officers in the military who supported him, wanted to wait until they were "strong enough to decisively influence events." [2]

We can think of Sankara as planning his revolution by determining how much activation energy is required to see through Y2 a reaction to its end. In any revolution, it is not enough to take apart the current system because in the absence of anything to replace it, the same problems, such as corruption or disenfranchisement, are likely to reassert themselves. There were multiple revolution examples from the 20th century he could have studied, from Cuba to Chile, to provide insight on the preparation required to build a new political, economic, and social infrastructure.

In addition, Sankara obviously learned from the ongoing political unrest in his country. From 1960 to 1982 there were multiple coups and power changes. Tensions between military and civilian leadership, as well as pressures from labor unions to droughts, led to social unrest and power struggles. Sankara eventually joined a coup that had widespread popular support and became president of Burkina Faso from 1983 to 1987. His four years as leader were spent trying to lay out enough kindling and light enough flames that eventually the fire of his vision would become self-sustaining. "Sankara… did not waste time. He soon outlined the broad sweep of his revolutionary vision: an overhauled state to serve the interests of all citizens; the elimination of ignorance, illness, and exploitation; and the development of a more productive economy to reduce hunger and improve living conditions." [3]

He empowered local leaders to take on his vision and pushed hard for the equality of women in Burkina Faso society by outlawing female genital mutilation and forced marriage, and by being the first African leader to appoint women to major cabinet positions.

Health clinics and schools were built at a rapid pace all over the country, most often by volunteers inspired by his sincerity in wanting to genuinely transform Burkinabe society to the betterment of all. He instituted a successful nationwide literacy campaign and mass vaccinations.

All of these initiatives were part of the activation energy required to build a new social and political system. Sankara wanted to build a country that was self-reliant, and he rejected foreign aid on the opinion that “he who feeds you, controls you.”[4] He organized extensive land redistribution to peasant farmers and more than doubled the annual wheat production in three years. Sankara tried to inspire those around him to buy into and work toward building the new structure. “Those who worked with the president learned that by aiming for the seemingly unattainable, they were able to accomplish much more than they had ever dreamed—they could push the boundaries of what was possible.”[5]

Sankara tried to put practices in place as if his new system was already mature and the manifestation of all these changes was guaranteed. He took a gamble. Part of the activation energy required for a successful reaction is that you have to be determined to see it through x3 to the end. You must be committed to your reaction.

Sankara put in reforms “to encourage Burkinabe to become more responsible for managing land in a rational way and for preserving the environment more generally. ‘One cannot imagine the development of agriculture and an increase it its productivity without a program for the regeneration and conservation of nature,‘ he said.”[6] This was 1985, and sustainability wasn’t even an issue of importance yet in North America. Thomas Sankara, however, was trying to position Burkina Faso as if the country was at the beginning of a great developmental flourishing. He owned his vision.

He may have been right in many ways about the activation energy needed to create and sustain a new, stable, system. The efforts he put forth, the people he engaged, the staggering improvements he led in four years are testament that he really did try to get the requirements right. However, what he seems to have misjudged was how much of that activation energy had to be provided by the people themselves.

As with any sweeping political change, not everyone buys in right away. Change often scares people. It's only natural to try and preserve the status quo. Not surprisingly, there was some opposition to Sankara's new policies. His reaction was to repress opposition instead of addressing frustrations by modifying his plans or compromising with other political groups. He instituted tribunals that tried people for crimes without credible evidence, and "when the nation's schoolteachers went on strike, Sankara dismissed all of them."[7] Reactions like these undermined his long-term goals; it's hard to improve education without teachers. They also caused loss of support for his leadership.

The problem with having an uncompromising stance was it didn't give people who might have been skeptical the chance to find common ground. In Burkina Faso, "Sankara was so committed to achieving his ideals he was unwilling to give them enough time to ripen in his people."[8] Without widespread commitment by a population, it is hard to make significant political and social changes in a country.

Sankara didn't get the time to possibly course correct. He was assassinated in 1987, and the reactions he started were not yet stable enough to continue on their own. Burkina Faso was taken over by the old order who valued corruption and concentrated wealth in the hands of a few.

In reaching for goals that were beyond the dreams of most, Sankara expended enough activation energy to have a very interesting, although not likely planned, success: a legacy. His vision continues to inspire people today. As Harsch explains, "So what was left of Sankara's revolution? The most obvious answer is: the memory of the man, and the ideas he so passionately defended."[9]

His legacy continues today. "Whether at anniversary commemorations or on other occasions, it has not been uncommon to see young people across West Africa wearing Sankara t-shirts. Activists can readily find his words...and musicians from Mali, Senegal, and Burkina Faso have released popular songs and videos sampling passages from Sankara's speeches."[10] In Senegal, youths go to rallies wearing t-shirts with Sankara's image and the words "I'm still here."

Sankara likely would have preferred to have many more years to try to carry out his vision, but it does show that investing energy in change can sometimes produce surprising reactions. Ultimately there wasn't enough energy for him to produce a stable, prosperous Burkina Faso, but "because he embodied and defended causes that resonate today among the world's oppressed,"[11] he was able to produce a stable legacy. And that is quite remarkable.

Putting the brakes on backsliding

What is the activation energy required to go from being a poor country to a rich one? What is required to achieve sustainable economic development at a level that a downturn will not put you back to the beginning?

In the book *How Asia Works*, Joe Studwell examines the underpinnings of the success of the economies of Japan, South Korea, and Taiwan, and the failures of Indonesia, Philippines, and Thailand. All these countries have experienced periods of intense growth, but only the first three were able to turn that growth into a sustainable system that could weather downturns and challenges. The key to activation energy is to evaluate how much do you need to see the reaction through to its conclusion. At what point have you gone far enough that you can't go back?

In the book, Studwell argues that there were "three critical interventions" that Japan, South Korea and Taiwan undertook to achieve sustainable economic development. They first maximized output from agriculture; next each country directed investment and entrepreneurs toward manufacturing; and finally all had financial policies that supported both of these things. Thus these three countries applied an integrated approach that "changed the structures of their economies in a matter that made it all but impossible to return to an earlier stage of development."[12]

As Studwell explains, "the vehicle for the change was a series of land reform programs to take available agricultural land and to divide it up on an equal basis (once variation in land quality was allowed for) among the farming population. This, backed by government support for rural credit and marketing institutions, ergonomic training and other support services, created a new type of market." [13] Once these agricultural policies were firmly established and their productivity manifested in economic improvement, the governments of Japan, South Korea, and Taiwan set up policies aimed at boosting manufacturing. In order to create long-term productivity in the manufacturing sector, firms were rewarded for their success as exporters. Firms that didn't measure up to this global competition were culled. [14]

Financial policy in Japan, South Korea and Taiwan was designed to support the agricultural and manufacturing policies. In summary, "Finance policy in northeast Asia recognized the need to support small, high-yield farms in order to maximize aggregate farm output rather than maximizing returns on cash invested via larger, 'capitalist' farms. And finance policy recognized the need in industry to defer profits until an adequate industrial learning process had taken place. In other words, financial policy frequently accepted low near-term returns on industrial investments in order to guild industries capable of producing high returns in the future." [15]

Conversely, the Asian countries that were developing at the same time but did not follow these agricultural interventions had long periods of impressive growth, but they were unable to sustain it. With no real land reform in Indonesia, the Philippines, and Thailand, agriculture output was dampened because landlords made more money renting plots than making investments to increase yields, and families had no incentive to maximize the outputs on the land they didn't own. In terms of manufacturing, these countries allowed firms to focus solely on the easier sell to domestic markets, which removed the incentives for knowledge transfer and technological development. And, of course, financial policy in each country supported these approaches of no land reform and little to no exports, focusing instead on consumer lending. Studwell explains, "The best banking returns in the East Asian region are produced in the region's most backward countries —The Philippines, Indonesia and Thailand." [16] Short-term focus on banking profits did not create sustainable growth reactions in these developing countries.

Therefore, when times were good, growth was possible, but when financial crisis hit, those that had not substantially transformed their economies were unable to deal with the challenges. Growth stalled in Thailand, Indonesia, and the Philippines, and the populations went back to being poor. Their policies did not have enough activation energy to complete their economic development.

