Linguistic Clues for Spotting Feedback Loops in the Wild

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for *The Creative Learning Exchange Newsletter*

It's not so hard to recognize a feedback loop when you encounter it in a course where the teacher is explicitly talking about systems thinking. It's a much harder knack to recognize feedback loops amid the distractions and complexity of the real world. But that's the knack our students will need if they are to use their understanding of feedback loops to explain phenomena, or make predictions, or solve problems in their personal and professional lives. The goal of this article is to provide learners with a strategy with which to recognize non-obvious feedback loops in their out-of-school reading.

As it happens, the English language has evolved a handful of phrases or idioms that are often used to describe systems underlain by feedback loops. When you see or hear one of these phrases, this may be a clue that you are in the presence of a feedback loop, even if the terms "feedback" and "loop" are nowhere in sight.

This article compiles some common linguistic clues for reinforcing (aka "positive") loops and balancing (aka "negative") loops. For each linguistic clue, we provide an example from popular writing, a link to the source, and a causal loop diagram for the system implied by the example text. We also reflect on how the behavior described in the text translates into the structure depicted by the diagram.

None of these phrases or idioms is 100% diagnostic of loopiness. They are merely clues to be alert to the possible presence of a feedback loop, with the attendant possible power to cause growth, collapse, or stability. In many texts, not all elements of the feedback loop are explicitly revealed; some may need to be inferred based on experience or research.

The article concludes with a suggested student activity, designed to instil the habit of mind of looking for loops in the wild in any systems of interest to the individual student.
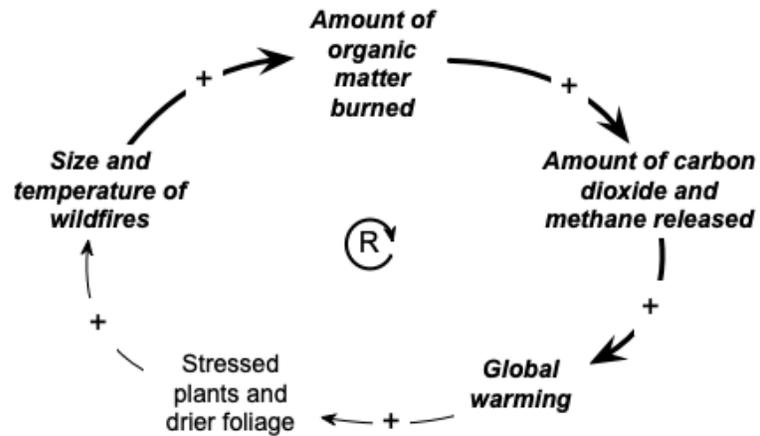
For Reinforcing (Positive) Feedback Loops:

Vicious cycle (or circle): This phrase is a widely used synonym for a reinforcing feedback loop leading inexorably to an outcome that the speaker or writer views as undesirable. Writings for the public about climate change deploy this phrase frequently. In the following climate example, "vicious cycle" is a clue, and so is the usage "X is both a symptom and a cause of Y."

- The Economist magazine writes: "Wildfires in the Arctic have produced more carbon emissions this year than in any year on record…Experts worry the fires may be evidence of a **vicious circle** of climate change. … As [wildfires] consume organic matter, they also release carbon dioxide and methane, both greenhouse gases that cause global warming… Bigger, hotter fires are both a symptom and a cause of climate change …"

In this and following diagrams, the **bold faced italic** nodes and heavy lines are explicit in the [linked article](#), but the non-bold nodes and light lines have to be inferred. It seems logical that warmer air could favor fires, but to spell out the steps by which this influence occurs requires consulting another reference, such as this blog post from the [Union of Concerned Scientists.](#)

Amount of organic matter burned

Size and temperature of wildfires

+

+

®

Amount of carbon dioxide and methane released

+

Stressed plants and drier foliage

+

+

Global warming

+

Virtuous cycle: By analogy with "vicious cycle," this phrase refers to a reinforcing feedback loop that the speaker or writer views as desirable or favorable. Discussing virtuous and vicious cycles is an opportunity to clarify the difference between feedback loops with good and bad outcomes versus positive and negative feedback loops; both virtuous and vicious cycles are reinforcing (positive) feedback loops, even though the desirability of the outcome is opposite.

