

# **Thinking Straight Friday, May 16**

## **Morning Session**

**Review of Assignment and discussion of empirical theories and their criticism**

**Workshop of second stage criticism of theories**

**Critical Exchange “idea fair”**

## **Afternoon Session beginning at 1 pm**

**Intelligent Design Seminar/Workshop**

# The Fact Theory Distinction

. Which of the following are statements of fact and which are statements of theory?

- 1 Most redheads have light complexions.
- 2 Leon Trotsky was killed as a result of a conspiracy.
- 3 Lung cancer is correlated with heavy cigarette smoking.
- 4 Some diseases are caused by germs.
- 5 The incumbent has an advantage in U.S. politics.
- 6 Mankind appeared on the earth as a result of evolution from nonhuman animals.
- 7 Atoms consist of electrons, protons, and neutrons.
- 8 Matter can be transformed into energy in amounts approximated by the formula  $E = mc^2$ .
- 9 Whatever causes gratuitous harm is morally wrong.

A deductive argument is valid if and only if it is impossible for all the premises to be true and the conclusion false

# **It's Just a Theory**

# Review of *Prisoners of Silence* Theory

What is explained : the (unexpected) responses for severely autistic subjects using “keyboard” based facilitated communication techniques

What does the explaining:

The Theory: (many) severely autistic subjects are *prisoners of silence*. They are individuals of normal(even extraordinary) intelligence trapped in a body that does not work normally so that they can communicate only with facilitation.

## Four criticisms of Empirical Theories

1. There is a plausible alternative theory
  2. The theory makes doubtful predictions.
  3. Defense against doubtful predictions is *ad hoc*.
  4. The theory is untestable.
- } *First-stage criticisms*
- } *Second-stage criticisms*

# Review of criticism of *Prisoners of Silence* Theory

## First Stage Criticism

### **The Initial Theory Being Evaluated**

(Many) severely autistic subjects are *prisoners of silence*. They are individuals of normal (even extraordinary) intelligence trapped in a world that does not work normally so that they can communicate only with facilitation

### **Plausible Alternative Theory**

Responses are being (unintentionally) caused by the facilitators

### **Regularities Being Explained**

The (unexpected) responses of severely autistic subjects using “keyboard” based facilitated communication techniques

### **Regularities Predicted by Initial Theory That Might Not Occur**

Subjects will be able to communicate what they know, even if the facilitator does not know it

