Systems: Lesson 4

Feedback

# Need to clarify that each slide needs title block. Also need to teach more clearly the difference between a narrative view of feedback and a controller view.

# Introduction

Feedback loops control systems. They do this by taking information created by the system and using it to influence the same system. They are ubiquitous but also somewhat invisible. It is much easier to observe that the system has changed--or not changed--then it is to see what is controlling the behavior. This assignment is about practicing seeing the feedback mechanisms themselves.

# Objective

Your objective in this lesson is to identify 3 examples of feedback loops in your day to day environment and document them. Documentation will take the form of a photograph that captures the essence of the system, a description of the control loop and a diagram that visualizes the feedback interaction schematically. You are welcome to include examples where you observed the system but needed to pursue research to understand the feedback mechanism.

# Discussion

The common usage of the word feedback is to describe interpersonal communication where one person provides comment to another about something he has done or said. There are two interesting points about this example. The first is that this is one case where the colloquial usage of a technical term is actually close to its technical meaning. The second is that it highlights the dependence of the definition of feedback on another critical system concept: the boundary.

In the interpersonal example, if one considers each person as a separate system than one person’s advice is simply input to the other. Only if one treats the two individuals and their communication as a system does the advice one gives to the other meet the definition of feedback: using information created by a system to influence that same system.

This should give you an important clue in your search for examples of feedback. It means that nearly any mechanism that causes change or stability that interests you can be seen as an example of feedback as long as you draw the boundary of the system to entirely include that mechanism.

Feedback is generally described as one of two types, but the terminology for doing so is confusing and bears clarification. One type of feedback is known as *positive* or *reinforcing* or *amplifying*. This feedback is the kind that causes a system to change state, to increase or decrease its activity. A familiar example of this type is what occurs when a microphone is placed near a speaker to which it is connected. A quiet hum rapidly becomes a terrible deafening screech.

The second kind of feedback is called *negative*, or *balancing*, or *stabilizing*. This feedback is the kind that keeps a system at the same state, to maintain equilibrium. A common example of this type of feedback is that provided by a thermostat to a heater in order to maintain a room at a constant temperature even as the exterior temperature falls.

# Submission

You will create a submission consisting of 4 slides (1680x1050): a title slide and 3 content slides, each of which describes a different feedback loop that you have observed.

Each content slide must contain this information:

1. a name you have given the loop as the slide title
2. a brief description of the loop, where it is observed, what it does and whether it is balancing or reinforcing
3. a single photograph that provides a distinctive visual reference for the loop
4. a diagram showing the components of the loop and how information flows through it

In addition to the electronic submission, you will bring in printed version of your slides, tabloid size, that you will post as part of a group critique on the due date for this lesson.

# Learning Goals

* practice seeing the feedback mechanisms in a system
* practice creating functional schematic drawings
* develop a comfort level with the distinction between amplifying and stabilizing feedback

# Grading Rubric

| **Quality** | **Pass (1)** | **Fail (0)** |
| --- | --- | --- |
| Completeness | Contains all the required elements | Does not contain all the required elements |
| Presentation | Layout, organization and graphic design of the information is appropriate and contributes to an ease of consumption of the information | Information is poorly organized, the graphic design is unattractive or inappropriate and the information contained is difficult to parse. |
| Content | The analysis presented is easy to understand, makes sense, tells a plausible story and follows a clear logic | The connections and relationships are not presented clearly, the arrangement doesn’t follows an apparent logic |