- A [technology journalist wrote](#): "For Windows, the enormous installed base attracted third-party software developers, which in turn drew more users. Apple's iPhone has had a similar **virtuous cycle."**
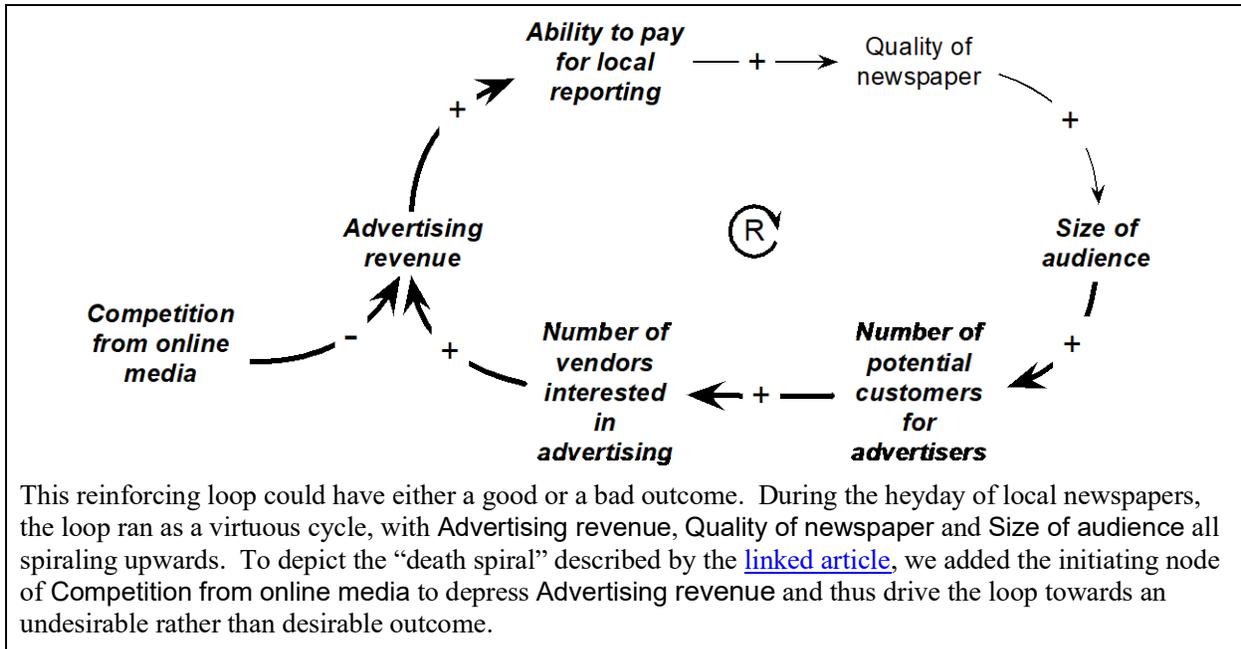
To complete this diagram, the student needs to infer the existence of several implied nodes between more third party software developers and more users. One of the implied nodes is technological (Variety and quality of apps) and the other is psychological (Desirability of platform.)