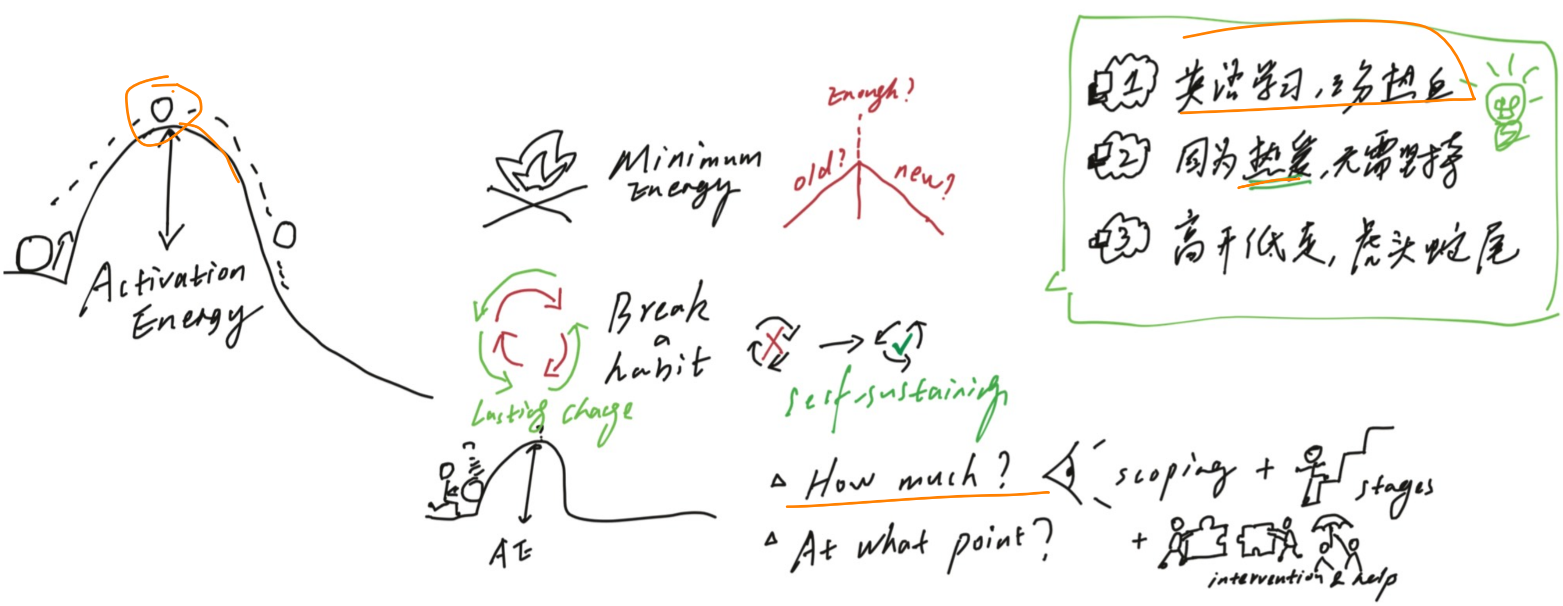
To be clear, it wasn't all smooth sailing for Japan, South Korea, and Taiwan when they started to implement their policy changes. Some business were winners and became internationally popular, like Toyota and Nikon, but there were also losers. Some international relations were strained. There was no overnight success, and the general population had to sacrifice short-term returns for the long-term national interest. However, managing the difficulties is part of getting to the finish line of a reaction.

The point here is not that there is a prescription for the exact amount of activation energy needed to fundamentally transform a nation's economy. As Studwell explains, "Different economics [are] appropriate to different stages of development."[17] Instead, recognize that reactions do have an activation energy, and you have a greater chance of success when you consider what is needed to bring about not just the start, but the conclusion of a reaction.

The arguments Studwell sets out are not about how countries can maintain healthy development, but are rather an idea of how to "become rich in the first place."[18] Land reforms and protectionism in developing industry are not long-term policy positions—they are instead short-term components of the activation energy required to bring about sustainable growth. In making the case for effective development in Japan, South Korea, and Taiwan, Studwell writes, "There is no significant economy that has developed successfully through policies of free trade and deregulation from the get-go. What has always been required is proactive interventions—the most effective of them in agriculture and manufacturing—that foster early accumulation of capital and technological learning."[19]

Conclusion

Creating lasting change is harder than creating change. Don't underestimate the activation energy required to not only break apart existing bonds, but to create new, strong ones. Some reactions are not quick, and all take some degree of effort. Trying to accurately estimate the activation energy required means you're less likely to quit too early. You won't run out of gas on the way up the hill or stop supporting a team during its transition phase. If you have enough activation energy, reactions will keep going, finishing what was started and forming new bonds that will then take a significant reinvestment of activation energy to break. Real change takes effort. Invest more than you think you need to, and you just might get there.

