DOWNLOAD PDF THE FEEDBACK LOOP

Chapter 1 : The Feedback Loop (The Feedback Loop #1) by Harmon Cooper

feedback loop n. The section of a control system that allows for feedback and self-correction and that adjusts its operation according to differences between the actual and.

Tell me if this sounds familiar to you: You get anxious about confronting somebody in your life. You get pissed off at the stupidest, most inane stuff, and you have no idea why. And the fact that you get pissed off so easily starts to piss you off even more. And then, in your petty rage, you realize that being angry all the time makes you a shallow and mean person, and you hate this; you hate it so much that you get angry at yourself. Now look at you: Here, have a fist. Or you get sad and alone so often that it makes you feel even more sad and alone just thinking about it. Welcome to the Feedback Loop from Hell. Oh my God, I feel like such a loser for calling myself a loser. I should stop calling myself a loser. Believe it or not, this is part of the beauty of being human. Very few animals on earth have the ability to think cogent thoughts to begin with, but we humans have the luxury of being able to have thoughts about our thoughts. Ah, the miracle of consciousness! Our society today, through the wonders of consumer culture and hey-look-my-life-is-cooler-than-yours social media , has bred a whole generation of people who believe that having these negative experiencesâ€”anxiety, fear, guilt, etc. I mean, if you look at your Facebook feed, everybody there is having a fucking grand old time. Look, eight people got married this week! And some sixteen-year-old on TV got a Ferrari for her birthday. And another kid just made two billion dollars inventing an app that automatically delivers you more toilet paper when you run out. The Feedback Loop from Hell has become a borderline epidemic, making many of us overly stressed, overly neurotic, and overly self-loathing. Back to shoveling hay. We feel bad about feeling bad. We feel guilty for feeling guilty. We get angry about getting angry. We get anxious about feeling anxious. What is wrong with me? This is why not giving a fuck is so key. Stress-related health issues, anxiety disorders, and cases of depression have skyrocketed over the past thirty years, despite the fact that everyone has a flat-screen TV and can have their groceries delivered. And this rips us apart inside. The desire for more positive experience is itself a negative experience. This is a total mind-fuck. Wanting positive experience is a negative experience; accepting negative experience is a positive experience. The more you desperately want to be rich, the more poor and unworthy you feel, regardless of how much money you actually make. The more you desperately want to be sexy and desired, the uglier you come to see yourself, regardless of your actual physical appearance. The more you desperately want to be happy and loved , the lonelier and more afraid you become, regardless of those who surround you. The more you want to be spiritually enlightened, the more self-centered and shallow you become in trying to get there. And yes, I just used my LSD hallucinations to make a philosophical point about happiness. You will never live if you are looking for the meaning of life. After all, I paid a lot of money for that ab machine! Ever notice that sometimes when you care less about something, you do better at it? Notice how sometimes when you stop giving a fuck, everything seems to fall into place? If pursuing the positive is a negative, then pursuing the negative generates the positive. The pain you pursue in the gym results in better all-around health and energy. Being open with your insecurities paradoxically makes you more confident and charismatic around others. The pain of honest confrontation is what generates the greatest trust and respect in your relationships. Suffering through your fears and anxieties is what allows you to build courage and perseverance. Seriously, I could keep going, but you get the point. Everything worthwhile in life is won through surmounting the associated negative experience. Any attempt to escape the negative, to avoid it or quash it or silence it, only backfires. The avoidance of suffering is a form of suffering. The avoidance of struggle is a struggle. The denial of failure is a failure. Hiding what is shameful is itself a form of shame. Pain is an inextricable thread in the fabric of life, and to tear it out is not only impossible, but destructive: To try to avoid pain is to give too many fucks about pain. To find out what I mean, put your email in the form and receive my page ebook on happiness, what it means, and how to achieve it. You can opt out at any time. See my privacy policy.

Chapter 2 : Steps of a Closed Feedback Loop | FeedbackLabs

Feedback occurs when outputs of a system are routed back as inputs as part of a chain of cause-and-effect that forms a circuit or loop. The system can then be said to feed back into itself.

Feedback loops are cause-and-effect processes within organisms and systems. Negative feedback loops serve to maintain homeostasis or equilibrium. Positive feedback loops are used to intensify or change the status of a system. In the s, Karl Ferdinand Braun and Henri Louis Le Chatelier separately discovered how systems tend to respond to stimuli by seeking to establish a new equilibrium. Feedback loops allow organisms and systems to maintain control of important processes by signaling back whether an input should be intensified or stopped. In its simplest form, a feedback loop might include two factors, which can be labeled A and B. In the feedback loop, A impacts B, and this stimulation of B leads it to have a return impact on A. Feedback loops are often much more complex than this, and can include more than two factors. Feedback loops can be either positive or negative, with each type of feedback loop being used in different types of processes. Negative Feedback Loops A negative feedback loop seeks to maintain homeostasis. Homeostasis is the ability to stay within specific boundaries so that an organism or system can function at optimal levels. A furnace thermostat is an example of a negative feedback loop. This negative feedback system allows a house to stay at a proper temperature, without becoming too hot or too cold. Based on the set temperature, a thermostat signals to a furnace that more heat is needed. The furnace produces more heat, and once the heat reaches the set temperature, the heat signals the thermostat to turn the furnace off. Should the temperature in the room decrease, the thermostat is trigged once more to turn the furnace back on, and the feedback loop continues. In this way, the thermostat triggers the furnace to turn on and off throughout the day to maintain the proper temperature. In the case of childbirth, the body must move steadily away from homeostasis for the baby to be safely born. Hormones and nerve impulses in the body lead to contractions, which cause the baby to be pushed against the cervix. This pressure against the cervix signals more nerve impulses which intensifies contractions and continues the loop around again. Rather than keeping the body within a set of boundaries, the goal of this positive feedback loop is to amplify contractions more and more until the child is born. Using Feedback Loops to Improve Organizations Feedback loops are natural mechanisms found in a variety of fields such as biology, physics, engineering, and mathematics. People have observed these feedback loops in nature and considered how this concept can help organizations and groups of people function more effectively.