## **Example of FC validation study**

Bebko, et. Al *in Journal of Autism and Developmental Disorders* 1996

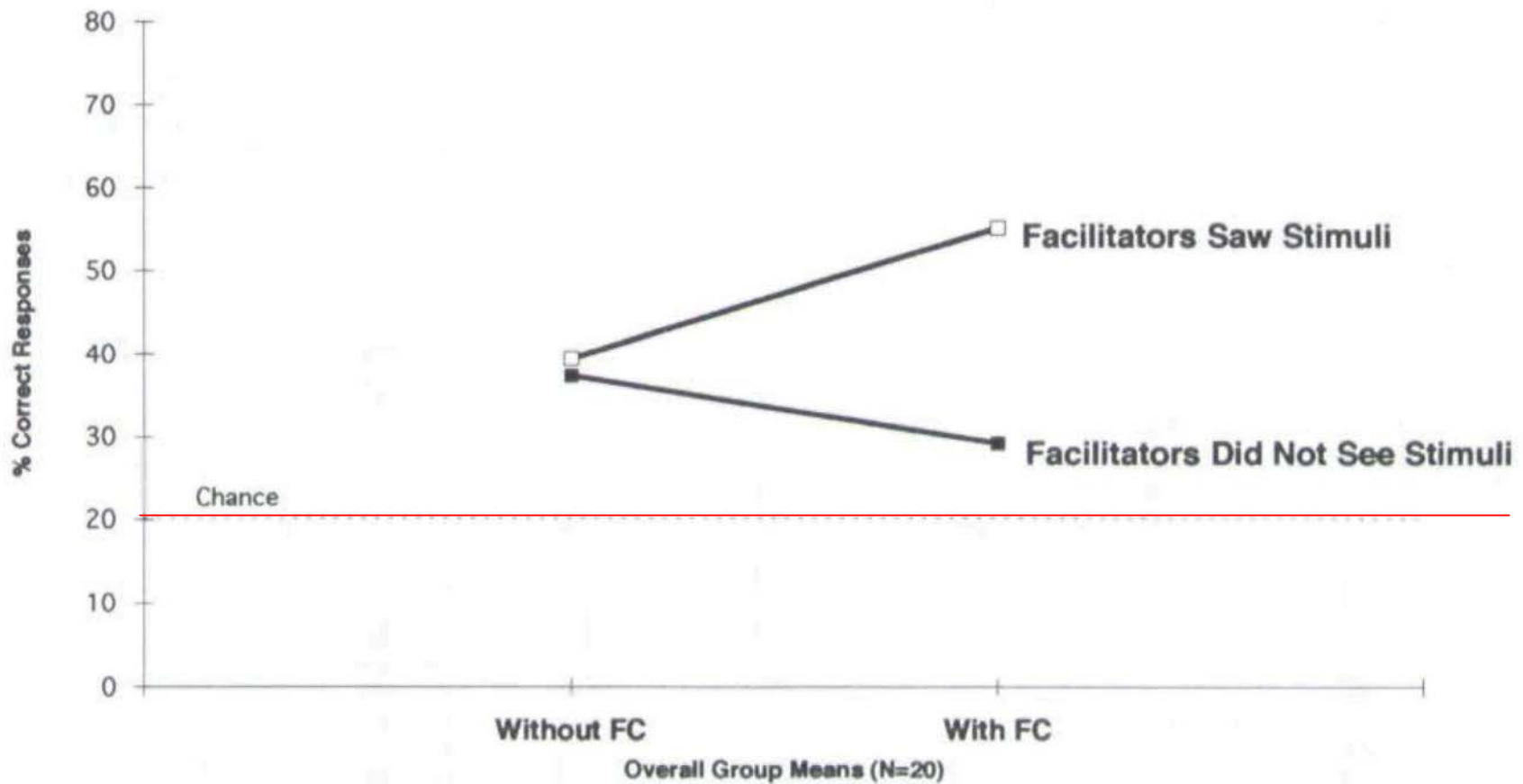
In the simplest case participating autistic individuals saw one of five pictures from a set, and was asked to point to the one that was the same from an arrangement of all five in others words were used either as individual stimulus or as part of the set of five

The stimuli were from among 480 3x4 inch colored photographs of familiar object and corresponding words

Total of 96 Trials per student (over 3 weeks)

There were four conditions in this method, representing the permutations of the two dimensions: a facilitated/independent dimension and a facilitator informed/not informed dimension. On half the trials the facilitator looked away as the single stimulus was shown to the student (facilitator not informed); on the other half the facilitator saw the stimulus. Both situations, however, facilitators could see the display of five stimuli while facilitating the students' response. Also, some trials were conducted with FC and some without (ie., the student was asked to point independently with facilitator in close proximity).





**Fig. 1.** Network design. Group data illustrating the interaction effect of the use of facilitated communication and facilitator knowledge on performance.

Scores in this method were the percentage of trials on which students pointed to the one of five pictures (or words) which corresponded to the picture (or word) which had been shown previously. Scores were computed separately for each of the four conditions (FC/informed, FC/not informed, no FC/informed, no FC/not informed) and are shown in Figure 1, across participants. A  $2 \times 2$  ANOVA indicated that the interaction was significant,  $F(1, 76) = 6.36, p = .0138$ , with performance in the FC/informed condition significantly greater than in the other three conditions, which did not differ.

**Statistical significance. Unlikely probability = .0138 that interaction effect shown was merely the result of sampling error**