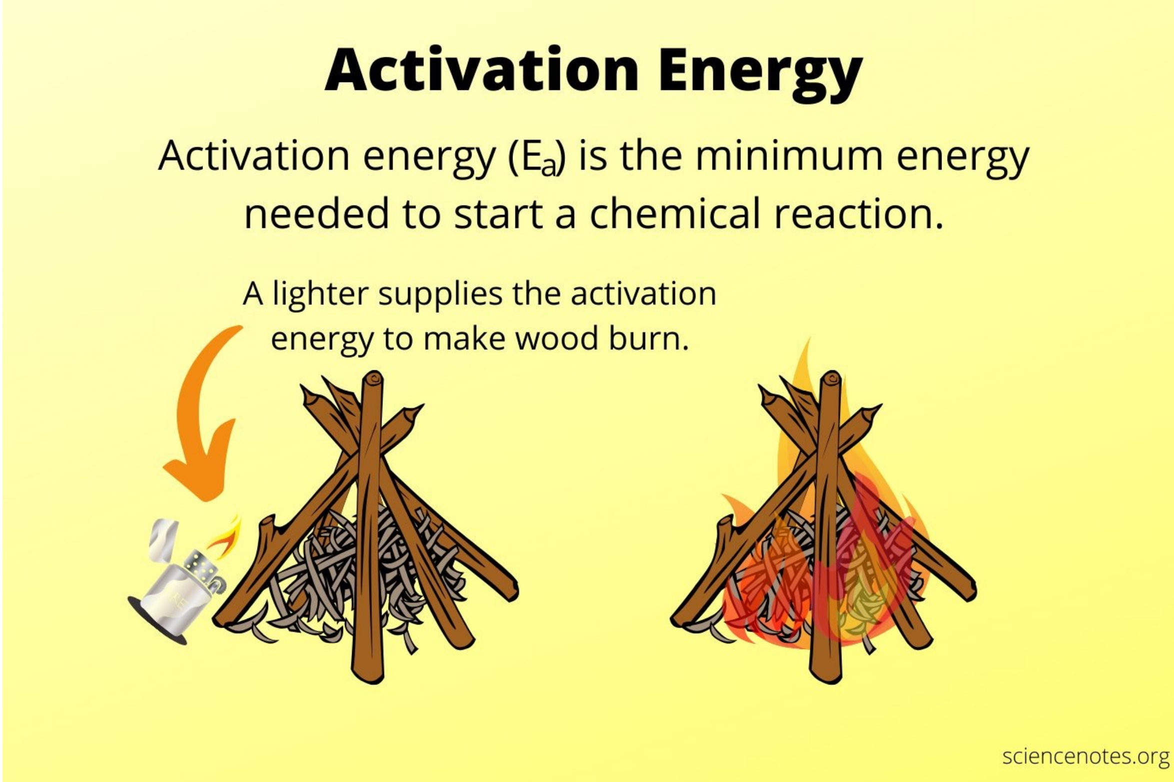


Chemistry

Catalysts

–

Change agent.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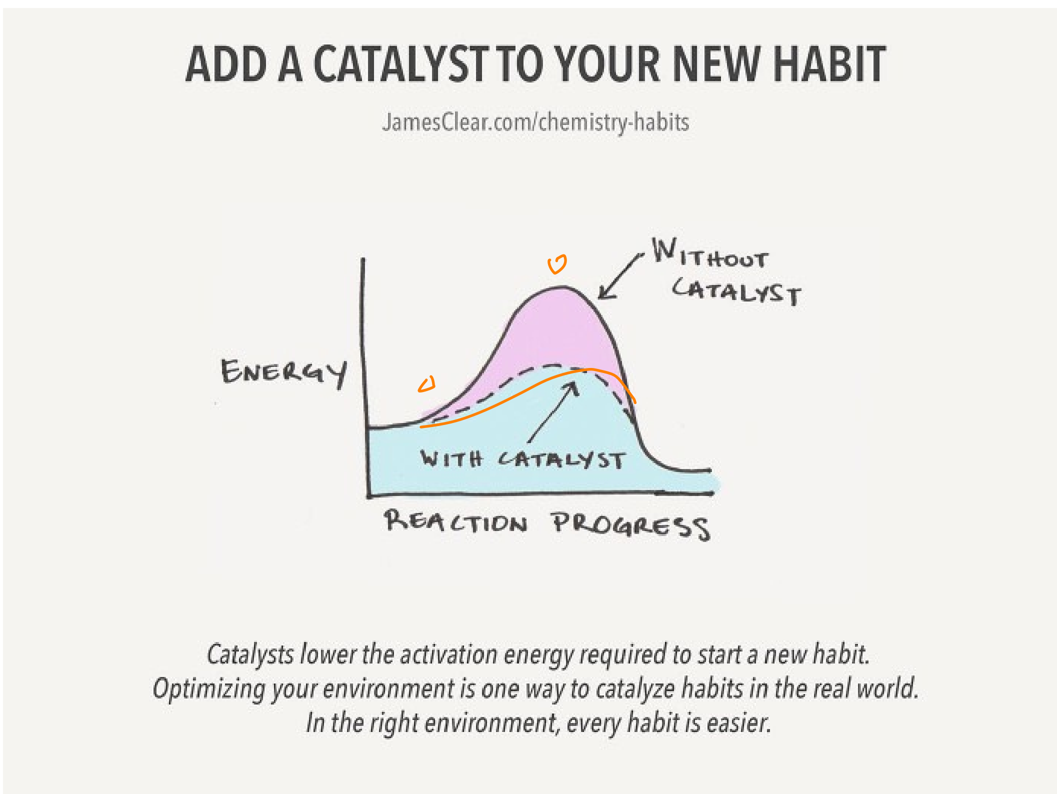
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Optimizing your environment is one way to catalyze habits in the real world.
In the right environment, every habit is easier.

Catalysts

Catalysts accelerate change. While they cannot make a reaction happen that would normally not, they can significantly reduce the time required for change to occur.

Finding the right catalyst is critical. No single substance increases the rate of all reactions. Because different reactions have different activation energies, there are many different catalysts.

The final important feature of catalysts is that they are not consumed by the reaction. They can be removed and used again, making them extremely useful.

The mechanisms through which catalysts work are relatively simple in theory. By creating alternative pathways for the reaction to occur, more of the reactant particles have enough energy. The reaction is then faster, safer, and, in industrial contexts, cheaper.

Catalysts are everywhere, even if they might not be obvious. Many everyday products—including bread, paper, yogurt, and detergent—are manufactured with help from catalysts. Inside our bodies, catalysts facilitate processes ranging from movement to digestion.

A common example of catalysts making our lives easier is in the catalytic converters of diesel or gasoline-fueled cars. Exhaust fumes from these cars contain toxic products, including carbon monoxide. Released into the atmosphere, the products have a myriad of harmful effects, including exacerbating respiratory conditions. To minimize this, catalytic converters contain catalysts that turn exhaust fumes into less harmful gases.

It is probable that people first discovered catalysis when alcohol was invented, although there was likely no specific term for it or understanding of the related mechanisms. Alcohol is one of humanity's oldest inventions and is unusual in that its popularity has spanned cultures, nations and religions. We naturally do not know who first discovered how to make alcohol, but the earliest known evidence of its production dates back as far as 10,000 years ago. Fermentation was likely discovered even further back than that; we just don't have an archaeological record. The catalyst in alcohol production is yeast. Alongside alcohol, the discovery of soap also employed catalysts, combining fats with alkaline substances, or bases, to make a useful substance for cleaning.

In the ensuing millennia, people discovered numerous ways of using catalysts. Serious study began in the 18th century with the work of Elizabeth Fulhame. Through extensive experimentation, Fulhame discovered that most oxidation reactions cannot occur in the absence of water. She also noted that the water involved appeared to be regenerated and not be used up in the process. Fulhame is an extraordinary figure in the history of science, in part for the forward-thinking nature of her work and in part for being one of the first women to make a substantial contribution to a field. For the latter reason, many of her peers refused to accept her work. Time has shown her to be correct, and the impact of her discoveries is hard to overstate.

Several decades later, chemist Jons Jacob Berzelius coined the term "catalysis" and syndicated the work of numerous earlier researchers into a coherent theory. By the end of the 19th century, researchers had a workable understanding of catalysis, which

Wilhelm Ostwald defined as substances that speed up reactions. Ostwald believed that there was no chemical reaction that could not be improved through catalysts.

When the Industrial Revolution began, people soon realized the potential for using catalysts in manufacturing, with a number of patents filed. Financial gain proved to be a powerful incentive for those researching catalysis, which is probably why there were so many advancements in a relatively short time.

Although the science continues to advance, we lack a comprehensive definition of how many catalysts actually work—a challenge for future scientists to uncover. Catalysts are the unsung heroes of the many processes that they make faster, cheaper, and safer.

> « Catalysis...is is to chemical reactions what civil engineering is to the Alps: you do not need to cross the mountain passes to get to the Mediterranean, you can pass through the Simplon Tunnel. »
>
> **Lars Ohrström** [1]

The first internet

Catalysts are not required for a reaction to occur, but they make things easier. Having them means that there are more possible starting conditions for reactions. Like all models from the physical world, they are value neutral. Catalysts can just as easily speed up the occurrence of negative reactions as of positive ones.

Once you start looking for catalysts, you see them everywhere; like the printing press, which significantly sped up the learning process. If attaining knowledge is thought of as a reaction, then prior to the printing press this reaction required comparatively huge activation energy to get started.

Handwritten books were rare and the purview of a very small section of society. Getting access to them was complicated—you needed the time and the means to seek them out. In order to learn, scholars would have to wander from scriptorium to scriptorium, hunting down one of Aristotle's or Euclid's works. In addition, they couldn't rely on the integrity of what they were reading—hand copying lent itself to errors and embellishment, and books were sometimes erased so the parchment could be reused. For medieval scholars, the older a manuscript was, the more likely it was to be accurate. [2]

The printing press acted as a catalyst to accelerate the process of obtaining knowledge. There was now a repeatable process for copying knowledge: books. These books were cheaper and faster to make than the old manuscripts, and thus were more widely available.

Knowledge now required less time and money to obtain—effectively like lowering the activation energy. The printing press increased knowledge because it broadened the conditions in which the reaction could occur. There were more pathways to learning and for accessing information.

Unexpected consequences

Social catalysts can take on unexpected forms. Consider the Black Death, which swept the world for several centuries, peaking in the 14th century. The epidemic was tragic, wiping out hundreds of millions of people. Yet it also proved to be a powerful catalyst for social, religious, economic, and cultural change. Though we can't know if these changes would have happened anyway and it is only the distance of time that enables us to find anything positive in it, it seems that the Black Death was the beginning of many elements of the society we now live in.

The precise origins of the Black Death are unlikely to ever be known, but we do know how it spread. Animals, in particular rats, carried fleas infected with the plague bacteria when they climbed aboard ships sailing around the world. The fleas then jumped onto humans, bit them, and infected them with the Black Death. In the 1340s, the trading routes that were bringing Europe new wealth and opportunities brought it something more sinister. With no knowledge of what was causing this devastating disease, people continued to move and trade, spreading the plague further and further afield.

