

Online Supplement: Stimuli

Rottman, B. M., Gentner, D., & Goldwater, M. B. (2012). Differences in Novice and expert categorization of Causal Phenomena. *Cognitive Science*.

Note: Seed cards are shaded in gray.

Domains	Causal System Category	
	A: Common Effect	B: Common Cause
1: Environmental Sci	Many processes are responsible for the level of CO ₂ in the atmosphere such as fossil fuel burning, plant photosynthesis, and CO ₂ absorption in oceans. When making public policy decisions about environmental issues, we must keep in mind the many complex factors that influence the level of CO ₂ in the atmosphere.	The introduction of a non-native species can have devastating and wide-ranging effects on an ecosystem. The introduction of a non-native fox population in Tasmania, Australia, led to the extinction of some wallaby and bandicoot species. Foxes are also threatening the long footed potoroo and the broad-shelled tortoise.
2: Economics	The Cost-of-Living Index is a measure of the cost of basic necessities in a particular city or country. Cost-of-Living is influenced by factors such as inflation, the price of consumer goods, and the local and federal tax rate. Because some cities are more expensive than others, companies will use the Cost-of-Living in part to determine salaries.	The unemployment rate has many implications for society. It influences crime and suicide rates, general health conditions of the public, and the Gross Domestic Product Index. Because of its significant effects, many politicians focus on decreasing the unemployment rate to improve many aspects of the economy.
3: Electrical Eng.	The quality of cell phone reception can be affected by distance from a cell tower, terrain such as large buildings or mountains, interference from other electric devices, and weather. You can also improve reception by moving away from electric devices and large buildings.	Internet routers work by distributing a data signal to multiple devices. If the router is turned off, then all the computers loose signal. However, the functioning of one individual computer does not affect the functioning of other computers. Thus, if one computer is turned off all the others still get the data signal from the router.
4: Mechanical Eng.	Although we take car engines for granted, their operation requires multiple simultaneous conditions to be met. The fuel injection, spark plug, and piston systems must all be working and synchronized. A number of factors, such as insufficient voltage in the spark plugs, low lubricant levels, or a lack of fuel could cause the engine to sputter or stop working.	All water piping in a home comes out of one pipe connected to the city water grid. If this main pipe is damaged, the water throughout your house will be affected. This includes not only sinks and showers, but also toilets, washing machines, and dishwashers.
5: Biology	Aside from genetics, the four main factors which increase the risk of heart disease are smoking, high blood cholesterol, high blood pressure, and obesity. Doctors advise people with any one, or a combination of these risk factors to improve their health to mitigate the risk of heart attack.	In the human body, an allergic reaction can trigger inflammation, rash, asthmatic attack, and typical cold-like symptoms. This is why allergies can be so annoying! The use of an anti-histamine medication can significantly improve many of these symptoms.

Causal System Category

Domains

C: Positive Feedback

D: Negative Feedback

<p>1: Environmental Sci</p>	<p>In the process of global warming, as the temperature of the earth rises, polar ice begins to melt. Water absorbs more heat from sunlight than ice. Consequently, as ice is turned into water, the temperature of the earth begins to rise even faster which in turn leads to increased ice-melt.</p>	<p>Predator / prey populations of animals sometimes follow a very predictable pattern. If the prey population increases in number, the predator population has more food and increases as well. At some point the predator population overeats and the prey population begins to decline in number. Consequently, the predator population decreases with the scarcity of available food.</p>
<p>2: Economics</p>	<p>When stocks are rising (a bull market), investors commonly believe that further rises are probable, and begin to buy more stocks. This buy-up increases the confidence of other investors and inspires them to buy as well. Many economists believe that this principle is occurring in the current housing boom. People are buying houses expecting the value to keep on rising.</p>	<p>The Federal Reserve has the ability to raise or lower the interest rates depending on the current state of the economy. If the economy is slow, the FED will lower interest rates to stimulate borrowing and economic activity. Raising interest rates will slow the economy by increasing the cost of borrowing.</p>
<p>3: Electrical Eng.</p>	<p>Audio feedback occurs when a microphone is placed too close to a speaker. Any noise that the microphone picks up is amplified and played through the speaker at a higher volume. The microphone then picks up the louder noise and sends it back to the speakers even louder. This can lead to a very loud squealing.</p>	<p>A thermostat works by measuring temperature and turning on or off a furnace or air conditioner to reach a desired temperature. If the temperature is too cold, the thermostat will turn on the furnace until it becomes warm enough. Likewise, the thermostat on an air conditioner turns on when the house is too warm.</p>
<p>4: Mechanical Eng.</p>	<p>In a nuclear reactor, water is used to keep the reaction under control. In the Three Mile Island incident, the water level was accidentally reduced while the nuclear reaction was already in progress. This allowed the reaction to increase and evaporate more water than normal. As the water level decreased at a faster and faster rate, the reaction increased causing a partial meltdown.</p>	<p>The float valve on a standard home toilet is a mechanism that measures the level of water in the tank to keep the tank filled. When the water level is low (the toilet has recently been flushed), the float lowers and opens the valve to fill up the tank. When the tank has filled up to the correct height, the float rises and closes the valve turning off the flow of water.</p>
<p>5: Biology</p>	<p>Drug tolerance occurs when a person's reaction to a drug (such as a painkiller or intoxicant) decreases so that larger doses are required to achieve the same effect. In addicted patients, the resulting pattern of steady escalation of doses may lead to a drug overdose.</p>	<p>Perspiration is one method that the human body uses to regulate temperature. When a person is too warm, the body adapts by perspiring. The evaporation of sweat off skin reduces the temperature of skin. Once the body temperature has been reduced sufficiently, the body can stop perspiring.</p>

Causal System Category

E: Chain

Domains

1: Environmental Sci	As a greenhouse gas, CO2 traps heat from sunlight and keeps it inside the earth's atmosphere. Thus, the level of CO2 in the atmosphere has a direct effect on the temperature of the earth. The more CO2 in the atmosphere, the more heat the atmosphere traps and the hotter the earth becomes.
2: Economics	The US economy is heavily dependent on the availability of petroleum. Petroleum is used particularly for transportation of consumer goods by truck or airplane. Consequently, higher oil prices can significantly increase the price of transportation which is reflected in the price of consumer goods.
3: Electrical Eng.	Some city power grids are organized so that a breakdown of one component can lead to the breakdown of a series of components. Recently in Los Angeles, one important power line was accidentally cut, which overloaded a facility and caused it to shut down. This triggered another facility to become overloaded until it shut down.
4: Mechanical Eng.	The powertrain in cars is the system that transfers energy generated by the motor into turning the wheels. The motor turns gears in the gearbox which rotate the driveshaft which rotates the wheels. When a car is in neutral, no gears are engaged, and thus no power is transferred from the motor.
5: Biology	The firing of a neuron is the product of a series of successful steps; electro/chemical propagation, synthesis of the neurotransmitter in the presynaptic terminal, release, binding, and lastly reuptake. The inhibition or increased stimulation of any one of these steps can affect the successful firing of a neuron.