Number and quality of developers

+

+

Size of user base

®

Variety and quality of apps

+

+

Desirability of platform

+
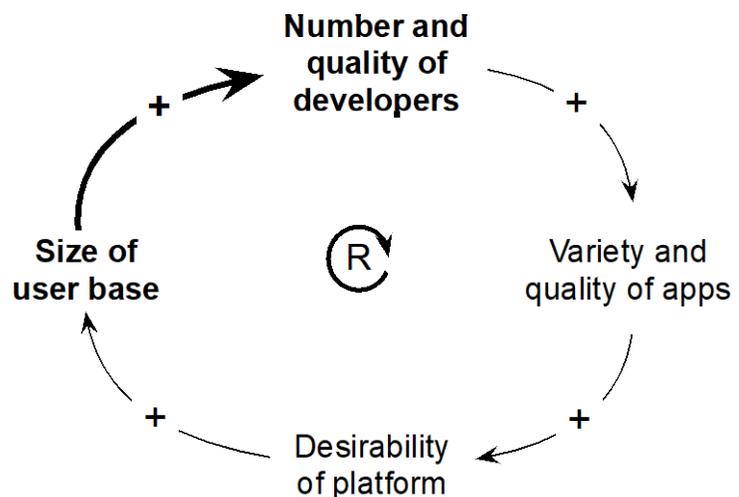
Downward spiral: This spatial metaphor manages to encompass in two words both the recursive structure of the feedback loop, and the undesirable direction in which the outcome is

headed. "Down" and "downward" have a common metaphorical association with bad or worse, as in "down and out," "going downhill," "feeling down." "Death spiral" is an alternative, less common, usage. For example:

- A [newspaper headline read](#) "Is Local News in a Death Spiral?" The article elaborated: "…local news has become a tough sell, especially online…. In drawing readers and viewers from a relatively small pond, local news outlets struggle to attract enough traffic to generate ad dollars sufficient to support the cost of gathering the news in the first place."
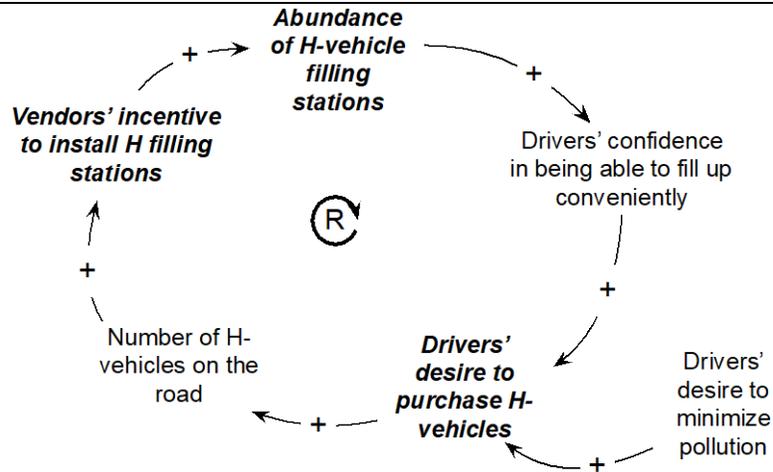

This reinforcing loop could have either a good or a bad outcome. During the heyday of local newspapers, the loop ran as a virtuous cycle, with Advertising revenue, Quality of newspaper and Size of audience all spiraling upwards. To depict the "death spiral" described by the [linked article](#), we added the initiating node of Competition from online media to depress Advertising revenue and thus drive the loop towards an undesirable rather than desirable outcome.

Chicken and egg situation: This phrase can be used for any kind of situation where A causes B and also B causes A, and it is impossible to disentangle which came first. It is often used for a situation where the speaker or writer is yearning for a virtuous cycle but has found it difficult to kick off. Alternatively, the same phrase is sometimes used for a vicious cycle that the speaker or writer deplores but is unable to stop. As an example of a not-yet-well-functioning desirable cycle:

- To teach English language learners about the "chicken and egg" idiom, [the Native English web dictionary](#) offers: "there are almost no hydrogen filling stations in the world--so there is no market for hydrogen cars--so there is no incentive to build the filling stations."
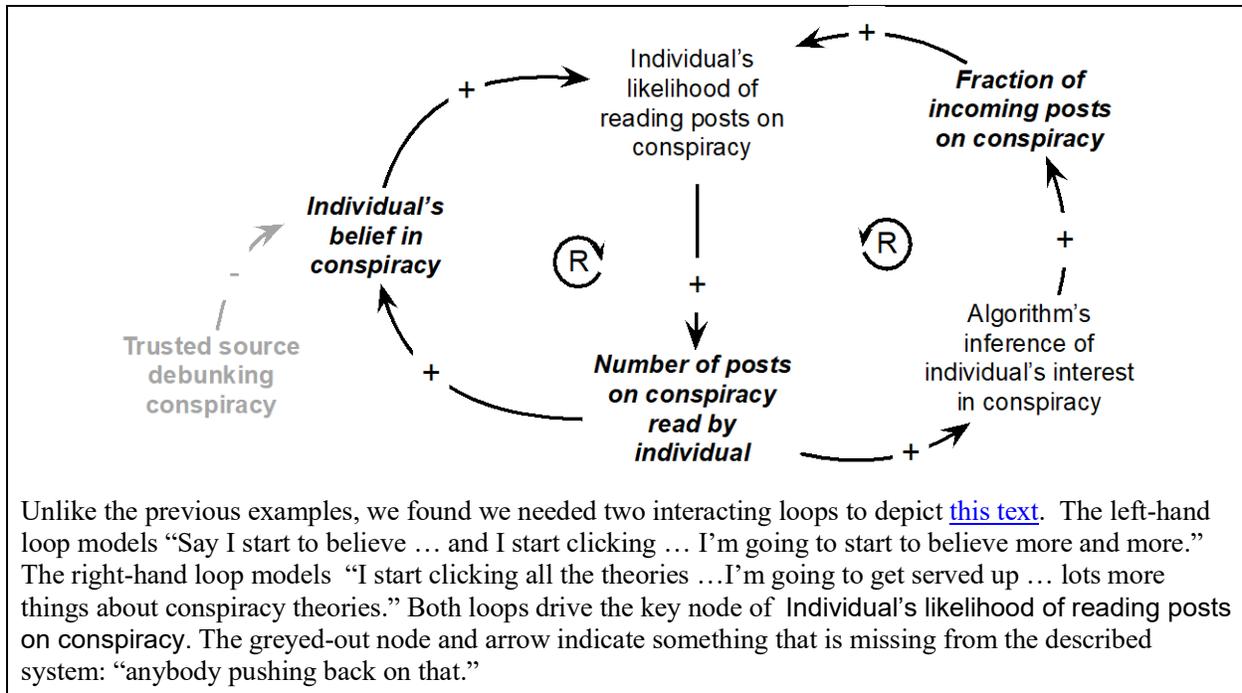
Because of the use of "no," "no," "no" in the cited text, students may first sketch a loop with no filling stations → no market → no filling stations.

With guidance, they may be able to see that this a loop that can run either towards more-more-more or towards less-less-less. And they may be able to propose ways to nudge the loop to run towards more-more-more.

Abundance of H-vehicle filling stations

Vendors' incentive to install H filling stations

Drivers' confidence in being able to fill up conveniently

(R)

Number of H-vehicles on the road

Drivers' desire to purchase H-vehicles

Drivers' desire to minimize pollution

+ + + + + + +

"X and X and X:"   Some writers use an unusual triplet of amplifying adjectives or adverbs, such as "more and more and more," or "worse and worse and worse." A writing teacher might strike out the third "more" as redundant. But it's not; the writer is trying to convey that the third more-ness builds on top of the second more-ness which built on top of the first more-ness. For example:

- In writing about how conspiracy theories spread on social media: "…Say I start to believe [a conspiracy] and I start clicking all the theories of [the conspiracy]. What I'm going to get served up on my social media channel is lots more things about conspiracy theories. And if I don't have anybody pushing back on that, and I'm going down that wormhole, I'm going to start to believe **more and more and more** disinformation."