As time progressed and more and more people died, society began to change. Old systems of labor collapsed with so few people left to work. Workers could demand more money because they were less replaceable. As wages rose, rents fell as landlords realized, to their chagrin, that they possessed more land than there was demand for. Survivors were considerably better off, and increased social mobility enabled even the poorest people to rise in society and earn more money. New industries bloomed to meet their needs, as those who once struggled to survive now had disposable income. Land became cheap and labor became expensive. With fewer workers, people developed labor-saving technology to make farming more efficient. The overall effect was a restructuring of society to be more equal.

While the Christian church had long dominated society, the Black Death weakened its grip for two reasons: people found it difficult to reconcile the tragedy they saw with religious teachings, and the numbers of priests and religious leaders shrunk. Those in religious orders died in the same numbers as anyone else. In the cultural gap created, new ideas emerged and led to the Renaissance. While European culture had stagnated for centuries, the weakening of the church enabled dramatic advancements in science and significant changes in the topics pursued in literature and poetry. People did not become less religious, and the church remained at the heart of society, but with changing sensibilities.

The Black Death may have led to improved conditions for women, who began to enter the workforce in new ways, particularly in industries such as brewing. Women also began marrying later in life.

Medicine also changed. After only making minor improvements for centuries and relying on humoral theory, it became apparent that old ideas surrounding the human body were incorrect, and doctors moved toward research based on observation. Subsequent generations likely lived longer, perhaps because only the strongest survived to pass on their genes.

The Black Death was a catalyst for change in almost every area of society. Although these changes may have happened anyway, the epidemic sped them up. As Peter Frankopan writes in *The Silk Roads*, "And yet, despite the horror it caused, the plague turned out to be a catalyst for social and economic change that was so profound that far from marking the death of Europe, it served as its making."[3] The changes were not evenly distributed and not all of the survivors enjoyed the same benefits. By and large, however, the Europe that emerged from the tragedy was an entirely different place. As populations recovered, European society continued to evolve. Although the immediate economic gains faded, some of the new structures were there to stay.

Catalysts lead to change. The right catalyst makes an endeavor that once seemed impossible simple. It need not only be about wide, systemic changes, like those described above. There are many smaller catalysts that we encounter in our everyday lives. Getting out of breath while walking up a flight of stairs might be the catalyst for someone to start exercising. Reaching a significant birthday might prompt someone to make a career change. A health scare may push someone to improve their habits. For many people, unpleasant events, such as getting fired or rejected, prove to be catalysts for tremendous personal growth.

— Sidebar: Autocatalysis

The comfort of a king

The endorsement of the rich, famous, or respected can act as a catalyst in the evolution of cultural norms. Society evolves. Over time, we change our sensibilities and preferences, our notions of acceptable behavior, even our concepts of what it means to be human. The forces that influence these changes come from a variety of sources.

Innovations in technology allow for different means of organization whose effects ripple through society, or geopolitical changes that require different functions from citizens, and thus serve to create new perceptions of roles in society. Sometimes these developments stagnate, not having enough energy to produce systemic change. Other times, seemingly innocuous changes are embraced by opinion leaders, who become, in effect, catalysts speeding up the adoption of the changes in society.

Autocatalysis

When the outputs of a reaction are the same catalysts needed to start it, the reaction becomes self-sustaining. This is called *autocatalysis*. In terms of harnessing the power of catalysts, producing an autocatalytic reaction is the gold standard. How many things in life do we wish could continue on their own for an extended period of time, without constantly needing the input of our energy?

Louis XV[*] of France was just such a person. Going into the 18th century in France, and Europe in general, homes were decorated to show off one's wealth and possessions. They weren't private sanctuaries, but rather public displays of status. By the mid-18th century the home as a public space had changed. Homes became designed for comfort and intimacy. We went from straight-backed wooden chairs to padded sofas, and public privies to private flush toilets.[4] It was incredible, and now most of us couldn't conceive of going back. Thus, we all owe a small debt to Louis XV for embracing the desire to have a comfortable home.

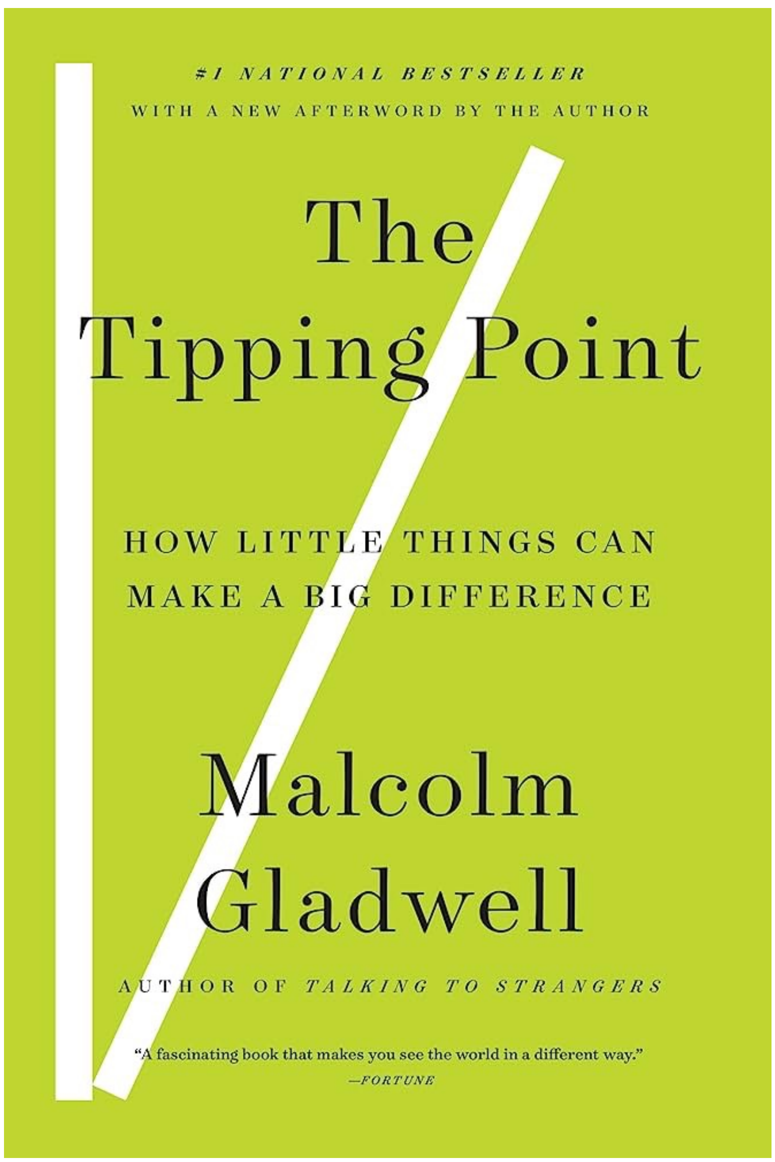
Part of the change to seeing the home as a private space was a result of larger social changes that were occurring. The upper classes were moving around less due to more stable political situations. Technological advancement was booming, leading to a new look at things like indoor plumbing and central heating. And, perhaps most importantly, the Enlightenment was developing, placing emphasis on individual liberty and the sharing of knowledge and ideas. One of the products of these changes was the French royalty no longer wanted to be uncomfortable at the palace.

During his reign, Louis XV transformed Versailles from an uncomfortable and public space to a place that reflected the desire of individuals to live in a place they could also enjoy. He created almost a parallel palace of interior rooms where he, his family, and close confidantes could exist outside of the public eye. He replaced wooden footstools with legions of sofas and armchairs and made it perfectly acceptable for intimate acquaintances to sit in the presence of the king. In his private rooms he was just Louis. He installed indoor plumbing and flush toilets in their own private rooms. For the first time guests at Versailles didn't have to relieve themselves in the hallways. Bedrooms were no longer places where anyone could wander through. Rooms were smaller and had specific functions. In short, Louis XV put in place many aspects of the modern home. [5]

Importantly, Louis didn't invent any of these things. He was greatly influenced by the sensibilities of his father's mistress, the Marquise de Montespan, who started some of the changes at Versailles, and his own mistress, the Marquise de Pompadour, who embraced the notions of comfort and privacy. They, in turn, were influenced by the changes and developments happening in society around them. [6]

Therefore it is quite possible that the widespread acceptance of the standards of comfort and privacy would have come to pass anyway. But, as Joan DeJean writes in *The Age of Comfort*, "The invention of modern comfort was a vast, and vastly costly, enterprise, one that transformed first the look of royal residences and then the cityscape of Paris, and did so, furthermore, in fast-forward mode, so rapidly that contemporaries kept repeating that it was all happening as if by magic."[7]

Early adoption by Louis XV and the royalty made comfort desirable and cheaper. The more people who wanted comfort, the more who bought into comfort, the more the prices lowered. This created a feedback loop where comfortable elements for the home became accessible to more and more people. Louis XV helped to make comfort both socially acceptable and financially affordable.



