

Noam Chomsky and Martin Seligman: Mavericks of the Cognitive Revolution.

Andrew Speirs-Bridge

Submitted as PSY31PYA PMP Essay

Due Date: 25th May 2005

Lecturer: Geoff Cumming

Tutor: Felix Acker (10am Monday)

Abstract

In the late 1950's and early 60's a paradigm shift took place in psychology, which became known as the *cognitive revolution*. This essay critically reviews two maverick psychologists, Noam Chomsky and Martin Seligman, and their contribution to the cognitive revolution. The essay first provides key definitions, and some historical context regarding the dominance of behaviourism at the time. Noam Chomsky and Martin Seligman and their contributions to the cognitive revolution are then discussed. The essay wraps up by reviewing the current state of affairs for behaviourism, and looks at Chomsky and Seligman today. In summary it is hard to imagine a psychology without reference to internal mental states, and Chomsky and Seligman certainly helped facilitate this shift away from behaviourism. Having said this, it is also important to acknowledge the contributions of the behaviourists to contemporary psychology.

Noam Chomsky and Martin Seligman: Mavericks of the cognitive revolution.

Andrew Speirs-Bridge.

In the late 1950's and early 60's a paradigm shift took place in psychology, which became known as the *cognitive revolution*. At the time Behaviourism dominated psychology in the USA, and bright young students began to question the validity of a psychology that assumed internal thought processes played no part in human behaviour. This essay critically reviews two of these mavericks, Noam Chomsky and Martin Seligman, and their contributions to the cognitive revolution.

In the passages that follow definitions are first offered, and some historical context regarding the dominance of behaviourism during 1950's and 60's is provided. The mavericks Noam Chomsky and Martin Seligman and their contributions to the cognitive revolution are then each discussed in turn. The essay wraps up by describing the current state of affairs for behaviourism, looking at Chomsky and Seligman today, and then drawing to a conclusion.

The definitions used in this essay now follow starting with *maverick*. The primary purpose of this essay is to demonstrate how Chomsky and Seligman are mavericks, or people who exhibit "great independence in thought and action" (Answers.com, 2006).

The next term *paradigm shift* was first coined by Thomas Kuhn to describe a shift in dominance from one scientific theory to another incompatible theory. A key criterion for a paradigm shift is that assumptions in the old theory have been falsified by the new theory (Chalmers, 1999).

Continuing with the definitions *behaviourism* is an approach to psychology that focuses on observing behaviour, assuming that internal mental states play no part in response to stimuli. The founders of the behaviourist school include Ivan Pavlov, John B. Watson, Edward Thorndike and B. F. Skinner. They were driven by the ideal that a pure science

should only include what can be easily observed, and as such rejected the idea that internal mental states such as beliefs, desires or goals had a role to play in psychology. Instead behaviourists believe that all behaviour is determined by a combination of forces comprising genetic factors and the environment, either through association or reinforcement. B.F. Skinner in particular became known for his brand of radical behaviourism, claiming that anything (including mental internal states) can be explained in terms of behaviourism (Wikipedia, 2006).

In wrapping up the definitions we briefly touch on the term cognitive revolution. This refers to a period of time (starting in the 1950's and continuing into the 1980's) when cognitive science was born out of the combination of psychology, linguistics, computer science and neuroscience. In particular cognitive psychology is the science of studying the very mental processes that the behaviourists choose to ignore. It also marks the period when behaviorism was overthrown as the dominant psychological model. Whilst Chomsky and Seligman are the subject of this essay it is important to acknowledge that many others were also involved in the revolution including: Ulric Neisser, Herbert Simon, Jerry Bruner and Alan Newell (Miller, 2003; Wikipedia, 2006).

Behaviourism was the dominant model of psychology (particularly in the USA) for much of the first half of the 20th century. This was largely due to the use of conditioning theories as scientific model of human behaviour. It was until the late 1950's that Behaviourism met with any real opposition (Graham, 2005; Wikipedia, 2006). The paragraphs that follow review how Noam Chomsky and Martin Seligman took on the behaviourists and proposed theories that challenged core behaviourist assumptions.

Noam Chomsky received his PhD in linguistics from the University of Pennsylvania in 1955. His doctoral thesis captured many of his ideas regarding linguistics, and these were further refined in his 1957 book *Syntactic Structures*. Chomsky joined the staff of

Massachusetts Institute of Technology (MIT) in 1955 (where he still teaches today). It was during his early years at MIT that he wrote his review of B.F. Skinner's *Verbal Behavior* (Wikipedia, 2006).