Chapter 3 : What is feedback loop? definition and meaning - www.nxgvision.com

The Feedback Loop Observations on tech news and current events. Scroll Down. Page 1 of 4 Older Posts.

Dynamical system , Chaos theory , Edge of chaos , and Control theory By using feedback properties, the behavior of a system can be altered to meet the needs of an application; systems can be made stable, responsive or held constant. It is shown that dynamical systems with a feedback experience an adaptation to the edge of chaos. Homeostasis and Allostasis In biological systems such as organisms , ecosystems , or the biosphere , most parameters must stay under control within a narrow range around a certain optimal level under certain environmental conditions. The deviation of the optimal value of the controlled parameter can result from the changes in internal and external environments. A change of some of the environmental conditions may also require change of that range to change for the system to function. The value of the parameter to maintain is recorded by a reception system and conveyed to a regulation module via an information channel. An example of this is insulin oscillations. Biological systems contain many types of regulatory circuits, both positive and negative. As in other contexts, positive and negative do not imply that the feedback causes good or bad effects. A negative feedback loop is one that tends to slow down a process, whereas the positive feedback loop tends to accelerate it. The mirror neurons are part of a social feedback system, when an observed action is "mirrored" by the brainâ€”like a self-performed action. Normal tissue integrity is preserved by feedback interactions between diverse cell types mediated by adhesion molecules and secreted molecules that act as mediators; failure of key feedback mechanisms in cancer disrupts tissue function. This type of feedback is important because it enables coordination of immune responses and recovery from infections and injuries. During cancer, key elements of this feedback fail. This disrupts tissue function and immunity. Repressor see Lac repressor and activator proteins are used to create genetic operons , which were identified by Francois Jacob and Jacques Monod in as feedback loops. On a larger scale, feedback can have a stabilizing effect on animal populations even when profoundly affected by external changes, although time lags in feedback response can give rise to predator-prey cycles. The hypothalamicâ€”pituitaryâ€”adrenal axis is largely controlled by positive and negative feedback, much of which is still unknown. In psychology , the body receives a stimulus from the environment or internally that causes the release of hormones. Release of hormones then may cause more of those hormones to be released, causing a positive feedback loop. This cycle is also found in certain behaviour. For example, "shame loops" occur in people who blush easily. When they realize that they are blushing, they become even more embarrassed, which leads to further blushing, and so on. Climate change feedback The climate system is characterized by strong positive and negative feedback loops between processes that affect the state of the atmosphere, ocean, and land. A simple example is the ice-albedo positive feedback loop whereby melting snow exposes more dark ground of lower albedo , which in turn absorbs heat and causes more snow to melt. Control theory Feedback is extensively used in control theory, using a variety of methods including state space controls , full state feedback also known as pole placement , and so forth. Note that in the context of control theory, "feedback" is traditionally assumed to specify "negative feedback". PID controller The most common general-purpose controller using a control-loop feedback mechanism is a proportional-integral-derivative PID controller. Heuristically, the terms of a PID controller can be interpreted as corresponding to time: The Dutch inventor Cornelius Drebbel built thermostats c to control the temperature of chicken incubators and chemical furnaces. In , the windmill was improved by blacksmith Edmund Lee, who added a fantail to keep the face of the windmill pointing into the wind. In , Thomas Mead regulated the rotation speed of a windmill by using a centrifugal pendulum to adjust the distance between the bedstone and the runner stone i. The use of the centrifugal governor by James Watt in to regulate the speed of his steam engine was one factor leading to the Industrial Revolution. Steam engines also use float valves and pressure release valves as mechanical regulation devices. Joseph Farcot coined the word servo in to describe steam-powered steering systems. Hydraulic servos were later used to position guns. Elmer Ambrose Sperry of the Sperry Corporation designed the first autopilot in Nicolas Minorsky published a theoretical analysis of automatic ship steering in and

