

Tips for Causal Loop Diagrams (CLDs)

Causal Loop Diagrams (CLDs) help one understand and communicate the interactions that determine the dynamics of a system. System behaviors are generated from within the system and are the result of one or more causal (or feedback) loops. CLDs illustrate how “structure generates behavior” within a system.

1. CLDs show causal relationships and illustrate circular feedback within a system.
A cause becomes an effect, becomes a cause. You should be able to read around the loop several times. “What goes around comes around.”
2. You may choose to identify important CLDs by looking for causal relationships among behavior-over-time graphs (BOTGs) that describe the system or by extracting those found within Stock/Flow maps and computer simulations.

Since CLDs are about the causes of change, it is helpful to identify how key elements actually did change by drawing accompanying BOTGs (See Fig. 1: As drug use goes up, dependency goes up; as dependency goes up, drug use goes up.)

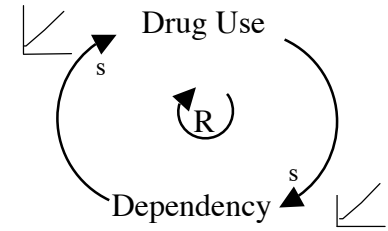
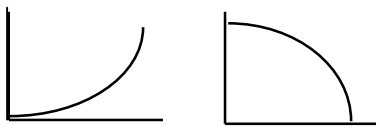


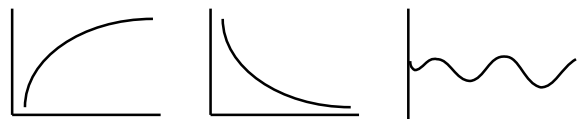
Figure 1

3. Find a specific focus for the loop(s) you draw, taking into account the purpose and audience for the loop(s). A CLD can help you tell a story or express your interpretation or mental model of how a system works. A single, understandable CLD can describe a simple system or a part of a more complex one.
Pick one aspect of the system. Focus on a behavior that is changing over time. What are the causes? What are the effects? This/these become the other aspects of the loop(s).
4. CLDs contain 4 elements (See Fig. 1):
 - a. variables that are related in cause/effect sequence(s) (See #5 below.)
 - b. arrows that indicate which elements are affecting other elements
 - c. symbols associated with the arrows that denote the direction of the influence of the relationships (See #6 below.)
 - d. a central symbol indicating the overall identity of the loop (either “R” reinforcing or “B” balancing) (See #7 below.)
5. All variables in a CLD must be able to increase or decrease; at least one must be a stock, i.e. an accumulation. (See “Tips for Stock/Flow Maps.”)
 - a. Choose precise, non-repetitive terms for the variables in CLDs, e.g., “Feelings” is too nebulous a term to include in a loop. Try a more specific feeling such as “happiness,” “sadness,” or “frustration” instead.
 - b. Do not use words such as more/less, or increases/decreases in the variable name. It is very hard to interpret less “more drug use” or more “less drug use.”
6. Symbols associated with the arrowhead end of each arrow indicate the effect of the influence.
 - a. An “S” means that both variables move in the same direction. If the first variable increases, the second variable will be greater than it would have been otherwise; a decrease in the first causes the second to be less than it would have been otherwise. A “+” may be used in a similar although not identical fashion.*
 - b. An “O” shows that the two variables change in the opposite direction. If the first variable increases, the second will be less than it would have been otherwise; a decrease in the first variable causes the second to be greater than it would have been otherwise. A “-” may be used in a similar, although not identical, fashion. *For clarification of the difference between “S” and “+” and “O” and “-,” refer to writings by John Sterman and/or George Richardson.
7. A CLD may be “reinforcing” and grow, or shrink, until acted upon by a limiting force, or “balancing” and move toward, return to, or oscillate around a particular condition. Reinforcing loops are marked with an “R” in the center; balancing loops are indicated with a “B” in the center. *Graphs of behaviors from:*

Reinforcing Loops



Balancing Loops



8. If there is a significant amount of time between the action of one variable and the reaction of the next variable in the loop, a time delay can be indicated by drawing two short, parallel line segments across the arrow that connects those two variables.