Chomsky's review of *Verbal Behavior* was brutal, referring to it as a *reductio ad absurdum* (reduction to the absurd) of behaviourist assumptions. His opinions were informed by his own work, where he had found that most children exhibited distinct developmental stages when learning language, and in some cases learnt without be taught or rewarded. Chomsky believed that our capacity for learning language is innate, and that the human brain is pre-wired for language (Chomsky, 1959).

This flew in the face of Skinner's behaviourist doctrine that implied that all higher learning is the result of *operant conditioning*. In his review Chomsky systematically took Skinner's *Verbal Behavior* a part. He questioned the rigor of Skinner's use of terminology (including: *stimulus*, *response* and *reinforcer*), accusing him of using these terms to add scientific weight to his pros. Chomsky argued that given the richness of human language there is no means or predicting a response for any given stimulus or uncovering the reinforcer that resulted in the response. For example for the stimulus *the car is red* the response could be as varied as: *vroom, vroom; no it's actually marron; or red is the most popular colour for Ferrari's*. Chomsky also called into question the external validity of behaviourist experimental methodology using animals. He doubted that such a methodology could reveal anything about verbal human behaviour (Chomsky, 1959).

Chomsky's full frontal attack on B.F. Skinner stirred up a lot of ill will with the behaviourists, but also inspired other likeminded individuals to follow his lead and question behaviourism (Miller, 2003). It took 10 years before the behaviourists published a consolidated response to Chomsky's criticisms of *Verbal Behavior* (MacCorquodale, 1970). This response distanced itself from Skinner's radical brand of behaviourism and implied for

the most part that *Verbal Behavior* was published as a commentary and not as a theory in its own right. As such MacCorquodale (1970) suggests that Chomsky has taken much of the book out of context, and interpreted it too literally. This essay now moves on to review Martin Seligman's contribution to the cognitive revolution, *learned helplessness*.

After completing a graduate degree in modern philosophy from Princeton, Martin Seligman went on to study experimental psychology at the University of Pennsylvania in 1964. Inspired by the slow death of his father in a nursing home, Seligman was keen to investigate the mystery human helplessness. In collaboration with a fellow student Steven Maier, Seligman devised an experiment using dogs and behaviourist experimental methodology. Groups of three dogs were conditioned at a time. The first dog in each group would receive a series of electric shocks. This dog could turn off the shock by pressing a panel with its nose. The second dog would receive the same shocks however this dog had no means of turning off the electricity. The third dog (a control) received no electric shocks. On the following day all three dogs were exposed to a similar electric shock in a shuttlebox where they could easily escape the shocks by jumping over a small barrier. Maier and Seligman found that whilst the first and third dogs quickly learnt to escape the shock by jumping over the barrier, the second dog (that had been exposed to the unescapable shock) lay down and whimpered whilst it was repeatedly shocked. Maier and Seligman repeated the experiment with eight groups of dogs and found that six out of eight demonstrated learned helplessness (Seligman, 1992).

The significance of this experiment was that a central premise of behaviourist learning theory had been contradicted, that learning only occurs when a response produces a reward or a punishment. The results were written up and to their surprise were accepted and published as a lead article in the influential behaviourist *Journal of Experimental Psychology*. On publication the theory of learned helplessness infuriated the behaviourists and was relentlessly

attacked by leading experts in the field. On one occasion whilst attending an international meeting Seligman was even confronted, whilst visiting the men's room, by Skinner's leading disciple (Seligman, 1992).

To counter these attacks a second experiment was devised which tested the behaviourists' explanation of learned helplessness, that the dogs were somehow being rewarded for sitting still. In this second experiment three groups of dogs were again used. The first group (the *sitting still group*) received electric shocks which stopped if the dog sat still for 5 seconds. The second *yoked group* received the same electric shocks but could not escape the shocks in anyway. A *control group* of dogs received no shocks. After conditioning the dogs were taken to the shuttlebox. If the behaviourists were right the dogs the *sitting still group* and the *yoked group* would both sit still in the shuttlebox. However the dogs in the *sitting still group* first tried sitting still to control the shocks but when that didn't work they quickly learnt to jump over the barrier to escape the shock. However the *yoked group* remained still and didn't try to escape, thus refuting the behaviourists challenge to the theory of learned helplessness (Seligman, 1992).