described the PID controller. Electronic engineering[edit] The simplest form of a feedback amplifier can be represented by the ideal block diagram made up of unilateral elements. Electronic feedback systems are also very commonly used to control mechanical, thermal and other physical processes. If the signal is inverted on its way round the control loop, the system is said to have negative feedback ; [35] otherwise, the feedback is said to be positive. Negative feedback is often deliberately introduced to increase the stability and accuracy of a system by correcting or reducing the influence of unwanted changes. This scheme can fail if the input changes faster than the system can respond to it. When this happens, the lag in arrival of the correcting signal can result in overcorrection, causing the output to oscillate or "hunt". Harry Nyquist at Bell Labs derived the Nyquist stability criterion for determining the stability of feedback systems. An easier method, but less general, is to use Bode plots developed by Hendrik Bode to determine the gain margin and phase margin. Design to ensure stability often involves frequency compensation to control the location of the poles of the amplifier. Electronic feedback loops are used to control the output of electronic devices, such as amplifiers. A feedback loop is created when all or some portion of the output is fed back to the input. A device is said to be operating open loop if no output feedback is being employed and closed loop if feedback is being used. These multivibrators are widely used and include: Negative feedback can be used to correct output errors or to desensitize a system to unwanted fluctuations. A general expression for the gain of a negative feedback amplifier is the asymptotic gain model. Positive feedback[edit] Positive feedback occurs when the fed-back signal is in phase with the input signal. Under certain gain conditions, positive feedback reinforces the input signal to the point where the output of the device oscillates between its maximum and minimum possible states. Positive feedback may also introduce hysteresis into a circuit. This can cause the circuit to ignore small signals and respond only to large ones. It is sometimes used to eliminate noise from a digital signal. Under some circumstances, positive feedback may cause a device to latch, i. This fact is very widely used in digital electronics to make bistable circuits for volatile storage of information. The loud squeals that sometimes occurs in audio systems , PA systems , and rock music are known as audio feedback. If a microphone is in front of a loudspeaker that it is connected to, sound that the microphone picks up comes out of the speaker, and is picked up by the microphone and re-amplified. If the loop gain is sufficient, howling or squealing at the maximum power of the amplifier is possible. A popular op-amp relaxation oscillator. An electronic oscillator is an electronic circuit that produces a periodic, oscillating electronic signal, often a sine wave or a square wave. They are widely used in many electronic devices. Common examples of signals generated by oscillators include signals broadcast by radio and television transmitters , clock signals that regulate computers and quartz clocks , and the sounds produced by electronic beepers and video games. This term is typically used in the field of audio synthesizers , to distinguish it from an audio frequency oscillator. There are two main types of electronic oscillator: They typically constructed using feedback that crosses over between two arms of the circuit, to provide the circuit with a state. The circuit can be made to change state by signals applied to one or more control inputs and will have one or two outputs. It is the basic storage element in sequential logic. Latches and flip-flops are fundamental building blocks of digital electronics systems used in computers, communications, and many other types of systems. Latches and flip-flops are used as data storage elements. Such data storage can be used for storage of state , and such a circuit is described as sequential logic. When used in a finite-state machine , the output and next state depend not only on its current input, but also on its current state and hence, previous inputs. It can also be used for counting of pulses, and for synchronizing variably-timed input signals to some reference timing signal. Flip-flops can be either simple transparent or opaque or clocked synchronous or edge-triggered. Although the term flip-flop has historically referred generically to both simple and clocked circuits, in modern usage it is common to reserve the term flip-flop exclusively for discussing clocked circuits; the simple ones are commonly called latches. Software[edit] Feedback loops provide generic mechanisms for controlling the running, maintenance, and evolution of software and computing systems. Feedback loops and foundations of control theory have been successfully applied to computing systems. From a software perspective, the autonomic MAPE, monitor analyze plan execute loop proposed by researchers of IBM is another valuable contribution to the application of feedback loops to the control of dynamic properties and the design and evolution of autonomic software systems.

Chapter 4 : Feedback Loops - Learning Theories

A feedback loop involves four distinct stages. First comes the data: A behavior must be measured, captured, and stored. This is the evidence stage. Second, the information must be relayed to the.

A series that I decided to try because it was so different from anything I had ever read, and was shocked to find that I really enjoyed. What do you know? I found I really liked this book too. So much, that I purchased books two and three, and even decided to give The Zero Patient Trilogy a go. I picked up this book mostly because I was waiting for book 5 in the Life is Beautiful series. Filled with crazy characters that are both deplorable and yet, somehow likeable, set in a world that is both completely unrealistic, but strangely completely imaginable. This series is set in the virtual reality world that is going on around the same time as Life is Beautiful. Quantum finds himself stuck in his Virtual Reality game reliving the same day over and over, until one day a visit from another human player disrupt everything and, to put it bluntly, all Hell breaks loose. Cooper continues to write. I am loving these crazy stories and characters he comes up with. Like a twisted version of Groundhog day, bit filled with violence. He could set the time by who was attacking him, or the movement of trash. Strange things began to happen. He had been trapped by a glitch, and now there were people seeking to kill him, and they Quantum was stuck, day after day, year after year living the same day. He had been trapped by a glitch, and now there were people seeking to kill him, and they had the means to make his death permanent, if they got him he was dead in both worlds, the Loop and the real one. The Feedback Loop plot is driven forwards by the main character, a man trapped in the same day, he keeps track by storing an item in is inventory for each day that has passed, these range from basic items, such as a cheese grater, to a mini gun. You can imagine the fun that can be had. In a way this reminded me a little of something I read by Tom Holt a long time ago, but darker. I appreciated the humour, and the way living in this violent world affected and altered Quantum as a character. It was fun to read. Take many of the components from Groundhog Day, The Matrix, and The Fifth Element, blend them up into a cyberpunk noir storyline and you get a good idea of what you can expect in The Feedback Loop. It is the first in a series of three books available in all your favorite formats. The book is splendidly written by Harmon Cooper and the audiobook narration is performed exceptionally well by none other than the master of audiobook narration; Jeff Hays. The book is a bit shorter then I would have expected for the first volume in a series, however it does finish up at a good point and the book contains very little fluff used simply to expend the page count. I will say I wanted more when it ended and was happy to be able to jump right into the second book in the series providing my needed fix. No need to wait for other books in the series to be released as they are currently all available in audiobook format at the time of this review. The story itself is nothing revolutionary to those familiar with the genre. A person is trapped in a virtual world and needs to save his life by finding a means of escape. However, the way this story is told along with its flow, humor, and technology makes it feel new and exciting. Unlike with most in the LitRPG genre, this one is not a fantasy world but instead a gritty and grimy cyberpunk environment. Then, one day, things appear to change from the normal routine. This is where the story hooks you and you will not want to put it down. I enjoyed the use of humor in the book as it helped to alleviate the tension and gritty feel of the world the characters were a part of. At times, I had to laugh out loud when the main character took specific actions trying to make his mundane situation a bit more entertaining for him. There may seem like a limited number of ways someone can kill another in this world, but our hero keeps finding new and interesting ways. When you have a continuous daily loop memorized because it has been experienced over and over, one needs to spice things up a bit, and he succeeds doing it. One of his favorite activities was summed up when he was speaking to another character and told them that violence is always the answer to anything in the game; and it shows. The game and the cyberpunk story world were very well setup and executed within the book. Afterwards you may feel like taking a shower to clean off all the dirt and grime. Although the characters were overall deep and likeable, I would have enjoyed having a bit more detail on their backgrounds, histories, and reasons for being in the situations they were. I can only assume this information will be revealed more and more as we dive into the other books of the series. The story includes some aspects of relationships and their

