

Chapter 6. Getting things under control

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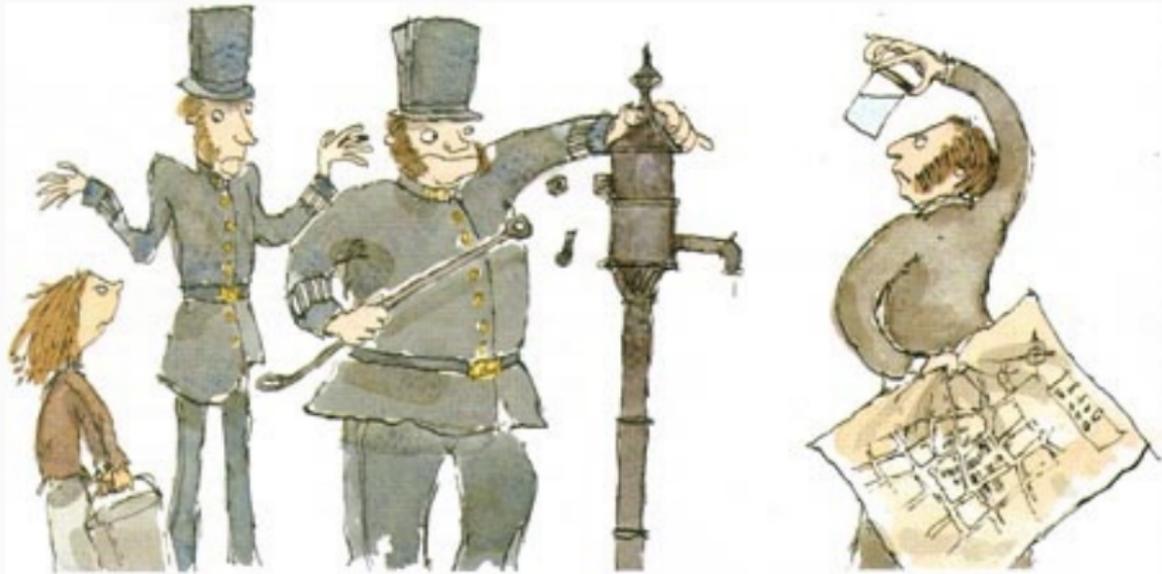
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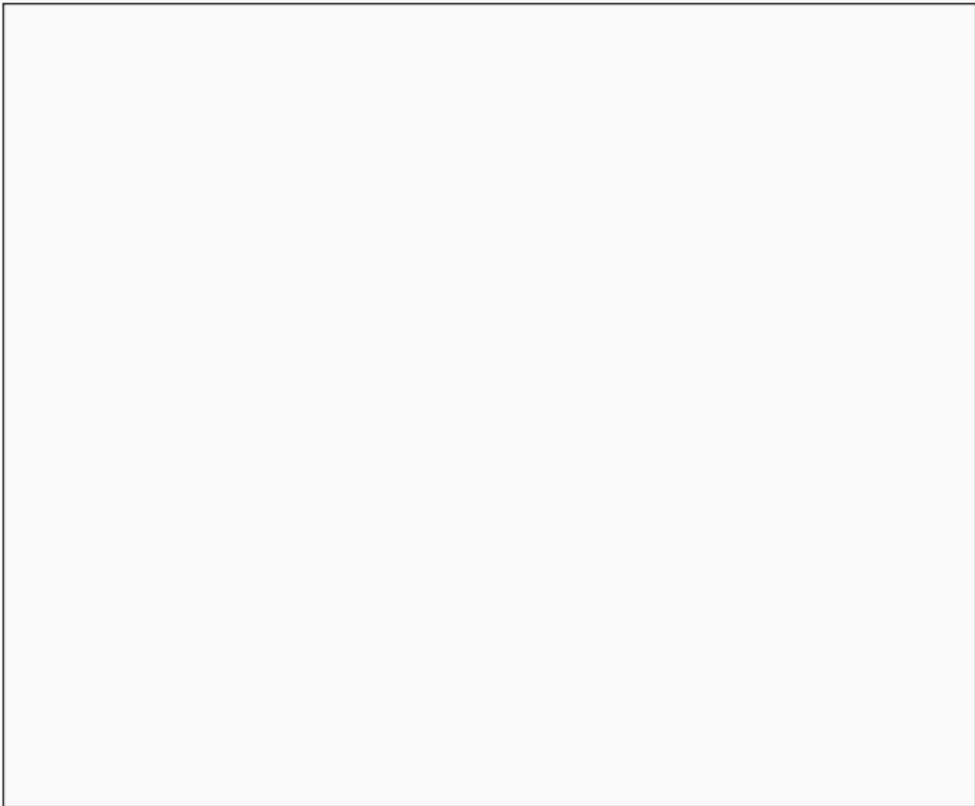
Goldberger and Pellagra (燥肤病)