The Tipping Point
Rules of Epidemics

1. **Law of the Few**
   - Property of messenger
   - Some people matter more than others
   - Qualities of those Few?

   Connectors | Mavens | Salesmen

2. **Stickiness Factor**
   - Property of message
   - Creating messages that are

   Simple and focused | Contagious

3. **Power of Context**
   - What makes people sensitive or unfeeling
   - How would seminarian, party lover behave in environments they do not have control on?
   - Examples

   Graffiti on wall (calls for crime) | Rule of 150 | Peer Pressure

   Lots of little schools in slum areas rather than couple of big schools

FOCUS ON THE FEW:

When starting a word-of mouth epidemic, contentrate your initial resources on these 3 groups: The Connectors, Mavens, and Salesmen

MAVENS

The Data Banks:
Mavens have the knowledge and marketplace scoop. They are information brokers who love to share knowledge. They create messages.

CONNECTORS

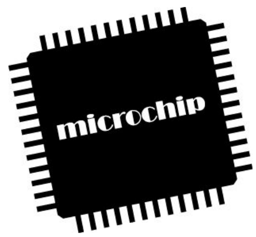
The Social Glue:
Connectors have the links that span and connect different worlds. They provide "cross-fertilization" across realms. They spread messages.

SALESMEN

The Persuaders:
Salesmen have the skills and charisma to persuade us when we are otherwise unconvinced. They induce buying decisions and behaviors.

Conclusion

Catalysts accelerate reactions that are capable of occurring anyway. They decrease the amount of energy required to cause change, and in the process make possible reactions that might not have occurred otherwise. People and technologies often act as catalysts, increasing the pace of social change and development.



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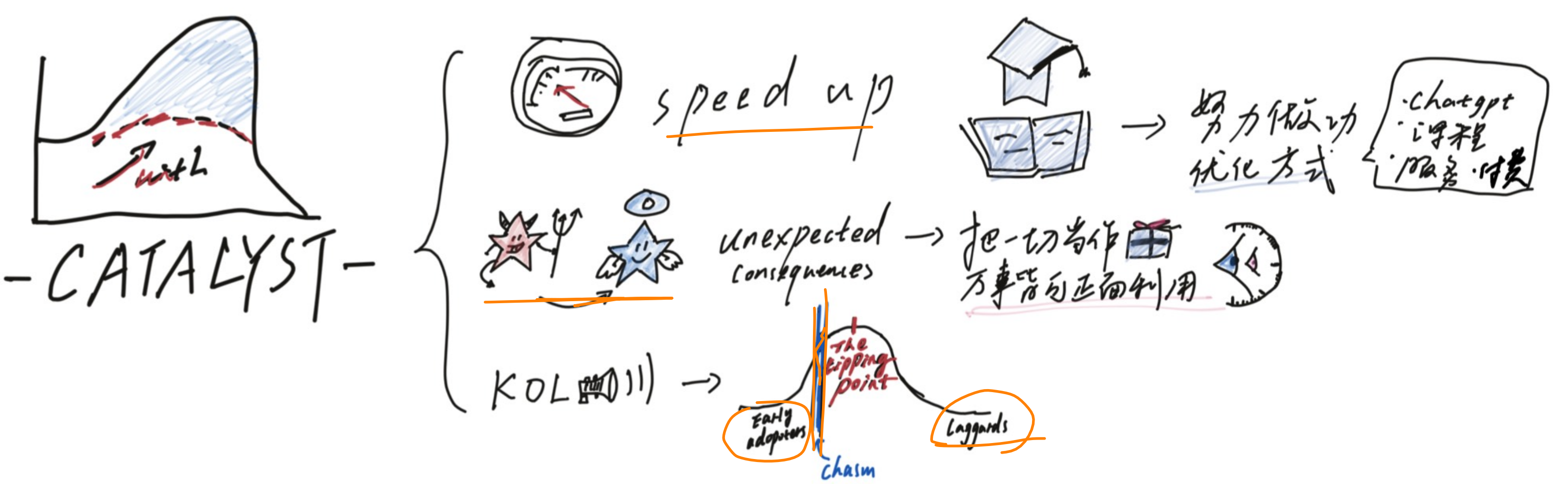
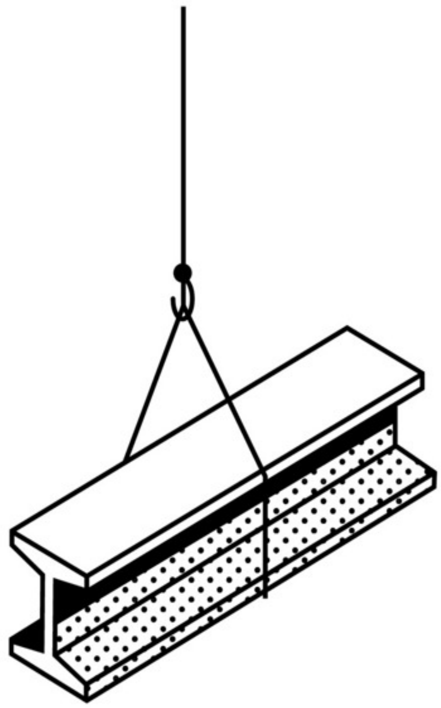
Developments in technology often acts as catalysts for social changes.



Chemistry

Alloying



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Greater than the sum of its parts.

Alloying

Alloying can be a powerful process because it combines components in specific combinations to produce a substance that can achieve what the individual elements cannot. An alloy is a mixture, either in solution or compound, of two or more metals, or a metal and a nonmetal. Alloying, then, describes the process of creating an alloy. Alloying is done in order to synthesize a product with unique properties, such as greater strength, anticorrosion, service life, and improve performance.

Alloying has greatly impacted the lives of humans. The Sumerians, for example, developed bronze made of 90% copper and 10% tin which made the resulting material harder and more chemically resistant than either pure copper or pure tin. Creating tools and weapons from bronze instead of copper allowed them to rule over their neighbors. Bronze was also effectively used by Asians during the Bronze Age. Copper mines in Asia produced a different quality of bronze than those found in other parts of the world. For this reason, they were able to make better musical instruments, mirrors, tools, and weapons during that time.

Another important alloy in history is steel, which is still the most widely produced metal. Persians initiated the Iron Age by developing carbon steel in the 16th century BCE. The combination of iron and carbon results in steel, which is much harder than pure iron. The hardness of steel led to improved agricultural tools and weapons. The addition of metals such as magnesium, nickel, and chromium to carbon steel adds further characteristics to the alloy.

These additives give the steel different properties, such as being stainless, and wear or corrosion resistant.

Not every combination of elements produces a better, more useful alloy, but when you find one that works, the results can allow you to accomplish things previously out of reach. “In the first 4,000 years or so of steel making, the early chemists and metallurgists had no real idea what they were doing, and thus found it very difficult to optimize their processes. Add to this difficulty the large and very diverse selection of iron ores found in nature—frequently with phosphorus and silicon atoms causing a nuisance—and you may appreciate some of the complexity of the problem. Simply copying a successful procedure might not give a satisfactory product with iron ore from another mine.”[1] However, they kept at it, giving themselves and their societies new opportunities for growth and development. With a successful alloy, one plus one can truly equal ten. The application of this model is relevant to everything from building teams to knowledge.

Medicine is one field where the concept of alloying comes in to play. Sometimes, a combination of two or more drugs can have a greater benefit than each drug individually. For example, chemotherapy drugs can be so toxic that they are almost certain to produce potentially fatal side effects. But combining them with another drug that reduces the impact of the side effects can make the treatment effective. In other cases, a chemotherapy drug may only be designed to target a particular biochemical pathway. If used in isolation, the cancer cells may simply develop resistance and use alternate pathways, rendering the drugs useless. Combining drugs that target different pathways leads to a drastically higher chance of destroying a tumor or halting its growth.