importance when attempting to not only survive in the world but also escape this looping world of events. There is love, joy, action, and sadness as the tale unfolds and we begin to learn more about not only our main character, but the world he has become a part of. I liked the standard stereotypical weapons found in a cyberpunk world such as shotguns and laser pistols, but also a myriad of other fun and interesting weapons to choose from that the author included. Jeff Hays takes any piece of fiction, or non-fiction, and make it better with his ability to flawlessly narrate just about anything. However, when he is given a great piece of work to narrate, it comes out like a symphony where all the parts blend together to make beautiful music. It may seem a bit strong using this analogy, but it really is the best way I can describe the impact and ability of his narration skills. I have listened to a number of books he has narrated, and I have never been disappointed; and this book is no exception. When I write audiobook reviews, Jeff is the standard by which I rate everything else. He puts his heart and passion into his work and it shows every time. He is one of the only male narrators who pulls off narrating female characters in a believable way. Many of his characters have very unique and distinguishable voices, not only in this book, but in all his narrated works. Jeff is also able to weave into his reviews some subtle recording extras and never over uses them; for example, the muffled voice of someone talking over a telephone, etc. The audio is professionally produced and it does not contain any noticeable audio artifacts. For parents or young readers, this book is set in a futuristic world having a dark and shadier feel to the environment. The author does use vulgar language at times, there are scenes involving and discussing sex, alcohol, and drug usage. There are times of intense violence, some of it humorous or light-hearted, but others not. I do not feel it is overly used, but take note if any of the above offends you or you are wondering if this book would be good for a younger reader. Even if you are not a fan of the genre, I recommend you give this book a try as you may find something new and exciting that you never knew existed. The book is certainly a thing Got this on a recommendation

Chapter 5 : The Feedback Loop from Hell | Mark Manson

of over 1, results for "the feedback loop" The Feedback Loop (Books): A Sci-Fi LitRPG Series (The Feedback Loop Box Set Book 1) Sep 9,

Thus depending on the feedback, state changes can be convergent, or divergent. The result of positive feedback is to augment changes, so that small perturbations may result in big changes. A system in equilibrium in which there is positive feedback to any change from its current state may be unstable, in which case the equilibrium is said to be in an unstable equilibrium. The magnitude of the forces that act to move such a system away from its equilibrium are an increasing function of the "distance" of the state from the equilibrium. Positive feedback does not necessarily imply instability of an equilibrium, for example stable on and off states may exist in positive-feedback architectures. Hysteresis Hysteresis causes the output value to depend on the history of the input In a Schmitt trigger circuit, feedback to the non-inverting input of an amplifier pushes the output directly away from the applied voltage towards the maximum or minimum voltage the amplifier can generate. In the real world, positive feedback loops typically do not cause ever-increasing growth, but are modified by limiting effects of some sort. According to Donella Meadows: A system with an unchecked positive loop ultimately will destroy itself. Usually a negative loop will kick in sooner or later. When the gain of the feedback loop is above 1, then the output moves away from the input: Once it reaches the limit, it will be stable. However, if the input goes past the limit,[clarification needed] then the feedback will change sign[dubious â€" discuss] and the output will move in the opposite direction until it hits the opposite limit. The system therefore shows bistable behaviour. Terminology[edit] The terms positive and negative were first applied to feedback before World War II. The idea of positive feedback was already current in the s with the introduction of the regenerative circuit. Black had trouble convincing others of the utility of his invention in part because confusion existed over basic matters of definition. Due to the controlled use of positive feedback, sufficient amplification can be derived from a single vacuum tube or valve centre. Regenerative circuits were invented and patented in [14] for the amplification and reception of very weak radio signals. Carefully controlled positive feedback around a single transistor amplifier can multiply its gain by 1, or more. The problem with regenerative amplifiers working at these very high gains is that they easily become unstable and start to oscillate. The radio operator has to be prepared to tweak the amount of feedback fairly continuously for good reception. Modern radio receivers use the superheterodyne design, with many more amplification stages, but much more stable operation and no positive feedback. The oscillation that can break out in a regenerative radio circuit is used in electronic oscillators. By the use of tuned circuits or a piezoelectric crystal commonly quartz , the signal that is amplified by the positive feedback remains linear and sinusoidal. There are several designs for such harmonic oscillators , including the Armstrong oscillator , Hartley oscillator , Colpitts oscillator , and the Wien bridge oscillator. They all use positive feedback to create oscillations. This reduces their gain, but improves their linearity, input impedance , output impedance , and bandwidth , and stabilises all of these parameters, including the closed-loop gain. These parameters also become less dependent on the details of the amplifying device itself, and more dependent on the feedback components, which are less likely to vary with manufacturing tolerance, age and temperature. The difference between positive and negative feedback for AC signals is one of phase: One problem for amplifier designers who use negative feedback is that some of the components of the circuit will introduce phase shift in the feedback path. If the loop gain the product of the amplifier gain and the extent of the positive feedback at any frequency is greater than one, then the amplifier will oscillate at that frequency Barkhausen stability criterion. Such oscillations are sometimes called parasitic oscillations. An amplifier that is stable in one set of conditions can break into parasitic oscillation in another. This may be due to changes in temperature, supply voltage, adjustment of front-panel controls, or even the proximity of a person or other conductive item. Amplifiers may oscillate gently in ways that are hard to detect without an oscilloscope , or the oscillations may be so extensive that only a very distorted or no required signal at all gets through, or that damage occurs. When an input voltage is expected to vary in an analogue way, but sharp thresholds are required for later digital processing,