Snow and Cholera (霍乱)



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- The Southwark and Vauxhall Company, however, had stayed downstream.

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Comparison, control, and manipulation

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- By comparing results obtained in different - but controlled - conditions, scientists rule out certain explanations and confirm others.
- The essential goal of experimental design is to **isolate a variable**. When a variable is successfully isolated, the outcome of the experiment will eliminate a number of alternative theories that may have been advanced as explanations.
- Scientists weed out the maximum number of incorrect explanations either by directly **controlling** the experimental situation or by **observing** the kinds of naturally occurring situations that allow them to test alternative explanations.

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- The variable manipulated is called the **independent variable** and the variable upon which the independent variable is posited to have an effect is called the **dependent variable**.
- Scientists prefer to manipulate the experimental variables more directly because direct **manipulation** generates stronger inferences.

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Snow Versus Goldberger

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- Random assignment ensures that the groups start out relatively closely matched on all extraneous variables that could affect the dependent variable of school achievement. These extraneous variables are sometimes called **confounding variables**.

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- Flipping a coin is one way to decide to which group each subject will be assigned to. In actual experimentation, a computer-generated table of random numbers is most often used.
- By using random assignment, the investigator is attempting to equate the two groups on all behavioral and biological variables prior to the investigation—even ones that the investigator has not explicitly measured or thought about.

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- That is, the more subjects there are to assign to the experimental and control groups, the closer the groups will be matched on all variables prior to the manipulation of the independent variable.
- Fortunately for researchers, random assignment works pretty well even with relatively small numbers (e.g., 20–25) in each of the groups.

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- The groups will always be matched fairly closely on any variable, but to the extent that they are not matched, random assignment removes any bias toward either the experimental or the control group.
- Perhaps it will be easier to understand how random assignment eliminates the problem of systematic bias if we focus on the concept of replication: the repeating of an experiment in all of its essential features to see if the same results are obtained.

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- Here is where the importance of replication comes in.

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- However, even in experiments where the matching is not perfect, the lack of systematic bias in random assignment allows us to be confident in any conclusions about cause— as long as the study can be replicated.
- This is because, across a series of such experiments, differences between the two groups on confounding variables will balance out.

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The portacaval shunt, a treatment for
cirrhosis of the liver

The importance of control group

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- The “nonvividness” of the control group—the group treated just like the experimental group except for the absence of a critical factor—makes it difficult to see how essential such a group is.

The importance of control group

	Improvement	No Improvement	Percent
Treatment	200	75	72.7%

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	Improvement	No Improvement	Percent
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No Treatment	50	15	76.6%

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- In short, it is relatively easy to draw people's attention away from the fact that the outcomes in the control condition are a critical piece of contextual information in interpreting the outcome in the treatment condition.
- Unfortunately, drawing people's attention away from the necessity of comparative information is precisely what our media often do.