In our lives, we often have one significant skill but don't have the other skills necessary to get the most out of it. We need to partner with those who do, forming an alloy that is greater than the sum of its parts. When we're building something from scratch, we need to consider both the raw materials and how they mix together. A team where everyone has good ideas and nothing else won't be as strong as a team that also includes someone who has an eye for which ideas are worth pursuing and the skills to make them a reality.


A painting is more than the sum of its parts.
A cow by itself is just a cow.
A meadow by itself is just grass, flowers.
And the sun peeking through the trees is just a beam of light.
But you put them all together...
...and it can be magic.

How two men beat an army

Two people working together and combining skills can give them abilities greater than either one has alone. The War of 1812, between the British and the American Republic, was fought along the border of what is now Canada and the United States. The British were trying to protect the remainder of their North American interests after having lost to the Americans in the War of Independence. The Americans were looking to ideally get the British out of North America completely or at least obtain a bargaining chip for their ongoing negotiations regarding British naval behavior. Canada was of interest on account of abundant resources and a small settled population.

The British, however, were embroiled in war with France, and so their North American territory was imperial priority number two. Therefore, only a fraction of their potential resources was devoted to stopping the Americans. It was apparent to those on the ground in Canada that some creative thinking was required.

The Americans thought taking Canada would be the equivalent of taking a walk. The land was vast, and the people willing to defend it were few in comparison. They were not expecting much of a challenge. So it was to their great surprise that the critical position of Fort Detroit was surrendered to the British without any actual fighting. How this came to pass was on account of two men, who were able to achieve together what they could not as individuals.

Tecumseh* was a Shawnee chief and leader of the native confederacy. His “consuming passion was the establishment of a native state on American territory."[2] His war was not the one of 1812, but a separate effort to secure native territory. Major-General Isaac Brock[*] had spent his career with the British army, and although he would have preferred a posting in France to Canada, he staunchly defended British interests there. As James Laxer writes in *Tecumseh & Brock: The War of 1812*, "their backgrounds and life experience could not have been more different."[3]

When the Americans declared war, these men realized that an alliance with each other gave them an improved chance of success. For Brock, Tecumseh brought experienced warriors and an extensive knowledge of the territory. For Tecumseh, an alliance with the British was important to check American control of land on the continent. In Brock, he also found an ally to his goal of a native state. "Tecumseh and Brock understood each other. Together, they could do what neither could do alone."[4] Both men felt that the upper hand would be gained by going on the offensive. So they set their sights on Fort Detroit.

Working together to employ a brilliant psychological assault on the American fort, they managed to take it without any actual fighting. Brock and Tecumseh coordinated their efforts to give the impression there were thousands more Native Americans waiting to fight at Fort Detroit than there were. Brock played on the fear of Native Americans held by the American commander of the fort, and Tecumseh used his men to provide a calculated visual manipulation. When the Americans rode out with the white flag, neither had lost any men.

The capture of Fort Detroit in an almost completely bloodless battle took the Americans by surprise. "During the battle for Detroit, play on

artial matches 3

play on
→ USE

play on somebody's fears/...
→ USE

play on somebody's sympa...
→ SYMPATHIZE

- *Yang looked at me with a pathetic expression on his face.*
- *We found a small dog sitting outside the back door, looking pathetic.*

— **pathetically** [adverb]

- *'No one ever listens to me,' she said pathetically.*
- *Suddenly, he looks pathetically young and scared.*

wretched / ˈretʃɪd, ˈretʃəd / [adjective]

someone who is *wretched* is very unhappy or unlucky, so that you feel very sorry for them - used especially in literature

- *With a violent drunkard for a husband, he thought, that wretched woman must lead a life of terror.*
- *Billy lay on the bed, wretched and close to tears.*

8. to try to make someone feel sorry for you

play on somebody's sympathy also **play for sympathy** / ˌpleɪ ɒn somebodyˈs ˈsɪmpəθi, ˌpleɪ fər ˈsɪmpəθi / [verb phrase]

to unfairly try to make someone feel sorry for you, in order to gain an advantage for yourself

- *She had lain in her bed for years, feigning illness and playing on the sympathy of her daughters.*
- *He decided it was best to play for sympathy on this occasion, because she might know if he tried to lie.*

hard-luck story / sob story / ˌhɑːrd ˈlʌk ˌstɔːri, ˈsɒb ˌstɔːrillˈsɑːb- / [countable noun]

a story or explanation, especially one that is untrue, told by someone in order to make other people feel sorry for them

- *A beggar approached me with some hard-luck story about an accident.*

▸ **give somebody a hard-luck / sob story**

- *The defendant gave us some sob story about a sick child.*

▸ **play on somebody's fears / greed / sympathy / prejudices etc**

to use someone's fears, sympathy etc in order to gain an advantage for yourself

- *A common sales tactic is to play on people's greed in order to make them buy more than they need.*
- *Disguised as an electrician, he played on people's trust to trick them out of money.*

Tecumseh and Brock reinforced each other's strengths, marrying the speed and flexibility of the native force to the firepower and solidity of the British regulars. That potent combination proved lethal for the cumbersome Americans and their shaky commanders. The consequence was a victory that should not have been won."[5]

Both men would continue to fight for what they believed in, and these causes would claim the lives of both within a year. The British succeeded in keeping the Americans out of Canadian territory, building on the successful tactics at Fort Detroit. When the end of the war was negotiated, and with neither Tecumseh nor Brock present, British support for native territory in America was not included in the treaty.

8. would可以表示後話。中文也常常有這樣的後話，例如《史記·刺客列傳·荊軻》就有：“荊卿好讀書、擊劍，以術說衛元君，衛元君不用。其後秦伐衛，置東郡，徙衛元君之支屬於野王。”這裡的“其後”就是離開了故事當時發展到的地步，一跳就跳到後來，然後又跳回來，繼續說故事（有時候中國章回小說用“此是後話不表”來打發）。這樣的插話，英文就用would來表示。【例如】Andrew hesitated but, since he had been living with the situation for so long, reasoned that nothing harmful would happen; therefore he did nothing. Later Andrew would blame himself bitterly for that omission. 安德魯猶豫了一下，但是，他既然同這種局面打交道已經這麼久了，他就推測不會出什麼有害的事的；於是他就放過去了。安德魯後來卻只好痛苦地責備自己如此疏忽。/ This edition(= a shorter version of War and Peace) constitutes Tolstoy's first attempt at the novel, which he published in 1866 in a Russian literary magazine. Tolstoy would spend another three years revising and enlarging his initial vision, ultimately producing the much longer novel familiar to modern readers. (Newsweek, Oct. 15, 2007, p. 81) 這一版是托爾斯泰最早動手試圖創作這部長篇小說的初稿，於1866 年發表在一份俄國文學期刊上。托爾斯泰後來又花了三年時間，對初稿進行了修改和擴大，終於產生了現代讀者們所熟悉的這部篇幅大得多的長篇小說。

Knowledge, the ultimate alloy

When we reflect on our knowledge, we recognize that it has component parts. At the very least, we can easily appreciate that there is knowledge we have gained from direct experience, and knowledge we have gained from theory, like that from books. Knowledge about when a stove is hot is often gained firsthand in our early years, but how that heat is produced is something we later learn in a science textbook.

Furthermore, most of us appreciate that to only learn from others, or to only credit that which is gained from direct experience would both be functionally useless. A scenario in which you could only learn from one or the other would not produce the alloy we call knowledge. Theoretical learning cannot prepare you to understand all the nuances of your particular life, such as your partner or the dynamics of your team. And if you relied solely on your own experiences to learn, you would be condemned to repeat the mistakes of others, which is extremely ineffective. Theory and experience together create knowledge, and both serve to augment and advance the capabilities of the other. Experience can trigger the updating of theory, and the validation or application of theory can trigger new experiences.