the Schmitt trigger circuit uses positive feedback to ensure that if the input voltage creeps gently above the threshold, the output is forced smartly and rapidly from one logic state to the other. This effect is called hysteresis: By reducing the extent of the positive feedback, the hysteresis-width can be reduced, but it can not entirely be eradicated. The Schmitt trigger is, to some extent, a latching circuit. An electronic flip-flop , or "latch", or "bistable multivibrator ", is a circuit that due to high positive feedback is not stable in a balanced or intermediate state. Such a bistable circuit is the basis of one bit of electronic memory. The flip-flop uses a pair of amplifiers, transistors, or logic gates connected to each other so that positive feedback maintains the state of the circuit in one of two unbalanced stable states after the input signal has been removed, until a suitable alternative signal is applied to change the state. The effects are usually catastrophic for the device in question. If devices have to be used near to their maximum power-handling capacity, and thermal runaway is possible or likely under certain conditions, improvements can usually be achieved by careful design. If a microphone picks up the amplified sound output of loudspeakers in the same circuit, then howling and screeching sounds of audio feedback at up to the maximum power capacity of the amplifier will be heard, as random noise is re-amplified by positive feedback and filtered by the characteristics of the audio system and the room. Audio and live music[edit] Audio feedback also known as acoustic feedback, simply as feedback, or the Larsen effect is a special kind of positive feedback which occurs when a sound loop exists between an audio input for example, a microphone or guitar pickup and an audio output for example, a loudly-amplified loudspeaker. In this example, a signal received by the microphone is amplified and passed out of the loudspeaker. The sound from the loudspeaker can then be received by the microphone again, amplified further, and then passed out through the loudspeaker again. The frequency of the resulting sound is determined by resonance frequencies in the microphone, amplifier, and loudspeaker, the acoustics of the room, the directional pick-up and emission patterns of the microphone and loudspeaker, and the distance between them. For small PA systems the sound is readily recognized as a loud squeal or screech. On the other hand, since the s, electric guitar players in rock music bands using loud guitar amplifiers and distortion effects have intentionally created guitar feedback to create a desirable musical effect. Artists such as the Kinks and the Who had already used feedback live, but Lennon remained proud of the fact that the Beatles were perhaps the first group to deliberately put it on vinyl. Microphones are not the only transducers subject to this effect. Jimi Hendrix was an innovator in the intentional use of guitar feedback in his guitar solos to create unique sound effects. He helped develop the controlled and musical use of audio feedback in electric guitar playing, [23] and later Brian May was a famous proponent of the technique. This video feedback effect was used in the opening sequences to the first ten series of the television program Doctor Who. Switches[edit] In electrical switches , including bimetallic strip based thermostats, the switch usually has hysteresis in the switching action. In these cases hysteresis is mechanically achieved via positive feedback within a tipping point mechanism. The positive feedback action minimises the length of time arcing occurs for during the switching and also holds the contacts in an open or closed state. For example, in childbirth, when the head of the fetus pushes up against the cervix 1 it stimulates a nerve impulse from the cervix to the brain 2. When the brain is notified, it signals the pituitary gland to release a hormone called oxytocin 3. Oxytocin is then carried via the bloodstream to the uterus 4 causing contractions, pushing the fetus towards the cervix eventually inducing childbirth. In physiology[edit] A number of examples of positive feedback systems may be found in physiology. One example is the onset of contractions in childbirth , known as the Ferguson reflex. When a contraction occurs, the hormone oxytocin causes a nerve stimulus, which stimulates the hypothalamus to produce more oxytocin, which increases uterine contractions. This results in contractions increasing in amplitude and frequency. The loop is initiated when injured tissue releases signal chemicals that activate platelets in the blood. An activated platelet releases chemicals to activate more platelets, causing a rapid cascade and the formation of a blood clot. So a slight initial leakage results in an explosion of sodium leakage which creates the nerve action potential. In most cases, such feedback loops culminate in counter-signals being released that suppress or break the loop. Chemicals break down the blood clot. Lactation stops when the baby no longer nurses. Positive feedback occurs when a gene activates itself directly or indirectly via a double negative feedback loop. Genetic engineers have constructed and tested simple positive feedback networks in bacteria to demonstrate the concept of bistability. Positive feedback

plays an integral role in cellular differentiation, development, and cancer progression, and therefore, positive feedback in gene regulation can have significant physiological consequences. Random motions in molecular dynamics coupled with positive feedback can trigger interesting effects, such as create population of phenotypically different cells from the same parent cell. Positive feedback can also occur in other forms of cell signaling , such as enzyme kinetics or metabolic pathways. For example, beginning at the macro level, Alfred J. Lotka argued that the evolution of the species was most essentially a matter of selection that fed back energy flows to capture more and more energy for use by living systems. Alexander proposed that social competition between and within human groups fed back to the selection of intelligence thus constantly producing more and more refined human intelligence. It has been shown that changes in biodiversity through the Phanerozoic correlate much better with hyperbolic model widely used in demography and macrosociology than with exponential and logistic models traditionally used in population biology and extensively applied to fossil biodiversity as well. Hyperbolic model implies a second-order positive feedback. The hyperbolic pattern of the world population growth has been demonstrated see below to arise from a second-order positive feedback between the population size and the rate of technological growth. The hyperbolic character of biodiversity growth can be similarly accounted for by a positive feedback between the diversity and community structure complexity. It has been suggested that the similarity between the curves of biodiversity and human population probably comes from the fact that both are derived from the interference of the hyperbolic trend produced by the positive feedback with cyclical and stochastic dynamics. When a B cell binds its antibodies to an antigen and becomes activated, it begins releasing antibodies and secreting a complement protein called C3. The very core of the apoptotic process is the auto-activation of caspases, which may be modeled via a positive-feedback loop. This positive feedback exerts an auto-activation of the effector caspase by means of intermediate caspases. When isolated from the rest of apoptotic pathway, this positive-feedback presents only one stable steady state, regardless of the number of intermediate activation steps of the effector caspase. In economics[edit] Markets with social influence[edit] Product recommendations and information about past purchases have been shown to influence consumers choices significantly whether it is for music, movie, book, technological, and other type of products. Social influence often induces a rich-get-richer phenomenon Matthew effect where popular products tend to become even more popular. This is usually unknown, and under certain conditions this process can amplify exponentially and rapidly lead to destructive or chaotic behavior. A Ponzi scheme is a good example of a positive-feedback system: Brian Arthur has also studied and written on positive feedback in the economy e. Simple systems that clearly separate the inputs from the outputs are not prone to systemic risk. This risk is more likely as the complexity of the system increases, because it becomes more difficult to see or analyze all the possible combinations of variables in the system even under careful stress testing conditions. The more efficient a complex system is, the more likely it is to be prone to systemic risks, because it takes only a small amount of deviation to disrupt the system. Therefore, well-designed complex systems generally have built-in features to avoid this condition, such as a small amount of friction, or resistance, or inertia, or time delay to decouple the outputs from the inputs within the system.

