

# WHAT MAKES A “GOOD QUESTION” IN SCIENCE?

(H. Weller, SMS 491/EDW 472, Spring 2007)

## A GOOD QUESTION IN SCIENCE IS NOT:

- Too vague to lead to ways to collect data and/or to create falsifiable hypotheses as to what are answers to the question.
- Involving something that we cannot acquire information about. For example, “Is the Universe and everything in it an elementary particle, say an electron, in a much bigger Cosmos?” How can we acquire information from outside our Universe (Sagan, 1996, p. 211).
- Including a possible answer within it (“assuming the answer”).
- Involving religion, politics, and ethics – in ways other than how they relate to science.
- Involving pseudoscience (Derry, 1999, ch. 12; Sagan, 1996).

## A GOOD QUESTION IN SCIENCE IS ALSO NOT:

- Asking for an answer that is a “prescription” for how to do something, rather than an explanation for a natural phenomenon.

### Example

“Cheshire Puss,” she began, rather timidly, as she did not at all know whether it would like the name: However, it only grinned a little wider. “Come, it’s pleased so far,” thought Alice, and she went on. “Would you tell me, please, which way I **ought** to go from here?” (Gardner/Carroll, 1960, p. 88).

## A GOOD QUESTION IN SCIENCE IS OFTEN:

- Leading readily to ways to collect data and/or create falsifiable hypotheses as to what are answers to the question.

## A GOOD QUESTION IN SCIENCE IS OFTEN:

- Simple, isolating the essentials of a problem.

### Example

“Galileo also developed the art of simplification, the isolation of the essentials of a problem, the peering in his thoughts through the clouds that in real systems conceal the underlying simplicity, just as he looked through his telescope and saw the complexity of the heavens. He set aside the creaking cart pulled through the mud; instead he considered the simplicity of a ball rolling on an inclined plane, a pendulum swinging from a high support” (Atkins, 2003, p. 2).

## **A GOOD QUESTION IN SCIENCE IS SOMETIMES:**

- Abstract, giving a broader view and/or connecting separate fields.

### Example

“First, abstraction doesn’t mean useless. Abstraction can have enormous practical significance because it points to unexpected connections between phenomena and allows thoughts developed in one field to be used in another. More importantly, though, abstraction is a way of standing back from a set of observations and seeing them in a broader context. One of the most satisfying ‘eureka!’ moments in science, and in reading about science, is the Cortez-like experience of seeing oceans merging into a single whole, and realizing the connection between phenomena that had seemed disparate” (Atkins, 2003, pp. 3-4).

## **REFERENCES**

Atkins, P. (2003). Galileo’s Finger: The Ten Great Ideas of Science. Oxford: Oxford University Press.

Derry, G. N. (1999). What Science Is and How It Works. Princeton, N.J.: Princeton University Press.

Gardner, M. (1960). The Annotated Alice (by Lewis Carroll). Bramhall House.

Sagan, C. (1996). The Demon-Haunted World: Science as a Candle in the Dark. New York: Ballantine Books.