II. The Behavioral Approach to Understanding Cognition

- The 3-term contingency is the interpretive workhorse of behavior analysis.

But there are Formidable objections to adequacy of 3-term contingency to explain cognition

- Appropriate behavior occurs without a specific history of 3-term contingencies, eg what's 520 + 36?
- 3-term contingency in history but when SD occurs, R differs. (What day is it?).
- Behavior under control of future events.
- Behavior occurs in an unbroken stream.
- Behavior seems to be controlled by stored "memories."
- Verbal behavior seems to be sensitive to rules not instantiated by 3-term contingencies.

Uniformitarianism in science

- Assumption of uniformity: Metaphor of the black void. There are an infinite number of irrefutable hypotheses. Cognition can be a magical world populated by conceptual unicorns.
  - Assumption of uniformity leads us to assume that private behavior is no different from public behavior.

Newton's rules

- We are to admit no more causes of natural things than such as are sufficient to explain them.
- To the same natural effects, we must, as far as possible, assign the same natural causes.
- The qualities found to belong to all bodies within the compass of our experiments should be held to be true of all bodies.
- In science, we are to look upon principles inferred by induction as accurate, or very nearly accurate, until evidence accrues from which they may be made more accurate or liable to exception, notwithstanding any contrary hypothesis.

What is behavior?

- Any activity of the organism that can be shown to vary systematically with contingencies of reinforcement.
- Any activity of the organism that *does* vary systematically with contingencies of reinforcement. (Whether we can show it or not.)
- (Could be minute muscular movements or even a pattern of wholly neural activity.)

Hefferline experiments

- Used EMG device to measure tiny muscle movements. Subjects could avoid static while listening to music by making the movement.
- Result: conditioning and extinction of the movement without the awareness of the subjects.
- Supports claim that covert behavior is like overt behavior.

Alternative schemes

- Cognitive maps
- Schemas
- Lexicons
- Encoding and retrieval mechanisms
- Intentions
- Storage registers
- Language acquisition devices
- Universal Grammar

- Parable of the credit card debtor

Appeals to hypothetical constructs

- Any account that has an element, no matter how small, that has no independent empirical status, is vacuous. The element can absorb all of the mystery; since it is hypothetical, it is elastic. (e.g., the language acquisition device, the lexicon, the memory library.)

- What's so bad about such proposals, as long as we regard them as tentative?
  - There are an infinite number of them. Each one can carry none of the explanatory burden.

- Behavioral accounts of complex behavior are hard. It is so easy to account for behavior by appealing to will-power, intentions, and purpose:
  - "Why did you hop on the subway?"
  - "I *wanted* to come to the meeting. I *intend* to take it on my way home as well."
    - Here, the causation of behavior is internal. Such explanations are easily grasped, and there is a sense in which they may be correct, but as they stand they have no merit, for the desires and intentions have to be explained in turn. We must translate them into objective terms, and when we have done so, we will have a behavioral interpretation, not a cognitive one.

- Behavioral accounts of complex behavior are difficult, for the same reasons that evolutionary explanations of complex biological structures are difficult: most of the relevant facts are out of reach, either buried in the history of the individual (or in the history of his genetic lineage) or simply too complex to bring into the laboratory. Nevertheless, to the extent to which we can show how a behavioral account *might* work, it provides an actual explanation for the phenomenon.

•It is important to understand the strength of this point, because there are many competing accounts that seem, superficially, to be much more adequate. It is only when we realize that they are incomplete that we understand the power of the behavioral account. [Intelligent design is a much more adequate account of nature than natural selection; it handles all phenomena with equal ease. All that is left is that troublesome gap: How do we explain the intelligence?]

Behaviorist's Alternative

Interpreting behavior is difficult because much behavior and many controlling variables, and much relevant history is hidden from view. However, if all relevant variables could be evaluated, the relationship between behavior and its controlling relationships would be clear.

Does this mean science is helpless?

The Two Purposes of Science

- Mastery of nature
- Understanding of nature

They require different levels of control: Analogy of the magician

Distinction between experimental analysis and interpretation

Skinner on “Interpretation”

- Interpretation is the use of scientific terms and principles in talking about facts about which too little is known to make prediction and control possible. The theory of evolution is an example. It is not philosophy; it is an interpretation of a vast number of facts about species using terms and principles taken from a science of biology based upon much more accessible material and upon experimental analyses and their technical applications. The basic principle, reproduction with variation, can be studied under controlled conditions, but its role in the evolution of existing species is a mere interpretation.

Laboratory analyses of the behavior of organisms have yielded a good deal of successful prediction and control, and to extend the terms and principles found effective under such circumstances to the interpretation of behavior where laboratory conditions are impossible is feasible and useful. I do not think it is properly called philosophy. The human behavior we observe from day to day is unfortunately too complex, occurs too sporadically, and is a function of variables too far out of reach to permit a rigorous analysis. It is nevertheless useful to talk about it in the light of instances in which prediction and control have proved to be possible.

- Behavioral interpretations are powerful because they are selectionist and therefore fit seamlessly into the biological sciences.
- They also have the advantage of being physiologically plausible.
  - Digression for discussion of physiological foundations of behavior

Example

- What's the 10th letter after D?
  - No prior history of 3-term contingency.

Plausible interpretation, supported by:
Long latency to respond.
Collateral behavior.
Self-report.
Plausible history.

But . . .

Appeals to unobserved events.

The Threshold of Observability

- Whether a response can be observed is not a property of the response itself but of the vantage point of the observer.
- We can conceptualize a threshold of response intensity at which, for a given observer at a given time, the response is just observable.
- Some portion of the behavior of the organism will inevitably be below the threshold of observability.

Summary: Cognition is the confluence of observed and unobserved events interacting according to established principles of behavior.

- With no appeal to:
  - Hypothetical constructs, such as intentions, beliefs, and representations.
  - Structures, such as memory stores and the lexicon
  - Control processes, such as encoding, storage, retrieval, and elaboration.

  That is, it adopts the assumption of uniformity.

Three Questions

- Are not additional tools an asset?
- How is an appeal to “covert responses” more legitimate than an appeal to “representations?”
- How does “interpretation” differ from “hypothesis,” “inference,” and “speculation?”

A Strategy for Understanding Cognition

- Unabashed behavioral interpretation of the entire landscape of human behavior.
- Experimental analysis of the tractable bits, guided by those interpretations

  – The former enterprise provides a rough sketch, the latter fills in the detail. But empirical work can only be seen for what it is in the context of the interpretation.

Does the history of behavioral interpretation encourage optimism?

- No. Outside our field, behavioral interpretations are fuel for ridicule rather than excitement.
- But popularity is a weak indicator of survival. Science does not proceed by acclamation.
- Behavioral interpretations have led to self-perpetuating and growing field of inquiry.

What does it mean to explain something?

- When we have interpreted a puzzling phenomenon in terms of principles that have an independent, empirical justification, we have resolved the mystery shrouding that phenomenon and can reasonably claim to have explained it.

Reasons for optimism

- Behavioral interpretations rest on a foundation of empirical principles.
- They are smoothly integrated with the rest of biology.
- They offer a genuine **explanation** of complex behavior.