The alloy that is knowledge can further be conceptualized with more complexity. Aristotle[*] discussed five components of knowledge. "They are what we today would call science or scientific knowledge (*episteme*), art or craft knowledge (*techne*), prudence or practical knowledge (*phronesis*), intellect or intuitive apprehension (*nous*) and wisdom (*sophia*)."[6] These components of knowledge were not mutually exclusive; they reflect the understanding of how much knowledge we bring to bear on any given situation. When driving, we understand the rules of the road and how to operate the machine. We further understand how road conditions are likely to impact our drive, both in terms of the vehicle handling and time of journey. We also factor in how other drivers are likely to respond in the variety of circumstances we could possibly face as we progress to our destination. The sources of our knowledge are varied.

To really explain knowledge as an alloy, something that is strengthened when we mix certain components in, we can look at the life of Leonardo da Vinci.[*] In Walter Isaacson's account, he explains that Leonardo was able to conceive of things in an extraordinary way leading him to discover or validate concepts that were often hundreds of years ahead of his time.[7]

Leonardo was curious; he wanted to know how the world worked and why. He also possessed and honed the skill of intense observation, studying birds and plant stems for hours, or making extensive notes and drawings on eddies of water and optics. He would observe a phenomenon, make a guess as to the principles behind it, and seek to validate those through further observation. Leonardo was willing to challenge accepted truths, seeking to understand them by questioning them. "His lack of reverence for authority and his willingness to challenge received wisdom would lead him to craft an empirical approach for understanding nature that foreshadowed the scientific method developed more than a century later by Bacon and Galileo."[8]

He was mainly self-taught, having had almost no formal schooling, but he recognized the value of learning from the experiences of others. A quote from one of his journals reads, “Get the master of arithmetic to show you how to square a triangle.…Ask Benedetto Protinari by what means they walk on the ice in Flanders…Get a master of hydraulics to tell you how to repair a lock, canal and mill in the Lombard manner”[9] These notes suggest that no one has the time to do everything, and the alloy that is our knowledge must contain what we can learn from others.

Leonardo also readily combined knowledge from different disciplines, his understanding of nature informing his art, or his theatrical experiences pushing him to understand more about optics. His interdisciplinary approach strengthened his knowledge by giving it a varied practicality and usefulness. “Thus, Leonardo became a disciple of both experience and received wisdom. More important, he came to see that the progress of science came from a dialogue between the two. That in turn helped him realize that knowledge also came from a related dialogue: that between experiment and theory.”[10]

In building our knowledge, the environment we are in plays a huge part, as it is the source of our experiences. For this component, Leonardo was lucky, because he was born at a time and place that valued the mixing of ideas from different disciplines. In 15th century Florence there were others who brought multidisciplinary thinking to design and creativity. “This mixing of ideas from different disciplines became the norm as people of diverse talents intermingled. Silk makers worked with goldbeaters to create enchanted fashions. Architects and artists developed the science of perspective. Shops became studios. Merchants became financiers. Artisans became artists.”[11] There is a role for discussion and communication in developing one's knowledge. Sharing knowledge is a part of how you test it, seeing how much stronger your alloy really is after you've added some new information.

Imagination can drive curiosity, as was the case for Leonardo, and is an important component of the knowledge alloy. Imagining what can be drives you to validate what actually exists and then to apply the investigative rigor to see if you can bridge the two. Leonardo was exemplary in this respect. "His uncanny ability to engage in the dialogue between experience and theory made him a prime example of how acute observations, fantastic curiosity, experimental testing, a willingness to question dogma, and the ability to discern patterns across disciplines can lead to great leaps in human understanding."[12] We start with what we get in terms of genetics and environment, but at a certain point we take over control of what we can become. Understanding that knowledge is an alloy of experience and theory that can be further strengthened with elements of curiosity, imagination and sharing gives us the ability to develop it as a true source of power in our lives.

—Sidebar: What works for one part of the system doesn't necessarily work for all.

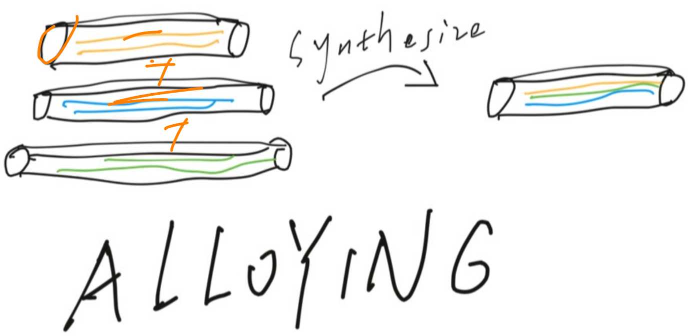
Disproportional Wear and Tear

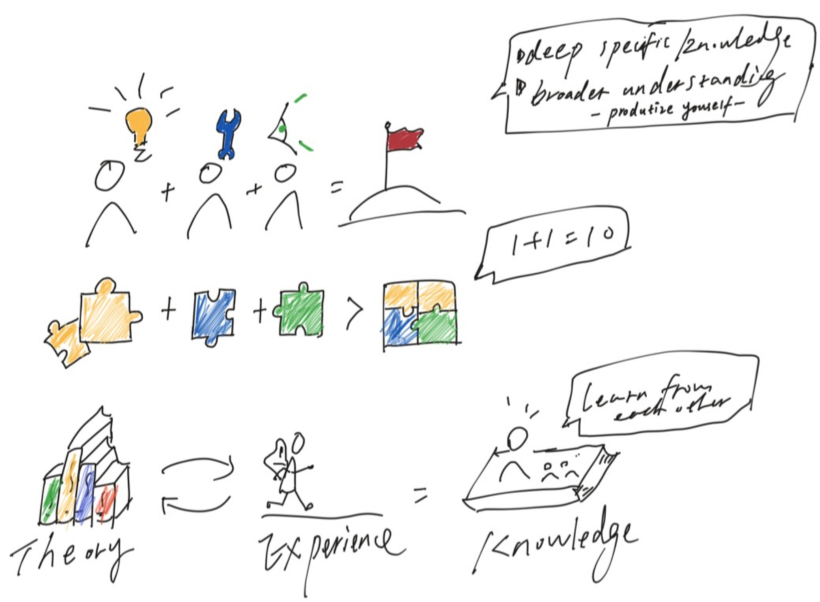
What works for one part of the system doesn't necessarily work for all of it. In a mechanical system, when one part is subjected to significantly more wear and tear, it makes sense to coat it with a strong alloy that will minimize the damage in proportion to the wear and tear on the rest of the system. You don't want to have to stop production for the frequent replacement of just one bit.