# Review of criticism of *Prisoners of Silence Theory*

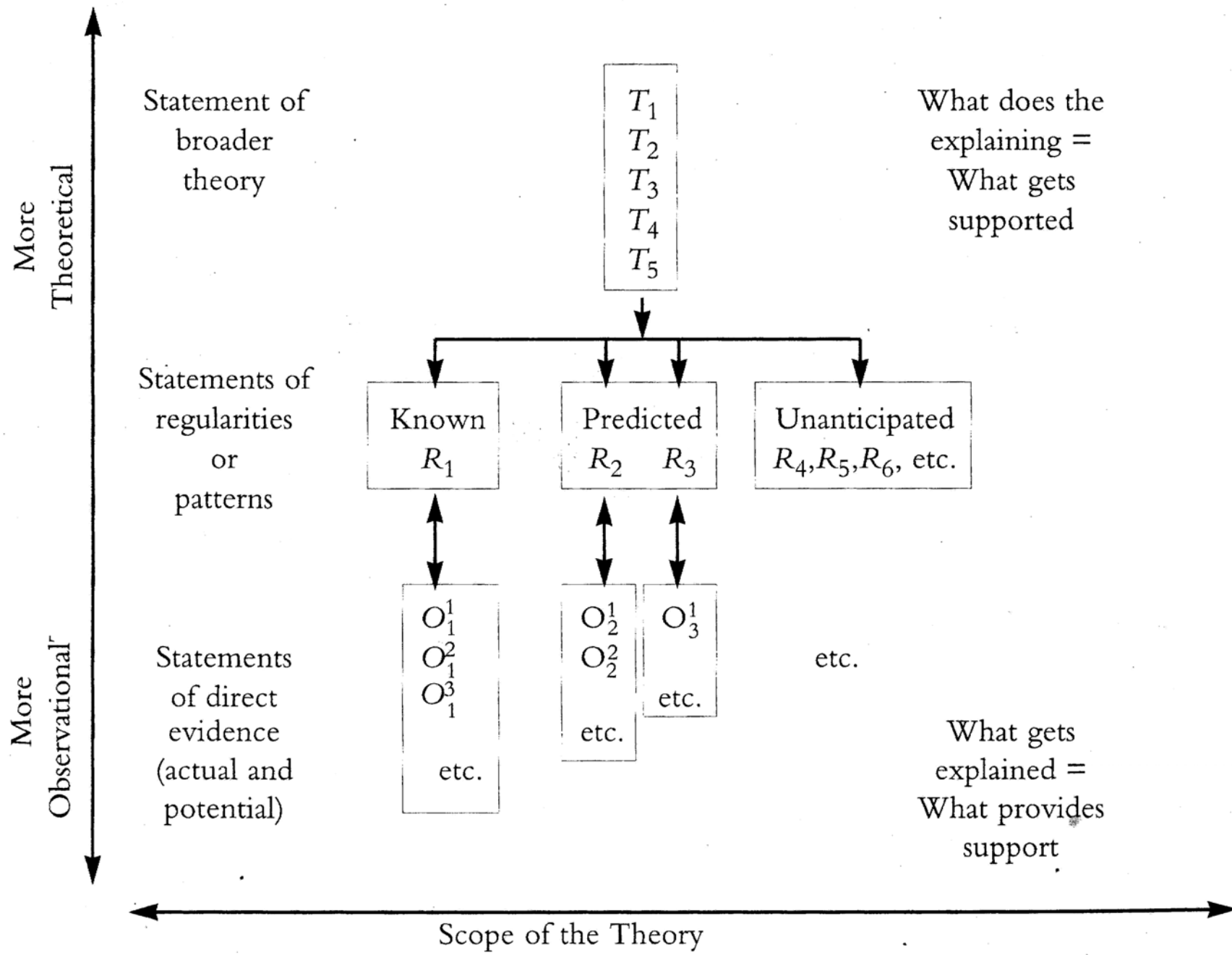
## Second Stage Criticism

Doug Biklen defended in theory against criticism by offering two explanations of failure of the **predicted regularity** that subjects will be able to communicate what they know, even if the facilitator does not know it

1. The test was a confrontational situation and the subjects of the test were unable to communicate as usual in an emotionally supportive way (Biklin 1990) video
2. The subjects had “word finding problems” that resulted in communication of the wrong word for the object in question.

**Is this defense ad hoc?**

**If tests such as those described in the video don't “test” the Prisoner of silence theory what would. It it really testable?**