Individual's
likelihood of
reading posts on
conspiracy

+

+

Fraction of
incoming posts
on conspiracy

Individual's
belief in
conspiracy

+

R

+

R

+

-

+

Algorithm's
inference of
individual's interest
in conspiracy

Trusted source
debunking
conspiracy

+

Number of posts
on conspiracy
read by
individual

+

Unlike the previous examples, we found we needed two interacting loops to depict this text. The left-hand loop models "Say I start to believe … and I start clicking … I'm going to start to believe more and more." The right-hand loop models "I start clicking all the theories …I'm going to get served up … lots more things about conspiracy theories." Both loops drive the key node of Individual's likelihood of reading posts on conspiracy. The greyed-out node and arrow indicate something that is missing from the described system: "anybody pushing back on that."

**For Balancing (Negative) Feedback Loops:**

The majority of idioms for feedback loops seem to refer to reinforcing feedback loops. However, there are a few linguistic clues that may indicate the presence of balancing (negative) feedback loops.

Putting the brakes on: The metaphor of "putting the brakes" on can refer to creating or activating a countervailing feedback loop to slow down a process or phenomenon that is going too fast. The phrase calls to mind the action of a cruise control system that decelerates a car when it gets going too fast. For example:

- The best-selling book *Putting on the Brakes: Understanding and Taking Control of your ADD or ADHD* helps young people recognize when they are going too fast and react to that recognition by deploying countervailing calming strategies like yoga and self-initiated timeouts.

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The book's author doesn't use the term "feedback loop," but she does spell out the necessity of both nodes in our diagram: learning to recognize when one is slipping into ADHD behaviors and learning to deploy calming strategies.

This is a case where some students may be able to draw on their personal experiences, with careful teacher facilitation, to explain how they themselves create balancing loops as a problem-solving strategy.
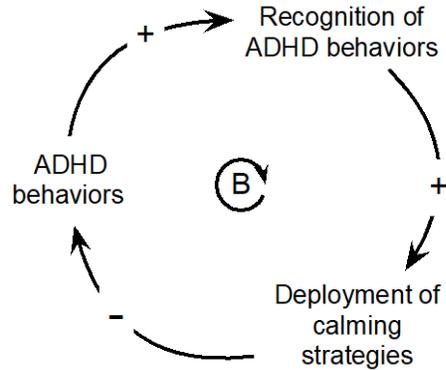
Stalemate: This term refers to a situation where Party A won't make a concession unless Party B does so, and likewise Party B won't make a concession unless Party A does so. One way that a stalemate can arise is through negative feedback loop dynamic: whenever a member or faction of Party A does try a conciliatory or collaborative action, the more extreme members of the group pull the would-be-stalemate-breaker back into the mainstream of Party A. For example:

- At a pivotal moment during the long path to peace in Northern Ireland, special envoy George Mitchell stated: "Rigid adherence by the parties to their past positions will simply continue the **stalemate** which has already lasted too long. The risks may seem high, but the reward is great."
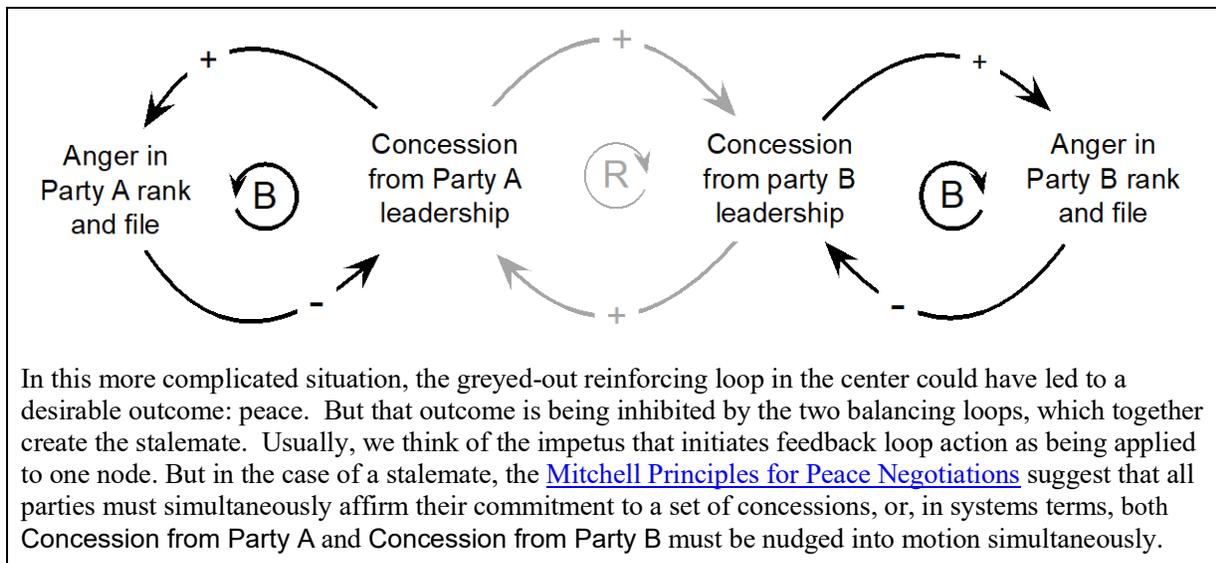
In this more complicated situation, the greyed-out reinforcing loop in the center could have led to a desirable outcome: peace. But that outcome is being inhibited by the two balancing loops, which together create the stalemate. Usually, we think of the impetus that initiates feedback loop action as being applied to one node. But in the case of a stalemate, the Mitchell Principles for Peace Negotiations suggest that all parties must simultaneously affirm their commitment to a set of concessions, or, in systems terms, both Concession from Party A and Concession from Party B must be nudged into motion simultaneously.

Student Activity:

Learning goals: Learners will develop the habit of mind of watching for feedback loops in out-of-school reading, and then using feedback loop thinking to analyze situations of interest

to them. Learners will strengthen their ability to translate between system behavior and underlying structure by sketching casual loop diagrams.

1. Read the article which your teacher has given you [this could be one of the articles linked from this newsletter or another article relevant to your course], which refers to a feedback loop system using one of the linguistic clues we have discussed. Find the feedback loop, and sketch a causal loop diagram.

2. Find another instance of one of these linguistic clues in a website, magazine, or book on a topic that interests you. Copy the relevant sentence or section of the reading, and provide a citation.

3. Is the situation referred to by the linguistic clue a feedback loop? Why or why not? Be careful: not all authors use these idiomatic phrases in the same way.

4. Sketch a causal diagram of the situation referred to by the linguistic clue. Some of the steps in the causal chain might not be explicitly mentioned in the reading. You may have to infer them from the context or your knowledge of the topic or do additional research. Use different colors or fonts in your diagram to show which nodes and links are explicit in the reading and which you had to infer.

5. Do you think that use of the linguistic clue helped or hindered the author's ability to communicate effectively with the intended audience? Why or why not?

Assessment: As you consider students' causal diagrams drawn from media texts, expect that some students will choose different nodes to include or may word the nodes differently than we did in our examples. Look for individual causal links that each have a plausible underlying mechanism, and for a chain of causal links that go all the way around the feedback loop leaving no gaps in the logic. It is possible that a student may bring forward a text where one of these linguistic clues is used in reference to a system that is not in fact a feedback loop; in that case their diagram may show linear or branching causal relationships instead of a loop.

Provide Feedback to Us:

We would love to hear from you if you or your students find other linguistic clues that indicate the likely presence of feedback loops.   Also, do you know of similar linguistic clues in other languages?   Reach out to us at kastens@ldeo.columbia.edu and shipley@temple.edu.