
ANTENNA



Hi Bods!

The Official ANTENNA editor has gone missing! Has she taken a trip through a worm-hole in space or been swallowed by a black hole? Anyway here is solid gold advice based on the work of Carl Sagan, the famous astronomer and science communicator, on how to make and test good arguments! Have fun!
-Duncan Rouch.



CARL SAGAN'S BALONEY DETECTION KIT

29 tools for testing arguments and detecting fallacious or fraudulent arguments! Based on the book 'The Demon Haunted World', by Carl Sagan

Build and Test Your Argument!

- (1) **Independent Data?** Wherever possible you should have independent confirmation of the facts from different kinds of data.
- (2) **Different points of view compared?** Find and examine substantive debate on the evidence by knowledgeable proponents of different points of view.
- (3) **Hypotheses Compared?** Spin more than one hypothesis - don't simply run with the first idea that caught your fancy.
- (4) **Be objective.** Try not to get overly attached to a hypothesis just because it's yours.
- (5) **Be Precise.** Quantify, wherever possible.
- (6) **Chain argument works?** If there is a chain of argument every link in the chain must work.
- (7) **Use "Occam's razor".** - if there are two hypotheses that explain the data equally well choose the simpler to explain what is happening.
- (8) **Can the hypothesis be tested?** Ask whether the hypothesis can, at least in principle, be falsified (shown to be false by some unambiguous test). In other words, is it testable by experiment? Can it be

differentiated from other hypotheses by testing them all in the same experiment?

Analyse Experimental Data

- (1) **Control experiments?** Check control experiments were performed, - especially "double blind" experiments where the person taking measurements is not aware of which are the test and control subjects.
- (2) **Are different data really independent?** Look for dependence of factors involved in different experiments.

Find Common Fallacies of Logic and Rhetoric

- (1) **Ad hominem** - attacking the arguer and not the argument!
- (2) **Argument from "authority".** Arguments from authority carry no extra weight: in science there are no "authorities". Arguments must work alone.
- (3) **Argument from adverse consequences** - pointing out worst-case consequences of an "unfavourable" decision.
- (4) **Appeal to ignorance** - absence of evidence is not evidence of absence!
- (5) **Special pleading** - typically referring to god's will.
- (6) **Begging the question** - assuming an answer in the way the question is phrased.
- (7) **Data is selective** - counting the hits and forgetting the misses. Suppressed evidence or half-truths.
- (8) **Data set is too small.** Small numbers have large statistical errors, so they lack reliability.
- (9) **Misunderstanding statistics.** President Eisenhower expressing astonishment and alarm on discovering that fully half of all Americans have below average intelligence!
- (10) **Inconsistency** - e.g. military expenditures based on worst case scenarios but scientific projections on environmental dangers thriftily ignored because they are not "proved".
- (11) **Non sequitur** - "it does not follow" - the logic falls down.
- (12) **Post hoc, ergo propter hoc** - "it happened after so it was caused by" - confusion of cause and effect.
- (13) **Meaningless question** - e.g. what happens when an irresistible force meets an immovable object?

(14) **Excluded middle** - considering only the two extremes in a range of possibilities (making the "other side" look worse than it really is).

(15) **Short-term v. long-term** - a subset of excluded middle, e.g. why pursue fundamental science when we have so huge a budget deficit?.

(16) **Slippery slope** - another subset of excluded middle - unwarranted extrapolation of the effects, e.g. give an inch and they will take a mile.

(17) **Confusion of correlation and causation.** Different phenomena that show the same trends (a correlation) may have the same or different causes.

(18) **Straw man** - caricaturing, or stereotyping, a position to make it easier to attack..

(19) **Weasel words** - e.g., use of euphemisms for war such as "police action" to get around limitations on Presidential powers. An important art of politicians is to find new names for institutions which under old names have become odious to the public.

Lastly, be sceptical but also be open to new ideas! As the great man himself said, *"It seems to me what is called for is an exquisite balance between two conflicting needs: the most skeptical scrutiny of all hypotheses that are served up to us and at the same time a great openness to new ideas.... If you are only skeptical, then no new ideas make it through to you.... On the other hand, if you are open to the point of gullibility and have not an ounce of skeptical sense in you, then you cannot distinguish the useful ideas from the worthless ones"* - Carl Sagan, 1987.

Further resources:

o **The Critical Thinking Community:**

<http://www.sonoma.edu/cthink/>

o **CSICOP/Skeptical Inquirer:**

<http://www.csicop.org/>

o **Australian Skeptics:** <http://www.skeptics.com.au/>

o **Quackwatch:**

<http://www.familyinternet.com/quackwatch/index.html>

o **U.S.A. Skeptics:** <http://www.skeptic.com/>

Trashing ideas:

o **Journal of Irreproducible Results:**

<http://www.jir.com/>

o **The Annals of Improbable Research:**

<http://www.improb.com/>

Based on <http://www1.tpgi.com.au/users/tps-seti/baloney.html>

That was prepared by Michael Paine.



Science Jokes of the Month!

A student recognizes Einstein in a train and asks, "Excuse me, professor, but does New York stop by this train?"

Why did the chicken cross the road? Albert Einstein replied, "Whether the chicken crossed the road or the road crossed the chicken depends on your frame of reference".

Why did the chicken cross the Mobius strip? To get to the same side.

THE CHEMIST'S RECIPIE FOR CHOCOLATE CHIP COOKIES!

The following recipe for chocolate chip cookies appeared in Chemical & Engineering News (C&EN, Jun 19, 1995, p. 100). It was attributed to Jeannene Ackerman of Witco Corp.

Ingredients:

1. 532.35 cm³ gluten
2. 4.9 cm³ NaHCO₃
3. 4.9 cm³ refined halite
4. 236.6 cm³ partially hydrogenated tallow triglyceride
5. 177.45 cm³ crystalline C₁₂H₂₂O₁₁
6. 177.45 cm³ unrefined C₁₂H₂₂O₁₁
7. 4.9 cm³ methyl ether of protocatechuic aldehyde
8. Two calcium carbonate-encapsulated avain albumen-coated protein
9. 473.2 cm³ theobroma cacao
10. 236.6 cm³ de-encapsulated legume meats (sieve size #10)



To a 2-L jacketed round reactor vessel (reactor #1) with an overall heat-transfer coefficient of about 100 Btu/F-ft²-hr add one, two, and three with constant agitation.

In a second 2-L reactor vessel with a radial flow impeller operating at 100 rpm add four, five, six, and seven until the mixture is homogeneous.

To reactor #2 add eight followed by three equal portions of the homogeneous mixture in reactor #1. Additionally, add nine and ten slowly with constant agitation. Care must be taken at this point in the reaction to control any temperature rise that may be the result of an exothermic reaction.

Using a screw extrude attached to a #4 nodulizer place the mixture piece-meal on a 316SS sheet (300 x 600 mm). Heat in a 460K oven for a period of time that is in agreement with Frank & Johnston's first order rate expression (see JACOS, 21, 55), or until golden brown.

Once the reaction is complete, place the sheet on a 25 deg. C heat-transfer table allowing the product to come to equilibrium.

Source: <http://www.ahajokes.com/>