Over the years that followed the theory of learned helplessness was further refined. Donald Hiroto adapted the experiment for human use by using noise instead of electric shocks, and replicated the animal results. Seligman himself continued to develop the theory to explain why 1 in 10 participants give up almost immediately and 1 in 3 never become helpless. The concept of *explanatory style* was introduced to factor in individual differences in optimism and pessimism. This was used to explain why the overly pessimistic $\frac{1}{10}$ gives up easily and the naturally optimistic $\frac{1}{3}$ never gives up (Seligman, 1992).

Seligman overcame sustained attacks from the behaviourist to establish learned helplessness which has since become a significant contribution to the study of depression. He developed and defended this theory by leveraging the experimental methodology developed

by the behaviourists, and took on board criticism to augment and strengthen learned helplessness with explanatory style (Seligman, 1992). This essay now moves on to review the role of behaviourism today, and to see how being a maverick has impacted the careers of Seligman and Chomsky.

In mainstream psychology today it is generally agreed that internal mental states can not be ignored, and as such Behaviourism as a major paradigm has been rejected. However Behaviourism has made some significant contributions to the field of psychology which still have relevance today. This legacy includes conditioning theory, animal experimental design, and clinical interventions that are still in use (behaviour management techniques for autistic children and token economies for chronic schizophrenics). Whilst the days of radical behaviourists such as Skinner are clearly over, the legacy of the behaviourist movement should be considered not insubstantial (Graham, 2005). And whilst some of his theories may have been discredited Skinner's influence still lives on. The popular TV show *Lost* makes reference to Skinner's work and the concept of operant conditioning is prominent in the story line of series two (Wikipedia, 2006). Given that Skinner's first choice of career was as a fiction writer (Wikipedia, 2006), I'm sure he would take this as a complement if he were alive today.

As for the mavericks both are still active academics. Noam Chomsky is currently Institute Professor in Linguistics at MIT. Chomsky's hierarchy of formal language has been influential both within and outside of the discipline of psychology, with contributions to the computer science and mathematics. However Chomsky is now probably best known as a left wing political activist, strongly opposed to US foreign policy (Wikipedia, 2006). Martin Seligman is also well known in academic circles as well as being a best-selling author. He is a world leader in the field of positive psychology, popularised by the publication of his book

Authentic Happiness (2002), and is currently a Professor of Psychology at the University of Pennsylvania (Wikipedia, 2006).

In the third year of my psychology education I find it hard to believe that behaviourism once dominated psychological teaching, and that internal mental states were relegated to the role of a nuisance variable. Chomsky and Seligman helped facilitate the paradigm shift away from behaviourism with their work in the 50's and 60's. However their styles were very different. Chomsky launched a personal attack on one of the founders of behaviourism calling Skinner's book *Verbal Behavior* absurd, whereas Seligman diligently leveraged behaviourist experimental methodology to undermine one of their key assumptions. Having said this it is important to acknowledge the contributions the behaviourists have made to contemporary psychology, and wonder how far they would have got if they had not made that simplifying assumption, to ignore unobservable mental states.

References

- Answers.com. *Online Encyclopedia, Thesaurus, Dictionary definitions and more*. Retrieved May 4, 2006 from <http://www.answers.com/>.
- Chalmers, A. F. (1999). *What is this thing called science?* (3rd ed.). St Lucia: University of Queensland Press. Chapter 8.
- Chomsky, N., (1959). A review of B.F. Skinner's Verbal Behavior. *Language*, 1(35), 26-58.
- Miller, G.A., (2003). The cognitive revolution: a historical perspective. *TRENDS in Cognitive Sciences*, 7(3), 141-144.
- MacCorquodale, K., (1970). On Chomsky's review of Skinner's Verbal Behavior. *Journal of the Experimental Analysis of Behavior*, 13(1), 83-99.
- Seligman, M.E.P., (1992). *Learned Optimism*. South Australia: Griffin Press. Chapters 2-3.
- Wikipedia. *The free encyclopedia*. Retrieved May 18, 2006 from <http://en.wikipedia.org/>.
- Graham, G., (2005). Behaviorism. In E.N. Zalta (Ed.). *The Stanford Encyclopedia of Philosophy (Fall 2005 Edition)*. Retrieved May 18, 2006 from <http://plato.stanford.edu/archives/fall2005/entries/behaviorism/>.