Chapter 6 : Homeostasis (article) | Human body systems | Khan Academy

Definition of feedback loop: Channel or pathway formed by an 'effect' returning to its 'cause,' and generating either more or less of the same effect. A dialogue is an example of a feedback loop. Dictionary Term of the Day Articles Subjects.

Feedback[edit] A feedback loop is a common and powerful tool when designing a control system. Feedback loops take the system output into consideration, which enables the system to adjust its performance to meet a desired output response. When talking about control systems it is important to keep in mind that engineers typically are given existing systems such as actuators, sensors, motors, and other devices with set parameters, and are asked to adjust the performance of those systems. In many cases, it may not be possible to open the system the "plant" and adjust it from the inside: This is performed by adding controllers, compensators, and feedback structures to the system. Basic Feedback Structure[edit] Wikipedia has related information at Feedback This is a basic feedback structure. Here, we are using the output value of the system to help us prepare the next output value. In this way, we can create systems that correct errors. Here we see a feedback loop with a value of one. We call this a unity feedback. Here is a list of some relevant vocabulary, that will be used in the following sections: Plant The term "Plant" is a carry-over term from chemical engineering to refer to the main system process. The plant is the preexisting system that does not without the aid of a controller or a compensator meet the given specifications. Plants are usually given "as is", and are not changeable. In the picture above, the plant is denoted with a P. Controller A controller, or a "compensator" is an additional system that is added to the plant to control the operation of the plant. The system can have multiple compensators, and they can appear anywhere in the system: Before the pick-off node, after the summer, before or after the plant, and in the feedback loop. In the picture above, our compensator is denoted with a C. Some texts, or texts in other disciplines may refer to a "summer" as an adder. Summer A summer is a symbol on a system diagram, denoted above with parenthesis that conceptually adds two or more input signals, and produces a single sum output signal. Pick-off node A pickoff node is simply a fancy term for a split in a wire. Forward Path The forward path in the feedback loop is the path after the summer, that travels through the plant and towards the system output. Reverse Path The reverse path is the path after the pick-off node, that loops back to the beginning of the system. This is also known as the "feedback path". Unity feedback When the multiplicative value of the feedback path is 1. Negative vs Positive Feedback[edit] It turns out that negative feedback is almost always the most useful type of feedback. When we subtract the value of the output from the value of the input our desired value , we get a value called the error signal. The error signal shows us how far off our output is from our desired input. Positive feedback has the property that signals tend to reinforce themselves, and grow larger. In a positive feedback system, noise from the system is added back to the input, and that in turn produces more noise. As an example of a positive feedback system, consider an audio amplification system with a speaker and a microphone. Placing the microphone near the speaker creates a positive feedback loop, and the result is a sound that grows louder and louder. Because the majority of noise in an electrical system is high-frequency, the sound output of the system becomes high-pitched. State-Space Equation[edit] In the previous chapter, we showed you this picture: If we take the transfer function only of this loop, we get:

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The Voter Feedback Loop is a balancing loop because the goal of the loop "balances" the behavior of voters to slowly but surely drive the behavior of politicians to be the same as the goal of the loop, as the gap gets smaller and smaller. Balancing loops are also called goal-seeking loops.