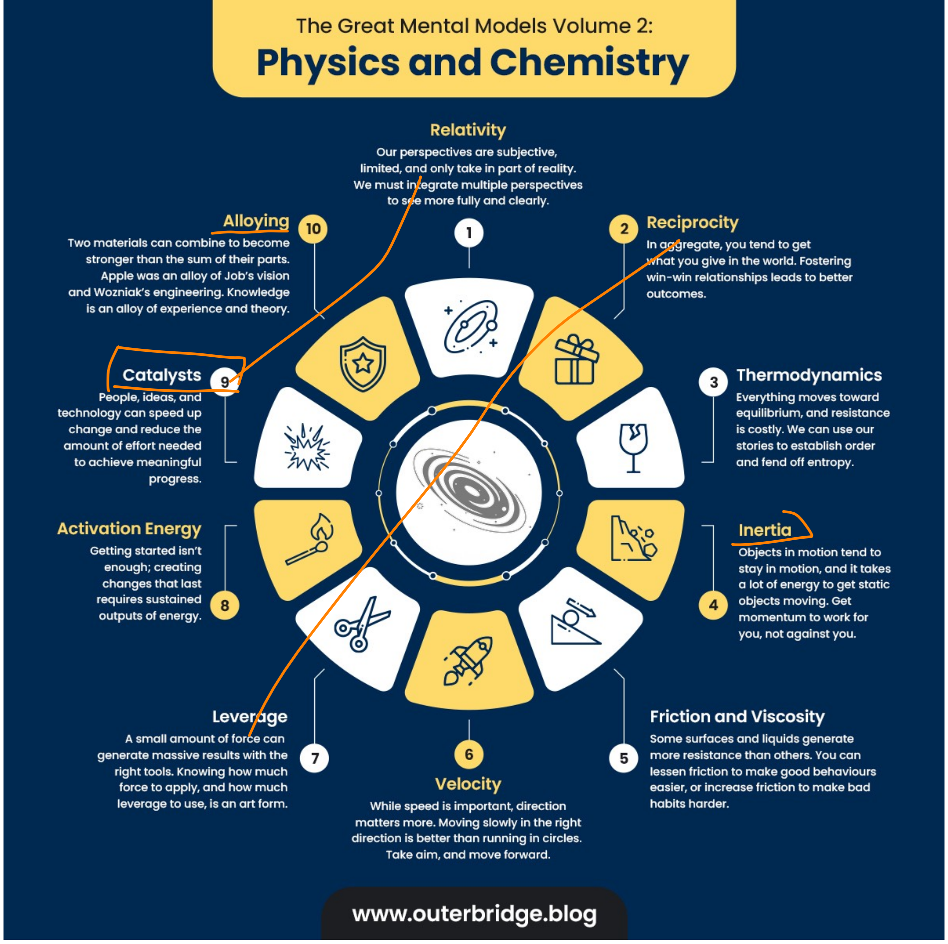
Leonardo also played a role in the development of an alloy in the original, chemical sense. He "was also the first person to record the best mix of metals to produce an alloy that reduces friction. It should be 'three parts of copper and seven of tin, melted together,' which was similar to the alloy he was using to make mirrors. 'Leonardo's formula gives a perfectly working anti-friction composition,' wrote Ladislao Reti, the historian of technology who played a role in discovering and publishing the Madrid Codices of Leonardo's work in 1965. Once again, Leonardo was about three centuries ahead of his time. The first antifriction alloy is usually credited to the American inventor Isaac Babbitt, who patented an alloy containing copper, tin, and antimony in 1839." [1]

Conclusion

Alloying is about increasing strength through the combination of elements. One plus one can really equal ten. Consider a person possessing deep engineering skills with an ability to explain ideas clearly. Surely they are more valuable than someone with just the engineering skills. Now add empathy, humility, resilience, and drive. Now this person is incredibly valuable. Combining a deep specialized knowledge in a domain with a broader understanding of the rules that govern the physical world is a rare combination that saves you time, money, and problems. If you can find people to partner with who can complement and augment your skills to create even more capabilities, then so much the better.






The Great Mental Models Volume 2:
Physics and Chemistry
Relativity
Our perspectives are subjective, limited, and only take in part of reality. We must integrate multiple perspectives to see more fully and clearly.
1
2
Reciprocity
In aggregate, you tend to get what you give in the world. Fostering win-win relationships leads to better outcomes.
3
Thermodynamics
Everything moves toward equilibrium, and resistance is costly. We can use our stories to establish order and fend off entropy.
4
Inertia
Objects in motion tend to stay in motion, and it takes a lot of energy to get static objects moving. Get momentum to work for you, not against you.
5
Friction and Viscosity
Some surfaces and liquids generate more resistance than others. You can lessen friction to make good behaviours easier, or increase friction to make bad habits harder.
6
Velocity
While speed is important, direction matters more. Moving slowly in the right direction is better than running in circles. Take aim, and move forward.
7
Leverage
A small amount of force can generate massive results with the right tools. Knowing how much force to apply, and how much leverage to use, is an art form.
8
Activation Energy
Getting started isn't enough; creating changes that last requires sustained outputs of energy.
9
Catalysts
People, ideas, and technology can speed up change and reduce the amount of effort needed to achieve meaningful progress.
10
Alloying
Two materials can combine to become stronger than the sum of their parts. Apple was an alloy of Job's vision and Wozniak's engineering. Knowledge is an alloy of experience and theory.
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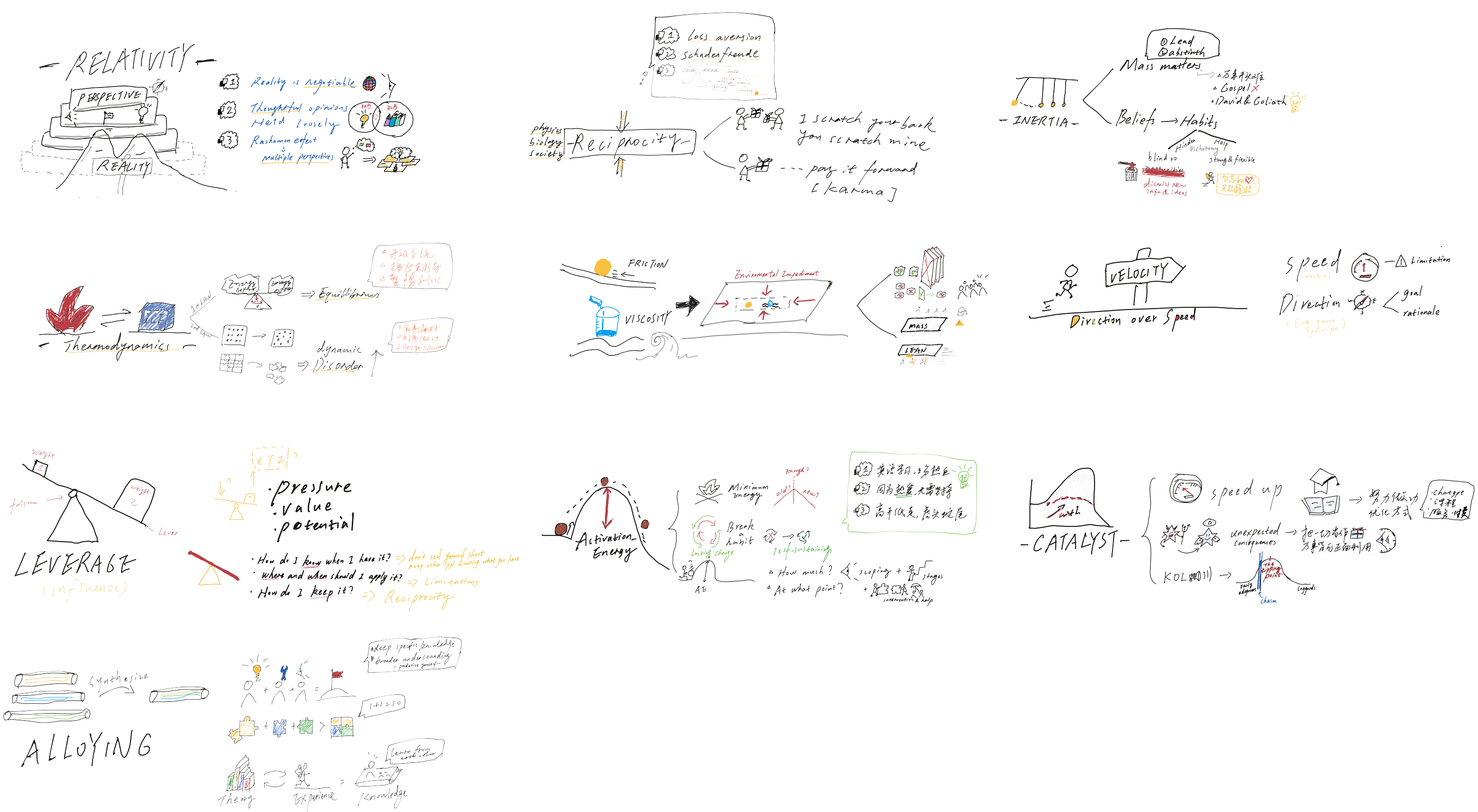
RELATIVITY
PERSPECTIVE
REALITY
Reality is negotiable
Thoughtful opinions Held loosely
Rashomon effect
multiple perspectives
Loss aversion
Schadenfreude
Reciprocity
I scratch your back you scratch mine
pay it forward
[karma]
INERTIA
Mass matters
Belief → Habits
Thermodynamics
Equilibrium
dynamic Disorder
FRICTION
VISCOSITY
Environmental Impediment
MASS
LEAN
VELOCITY
Direction over Speed
Speed
Direction
goal
rationale
LEVERAGE
(influence)
pressure
value
potential
Reciprocity
Activation Energy
CATALYST
speed up
ALLOYING
synthesize
theory
experience
knowledge