

How to Think Straight About Psychology

Chapter 8

Avoiding the Einstein Syndrome:
The Importance of
Converging
Evidence



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Don't Trust the Tabloids

"New Breakthrough in Mind Control!"

"Biological Experiment Reveals the Key to Life!"

California Scientist Discovers How to Postpone Death!"

It's not hard to spot these ridiculous claims and because they come from the most irresponsible quarters of the media, most scientists recommend they be approached with skepticism.

These fantastic headlines make the implication that all problems in science are solved when a single, crucial experiment completely decides the issue or that a recent finding overturns all previous knowledge.

This is great for Hollywood, but if taken too seriously, can lead to misconceptions about scientific advances.

The Connectivity Principle

One example of where a tabloid-esque theory was mostly correct was Einstein's Theory of Relativity. We just see others so often because they fit the "script" the media outlets use.

The Connectivity Principle is that a new scientific theory must make contact with previously established empirical facts. To be an "advance" in science, it needs to not only explain new facts, but also account for old ones, even if it explains the old facts in new ways.

Old and new theories will exist as contending theories until a new synthesis is achieved.

Eg. Earth as the center of the Solar System vs the Sun, Newtonian Physics vs Einsteinian, etc.

A Consumer's Rule: Beware of Violations of Connectivity

This is best taught by example: UC paleontologist Kevin Padian showed how the nature of science is misunderstood by the public when the connectivity principle is ignored. During the decision of the Kansas Board of Education to remove the mention of evolution from its curriculum, Padian pointed out that removing evolution would have negative ramifications in paleontology, embryology, morphology, biogeography, neuroscience, etc.

The "Great-Leap" Model Versus the Gradual-Synthesis Model

We tend to think that scientific advances occur in giant leaps, like how we perceive Einstein's brilliant breakthrough on relativity. The problem with this is that because of how the information is presented, that's how we now expect all scientific progress should take place.

Take all the breakthroughs in genetics and molecular biology that happened in the last 100 years. They weren't because of just one person and their single brilliant experiment, it took many people and many experiments/failures.

"Scientists are not dependent on the ideas of a single person, but on the combined wisdom of thousands"

-Ernest Rutherford:
discoverer of the atom's
nucleus

Converging Evidence: Progress Despite Flaws

There are a number of ways in which an experiment can go wrong (confounded). If a number of experiments are done and they have a similar flaw, then the confidence in the outcome would be decreased because the outcome could have simply come from that one flaw. On the other hand, if the experiments are all flawed in different ways, then our confidence in the results would increase because it would be less likely that the consistency was due to a contaminating factor. Thus, if you have many experiments (that may have confounded factors), you can still get a strong conclusion.

Converging Evidence in Psychology

Especially in psychology, we need to resist the temptation to say a hypothesis is "proven" when the evidence is still ambiguous. Theories are proven by many experiments and case studies. (eg. violent TV and violent kids, cigarette company executives making claims based on only one favorable medical study, etc.)

There are several ways to investigate and converge evidence and they all have their flaws: Epidemiological studies (correlational - high chance of sporadic link between variables), Laboratory studies (animals instead of humans), Clinical Trials (hospital setting only)

We are justified in drawing strong conclusions when the data from all the different methods converge strongly.

"most science isn't a breakthrough. It's incremental, brick by brick"

-Judah Folkman

Scientific Consensus

Think in terms of scientific consensus rather than breakthrough; or gradual synthesis rather than great leap

The media often hinders or obscures scientific progress because of its "he-said, she-said" orientation. Everyone has one, and only one side on every issue according to them.

Methods and the Convergence Principle

The convergence principle also implies that we should use many different methods in all psychological research. A balance between methodologies is preferred.

The distribution of research methods in psychology is now much more balanced than it was even just a few years ago.

The Progression to More Powerful Methods

In psychological studies, it is not uncommon for experiments to move on to more complex techniques because of the correlations of past experiments.

A good example of this is the type A vs type B personality studies that have evolved into full heart health and life risk factor experiments.

A Counsel Against Despair

Don't despair when the initial results of a study appear to be contradictory. This contradictory data is simply the result of our current inadequate understanding of the problem. They may simply be random chance occurrences or subtle methodological differences between experiments.

"[investigators should not] interpret a single study's results as having importance independent of the effects reported elsewhere in the relevant literature"

-Wilkinson, 1999 APA task force

Science progresses by convergence upon conclusions.

Summary

The gradual-Synthesis model for scientific advance is better than the **breakthrough model**.

No one experiment is definitive, but each helps us to rule out at least some alternative explanations and, thus, aids in the process of homing in on the truth.

When conceptual change occurs, it adheres to the principle of connectivity: New theories not only must account for new scientific data but must also explain the previous data.