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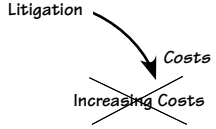
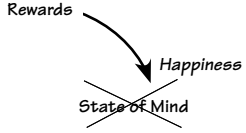
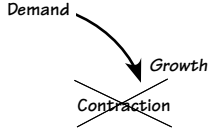
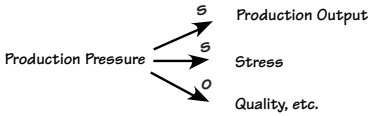
Guidelines for Drawing Causal Loop Diagrams

by Daniel H. Kim

Causal loop diagrams, or CLDs, provide a language for articulating our understanding of the dynamic, interconnected nature of our world. We can think of them as sentences that are constructed by linking together key variables and indicating the causal relationships between them. By stringing together several loops, we can create a coherent story about a particular problem or issue.

Each loop consists of variables connected by arrows that represent causal connections showing the movement of feedback throughout the system. Each arrow is labeled with a sign ("s" or "o") that indicates how one variable affects another: "s" indicates a change in the same direction, and "o" a causal change in the opposite direction.

Causal loop diagrams are composed of a combination of balancing ("B") and reinforcing ("R") loops. A balancing process is goal-seeking in nature and tends to keep the system steady around a particular goal. A reinforcing loop, by contrast, produces either rapid growth or collapse by driving change in one direction with increasing change in the same direction each time you go around the loop. Balancing and reinforcing processes can be combined in an infinite number of combinations to describe the behavior of all kinds of systems, including the behavior of organizational systems.

	Guideline	Example
Selecting Variable Names	**1.** Use nouns when choosing a variable name. Avoid verbs and action phrases, because the action is conveyed in the loop's arrows. For example, "Costs" is better than "Increasing Costs," because a decrease in Increasing Costs is confusing. The sign of the arrow ("s" for same or "o" for opposite) indicates whether Costs increase or decrease relative to the other variable.	
Selecting Variable Names	**2.** Use variables that represent quantities that can vary over time. It does not make sense to say that "State of Mind" increases or decreases. A term like "Happiness," on the other hand, can vary.	
Selecting Variable Names	**3.** Whenever possible, choose the more "positive" sense of a variable name. For example, the concept of "Growth" increasing or decreasing is clearer than an increase or decrease in "Contraction."	
Loop Construction	**4.** Think of the possible unintended consequences as well as the expected outcomes for every course of action included in the diagram. For example, an increase in "Production Pressure" may increase "Production Output," but it may also increase "Stress" and decrease "Quality."	

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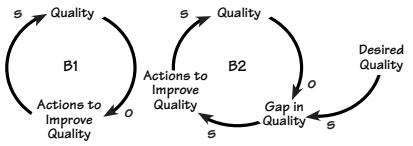
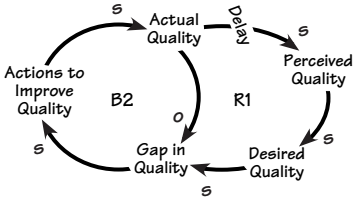
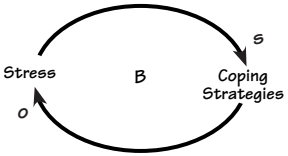
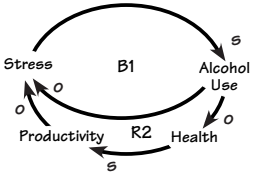
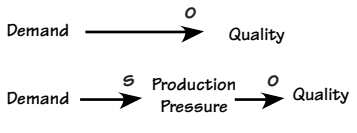
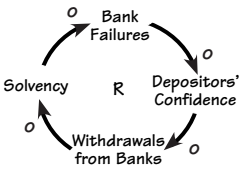
	Guideline	Example
Loop Construction	**5.** All balancing loops are goal-seeking processes. Try to make explicit the goals driving the loop. For example, Loop B1 may raise questions as to why increasing "Quality" would lead to a decrease in "Actions to Improve Quality." By explicitly identifying "Desired Quality" as the goal in Loop B2, we see that the "Gap in Quality" is really driving improvement actions.	
Loop Construction	**6.** Distinguish between perceived and actual states, such as "Perceived Quality" versus "Actual Quality." Perceptions often change slower than reality does, and mistaking the perceived status for current reality can be misleading and create undesirable results.	
Loop Construction	**7.** If a variable has multiple consequences, start by lumping them into one term while completing the rest of the loop. For example, "Coping Strategies" can represent many different ways we respond to stress (exercise, meditation, alcohol use, etc.).	
Loop Construction	**8.** Actions almost always have different long-term and short-term consequences. Draw larger loops as they progress from short- to long-term processes. Loop B1 shows the short-term behavior of using alcohol to combat stress. Loop R2, however, draws out the long-term consequences of this behavior, showing that it actually *increases* stress.	
General Tips	**9.** If a link between two terms requires a lot of explanation to be clear, redefine the variables or insert an intermediate term. Thus, the relationship between "Demand" and "Quality" may be more obvious when "Production Pressure" is inserted in between them.	
General Tips	**10.** A shortcut to determining whether a loop is balancing or reinforcing is to count the number of "o's" in the loop. An odd number of "o's" indicates a balancing loop (i.e., an odd number of U-turns keeps you headed in the opposite direction); an even number or no "o's" means it is a reinforcing loop. CAUTION: After labeling the loop, you should always read through it to make sure the story agrees with your R or B label.	

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