The importance of control group

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- “The Lasting Wounds of Divorce”

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- “Progressa Program for Education”

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The case of clever hans



Description and explanation

- The case of Clever Hans is a good context in which to illustrate the importance of carefully distinguishing between the description of a phenomenon and the explanation of a phenomenon.
- Link to principle of parsimony

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Facilitated communication

Facilitated communication

- Autism and facilitated communication

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- The claim was made that autistic individuals and other children with developmental disabilities who had previously been nonverbal had typed highly literate messages on a key-board when their hands and arms had been supported over the typewriter by a sympathetic “facilitator.”

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- The facilitator, almost always a sympathetic individual who was genuinely concerned that the child succeed, had numerous opportunities to consciously or unconsciously direct the child's hand to the vicinity of keys on the keyboard.
- That cuing by the facilitator was occurring should also have been suggested by the additional observation that the children sometimes typed out complicated messages while not even looking at the keyboard.
- Additionally, highly literate poetic English prose was produced by children who had not been exposed to the alphabet.

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- Thus, the responses were determined by the facilitator rather than the child.
- But this sad story gets even worse.
- The implementation of unproven treatments has real costs

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- Here we have another example of the harm done by reliance on testimonial evidence and the fallacy of the idea that therapeutic fads and pseudoscience do no harm.
- We can also see that there is simply no substitute for the control and manipulation of the experimental method when we want to explain behavior.

Facilitated communication

Facilitated communication

- Note again the link to the principle of parsimony. That the severe linguistic difficulties of autistic children could be solved by a single “magic bullet” (see Chapter 9) intervention flies in the face of decades of work on the cognitive, neuropsychological, and brain characteristics of autistic children.

Facilitated communication

- Note again the link to the principle of parsimony. That the severe linguistic difficulties of autistic children could be solved by a single “magic bullet” (see Chapter 9) intervention flies in the face of decades of work on the cognitive, neuropsychological, and brain characteristics of autistic children.
- It would require that too much else that we know about cognition and neurology be altered. The existence of facilitated communication would show no connectivity with the rest of science.

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- the importance of carefully distinguishing between the description of a phenomenon and the explanation of a phenomenon.
- The term “facilitated communication” is not a neutral description of what occurred between facilitator and child. Instead it posits a theoretical outcome—that communication actually occurred and had been truly enhanced by the facilitator.
- But that is the very thing that had to be proved!

More Examples

- Shaken baby syndrome
- Accident

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Prying Variables Apart: Special Conditions

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Prying Variables Apart: Special Conditions

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- In order to separate, to pry apart, the causal influence of many simultaneously occurring events, we must create situations that will never occur in the ordinary world.
- Scientific experimentation breaks apart the natural correlations in the world to isolate the influence of a single variable.
- Psychologists operate in exactly the same manner: by isolating variables via manipulation and control.

Examples

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- Reading process, longer words; Frequency

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- Goldberger, Oskar Pfungst and Hans

Examples

- Reading process, longer words; Frequency
- Goldberger, Oskar Pfungst and Hans
- facilitated communication

Attachment theory

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- Many classic experiments in psychology involve this logic of prying apart the natural relationships that exist in the world so that it can be determined which variable is the dominant cause.

Attachment theory



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- Creating special conditions to test for actual causal relationships is a key tool we can use to prevent pseudoscientific beliefs from attacking us like a virus
- Consider the case of therapeutic touch (TT)—a fad that swept the North American nursing profession in the 1990s.
- That is, they move their hands over the patient's body but do not actually massage it.

In summary

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- In short, it is often necessary for scientists to create special conditions that will test a particular theory about a phenomenon. Merely observing the event in its natural state is rarely sufficient.

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- Despite extensive experience with moving and falling objects, people's intuitive theories of motion are remarkably inaccurate.
- It is critical to understand that the lay-person's beliefs are inaccurate precisely because his or her observations are "natural," rather than controlled in the manner of the scientist's.

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Intuitive Psychology and pain

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Intuitive Psychology and pain

- The research literature serves to warn us that personal experience is no guarantee against incorrect beliefs about human psychology.
- Behavioral economist Dan Ariely (2008) tells the story of suffering burns over 70 percent of his body as the result of an accident when he was 18 years old.