# PBS Educators Web Site Definitions

Regularities

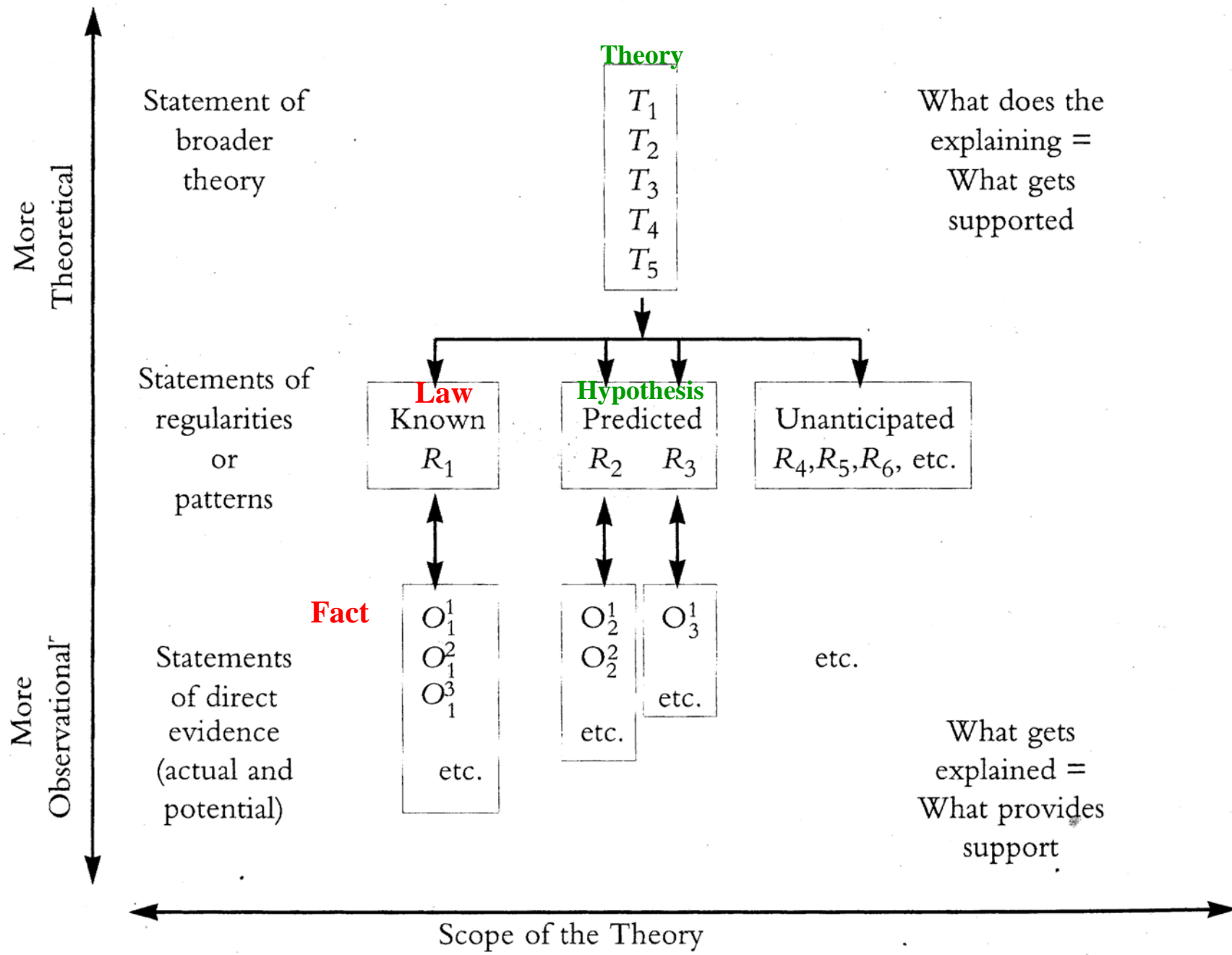
**Fact:** An observation that has been repeatedly confirmed. For example, there are 23 pairs of chromosomes in human cells.

**Law:** A descriptive generalization about how some aspect of the natural world behaves under stated circumstances. For example, one of Newton's laws of motion states that for every action, there is an equal and opposite reaction.

**Hypothesis:** A testable statement about the natural world that can be used to build more complex inferences and explanations. It explains why something occurs. For example if the tomato plants in your garden did not produce as many fruits as the year before, one hypothesis might be that the excessive number of rainy days in the current year interfered with the pollination of the tomato flowers.

Theory

**Theory:** In science, a well-substantiated, overarching explanation of some aspect of the natural world that can incorporate facts, laws, inferences, and tested hypotheses. For example, the cell theory states that cells are the basic unit of all living organisms and that all new cells arise from the division of pre-existing cells.



## A more Formal picture of Theories

That's All Folks