August 6, , Feedback loops are therefore the process whereby a change to the system results in an alarm which will trigger a certain result. This result will either increase the change to the system or reduce it to bring the system back to normal. A few questions remain: How do these systems work? What is a positive feedback? What is negative feedback? Where do we find these systems in nature? Biological systems operate on a mechanism of inputs and outputs, each caused by and causing a certain event. A feedback loop is a biological occurrence wherein the output of a system amplifies the system positive feedback or inhibits the system negative feedback. Feedback loops are important because they allow living organisms to maintain homeostasis. Homeostasis is the mechanism that enables us to keep our internal environment relatively constant â€" not too hot, or too cold, not too hungry or tired. The level of energy that an organism needs to maintain homeostasis depends on the type of organism, as well as the environment it inhabits. Compare this to a warm-blooded whale in the same environment: This is a difference between ectotherms and endotherms: Endotherms can maintain their metabolism at a constant rate, allowing constant movement, reaction and internal processes, whereas ectotherms cannot maintain their metabolism at a constant rate. This means that their movement, reaction and internal processes are dependent on adequate external heat, but it also means that they require less energy in the form of food, as their bodies are not constantly burning fuel. Feedback loops can also occur to a larger degree: A good example of this is in the cycle of predator and prey populations: This will then lead to over predation, and the prey population will again decline. The predator population will decline in response, releasing the pressure on the prey population and allowing it to bounce back. One such relationship is that of nectarivorous birds and the flowers on which they feed. The birds evolve long beaks to gain access to the nectar within the flower. In response, the flower develops a longer and longer trumpet-like shape, in an attempt at preventing the bird from getting to the nectar. The bird responds by developing an even longer beak. And so it continues. The population trends of predator and prey. Positive Feedback Loops A positive feedback loop occurs in nature when the product of a reaction leads to an increase in that reaction. If we look at a system in homeostasis, a positive feedback loop moves a system further away from the target of equilibrium. It does this by amplifying the effects of a product or event and occurs when something needs to happen quickly. Fruit Ripening There is a surprising effect in nature where a tree or bush will suddenly ripen all of its fruit or vegetables, without any visible signal. This is our first example of a positive biological feedback loop. If we look at an apple tree, with many apples, seemingly overnight they all go from unripe to ripe to overripe. This will begin with the first apple to ripen. Once ripe, it gives off a gas known as ethylene C2H4 through its skin. When exposed to this gas, the apples near to it also ripen. Once ripe, they too produce ethylene, which continues to ripen the rest of the tree in an effect much like a wave. This feedback loop is often used in fruit production, with apples being exposed to manufactured ethylene gas to make them ripen faster. The process of apples ripening is a positive feedback loop. This stimulates receptor cells to send a chemical signal to the brain, allowing the release of oxytocin. This oxytocin diffuses to the cervix via the blood, where it stimulated further contractions. These contractions stimulate further oxytocin release until the baby is born. The contractions experienced in childbirth come about as a result of a positive feedback loop. Blood Clotting When tissue is torn or injured, a chemical is released. This chemical causes platelets in the blood to activate. Once these platelets have activated, they release a chemical which signals more platelets to activate, until the wound is clotted. The process of wound clotting is a positive feedback loop. Negative Feedback Loops A negative feedback loop occurs in biology when the product of a reaction leads to a decrease in that reaction. In this way, a negative feedback loop brings a system closer to a target of stability or homeostasis. Negative feedback loops are responsible for the stabilization of a system, and ensure the maintenance of a steady, stable state. The response of the regulating mechanism is opposite to the output of

the event. Temperature Regulation Temperature regulation in humans occurs constantly. Normal human body temperature is approximately When body temperature rises above this, two mechanisms kick in the body begins to sweat, and vasodilation occurs to allow more of the blood surface area to be exposed to the cooler external environment. As the sweat cools, it causes evaporative cooling, while the blood vessels cause convective cooling. Normal temperature is regained. Should these cooling mechanisms continue, the body will become cold. The mechanisms which then kick in are the formation of goose bumps, and vasoconstriction. Goosebumps in other mammals raise the hair or fur, allowing more heat to be retained. In humans, they tighten the surrounding skin, reducing slightly the surface area from which to lose heat. Vasoconstriction ensures that only a small surface area of the veins is exposed to the cooler outside temperature, retaining heat. The process of temperature regulation in humans is a negative feedback loop. Blood Pressure Regulation Baroreflex Blood pressure needs to remain high enough to pump blood to all parts of the body, but not so high as to cause damage while doing so. While the heart is pumping, baroreceptors detect the pressure of the blood going through the arteries. If the pressure is too high or too low, a chemical signal is sent to the brain via the glossopharyngeal nerve. The brain then sends a chemical signal to the heart to adjust the rate of pumping: Osmoregulation Osmoregulation refers to the control of the concentration of various liquids within the body, to maintain homeostasis. We will again look at an example of a fish, living in the ocean. The concentration of salt in the water surrounding the fish is much higher than that of the liquid in the fish. This water enters the fish diffusion through the gills, through food consumption, and through drinking. Also, because the concentration of salt is higher outside than inside the fish, there is passive diffusion of salt into the fish and water out of the fish. The salt concentration is then too high in the fish, and salt ions must be released through excretion. This occurs via the skin, and in very concentrated urine. In addition, high salt levels in the blood are removed via active transport by the chloride secretory cells in the gills. The correct salt concentration is thus maintained. The process of osmoregulation in saltwater fish is a constant negative feedback loop. Negative Feedback The key difference between positive and negative feedback is their response to change: This means that positive feedback will result in more of a product: Negative feedback will result in less of a product: Positive feedback moves away from a target point while negative feedback moves towards a target. Without feedback, homeostasis cannot occur. This means that an organism loses the ability to self-regulate its body. Negative feedback mechanisms are more common in homeostasis, but positive feedback loops are also important. Changes in feedback loops can lead to various issues, including diabetes mellitus. In a normal glucose cycle, increases in blood glucose levels detected by the pancreas will result in the beta cells of the pancreas secreting insulin until normal blood glucose levels are reached. Whereas if low blood glucose levels are detected, the alpha cells of the pancreas will release glucagon to raise blood glucose levels to be normal. This means that when blood glucose levels rise, insulin production is not triggered, and so blood glucose levels continue to go up. This can result in symptoms such as blurred vision, weight loss, hyperventilation, nausea and vomiting, among others. In type 2 diabetes, chronic high blood glucose levels have occurred as a result of poor diet and lack of exercise. This results in cells no longer recognizing insulin, and so blood glucose levels continue to rise. Wrapping Up Positive and Negative Feedback Loops Feedback loops are biological mechanisms whereby homeostasis is maintained. Positive feedback occurs to increase the change or output: Negative feedback occurs to reduce the change or output: Some examples of positive feedback are contractions in child birth and the ripening of fruit; negative feedback examples include the regulation of blood glucose levels and osmoregulation.

Chapter 8 : Feedback Loop - Tool/Concept/Definition

"The Feedback Loop has a core of solid noir, is wrapped in a rich coating of ultra-violence, sprinkled with witty dialog, and leaves you satisfied with a smile on.

For example, the work output of a population can increase the goods and services available to that population, which can increase the average life expectancy, which can increase the population, which can increase the work output still more, and the loop starts all over again. Using system dynamics notation, this feedback loop would look like the Population Growth loop shown. This loop is the foundation of modern democracy. You may have noticed that democracy is in crisis. One of the intermediate causes is that the Voter Feedback Loop is in trouble. Thus this loop must be understood if we are to become able to dig deeper and uncover the root causes of why democracy is in crisis. When citizens decide who to vote for, they compare desired politician performance to actual politician performance. The difference is the politician performance gap. If the gap is low it hardly matters who to vote for. Otherwise, people vote for the "best" candidate to close the gap. Politicians know voters think this way, which causes a politician incentive to please voters by optimizing the common good. By standing for the common good, politicians can attract a majority of voters and win elections. Once elected, politicians engage in actual politician performance and the loop starts all over again. The Voter Feedback Loop is a balancing loop because the goal of the loop "balances" the behavior of voters to slowly but surely drive the behavior of politicians to be the same as the goal of the loop, as the gap gets smaller and smaller. Balancing loops are also called goal-seeking loops. Like the way the setting of a room thermostat drives a heating and cooling system to the preferred temperature of the room, the goal of the Voter Feedback Loop drives a democratic system to the preferred state of "good" performance of its politicians. Powerful root cause forces are working to weaken the loop, as the annotated version explains below. Note the final conclusion: Few real world problems are as simple. For example, The Dueling Loops of the Political Powerplace model has 43 variables, 3 main loops, about 5 additional loops, and 4 stocks. It is a simplification of a larger model that has variables, 11 stocks, and countless loops. Its construction took a single person several years. Another example is the World3 model in Limits to Growth, which contains about variables and 20 stocks. It took 17 researchers 2 years to construct the model. The Voter Feedback Loop is a simple loop for educational purposes. Understanding the behavior of difficult complex social system problems well enough to even begin to hypothesize a realistic solution, with a high probability of working the first time, is impossible without understanding the key feedback loops involved. A quick introduction to how feedback loops work The universe contains only two kinds of feedback loops: Once you grasp how they work you are well on your way to understanding the foundation of systems thinking. An example of a reinforcing loop is Population Growth. As population goes up, so does births per year. As that goes up, so does future population. The loop goes round and round, growing exponentially until the loop hits its limits, which are not shown. An example of a balancing loop is Constrained Population Growth. Here the constraint is carrying capacity, which is the maximum number of people a system can support. Population will grow until it reaches this constraint, also known as a limit or target. In a balancing loop the gap equals the limit minus the actual state. Suppose the carrying capacity is people and population starts at That causes a population gap of This increases births per year to a high rate. As that goes up, so does population. As population rises, the population gap falls. This lowers the birth rate, which over a long period of time lowers population, which increases the gap, which increases the birth rate, and so on until the gap approaches zero. This behavior causes population to gradually approach the carrying capacity of the system, since the system can support a limited number of people. In practice population will tend to overshoot carrying capacity and suddenly collapse, due to long delays in environmental degradation. Every time a balancing loop goes around, it behaves in the opposite manner than it did before, since a balancing loop contains an odd number of inverse relationships. A reinforcing loop contains an even number of inverse relationships. A solid arrow indicates a direct relationship. A dashed arrow is an inverse relationship. Understanding how balancing loops behave can be tricky at first. If so, do what we did. Draw a few reinforcing and balancing loops on paper. Trace them around until things start to become

clear. Another example of a balancing loop is a Thermostat. Suppose you set the target temperature to 65 degrees. The higher the target the greater the temperature gap. The greater the gap the more heat that flows into the system. That increases the temperature. As this goes up the temperature gap goes down. It keeps going down until the gap is zero, at which point the system has reached the target. These are causal loop diagrams. Arrows indicate that one node influences another. Solid arrows are a direct relationship. One node varies directly with another. If A goes up then so does B, or if A goes down then so does B. Dashed arrows are an inverse relationship. If A goes up then B goes down and vice versa. As simple as models like these are, they can allow problem solvers to understand the relevant behavior of complex systems well enough to solve surprisingly difficult problems. While large social systems contain millions of loops, the decisive behavior of any specific problem is controlled by only a few of these loops. Feedback loops control the behavior of a system over time, as shown by the graphs above. Balancing loops cause 2 goal-seeking behavior. In a balancing loop a quantity such as temperature will grow rapidly for awhile and then slow down, as it homes in on its goal. A balancing loop with a delay causes 4 oscillation around the goal of the loop. The loop is continually overshooting and undershooting the goal due to the information delay. It learns too late when it should correct its growth or decline. For example, most thermostats oscillate around their temperature goal by a few degrees. All realistic models have at least one reinforcing and one balancing loop. An exponential growth loop combined with a goal seeking loop and a small delay causes 5 S-shaped growth with small overshoot. As the delay for correction to the goal grows, the overshoot becomes so large that the perfect approach to the goal shown in graph 5 becomes impossible. The results is 6 S shaped growth with large overshoot and collapse. This is the plight of Homo sapiens today. Due to high systemic change resistance , solution delay has caused large overshoot. The larger the overshoot becomes the more likely a large collapse becomes. Systems Thinking and Modeling for a Complex World, page Sterman makes the important point that "The most fundamental modes of behavior are exponential growth, goal seeking, and oscillation.

Chapter 9 : Feedback - Wikipedia

Feedback loop email address: You will need to set up an email account on your end that will receive the messages being sent back from the mailbox providers. This email address should have a parsing script looking through all the messages coming in to remove the needed information.