

YOU CAN'T PLAY 20 QUESTIONS WITH NATURE AND WIN:  
PROJECTIVE COMMENTS ON THE PAPERS OF THIS SYMPOSIUM

*Allen Newell*  
Carnegie-Mellon University

I am a man who is half and half. Half of me is half distressed and half confused. Half of me is quite content and clear on where we are going.

My confused and distressed half has been roused by my assignment to comment on the papers of this symposium. It is curious that it should be so. We have just listened to a sample of the best work in current experimental psychology. For instance, the beautifully symmetric RT data of Cooper and Shepard (Chapter 3) make me positively envious. It is a pleasure to watch Dave Klahr (Chapter 1) clean up the subitizing data. The demonstrations of Bransford and Johnson (Chapter 8) produce a special sort of impact. And so it goes. Furthermore, independent of the particular papers presented here, the speakers constitute a large proportion of my all-time favorite experimenters--Chase, Clark, Rosner, Shepard. Not only this, but almost all of the material shown here serves to further a view of man as a processor of information, agreeing with my current theoretical disposition. Half of me is ecstatic.

Still, I am distressed. I can illustrate it by the way I was going to start my comments, though I could not in fact bring myself to do so. I was going to draw a line on the blackboard and, picking one of the speakers of the day at random, note on the line the time at which he got his PhD and the current time (in mid-career). Then, taking his total production of papers like those in the present symposium, I was going to compute a rate of productivity of such excellent work. Moving, finally, to the date of my chosen target's retirement, I was going to compute the total

future addition of such papers to the (putative) end of this man's scientific career. Then I was going to pose in my role as discussant, a question: Suppose you had all those additional papers, just like those of today (except being on new aspects of the problem), *where would psychology then be?* Will we have achieved a science man adequate in power and commensurate with his complexity? And if so, how will this have happened via these papers that I have just granted you? Or will we be asking for yet another quota of papers in the next dollop of time?

Such an approach seems fairly harsh, especially: visit upon visitors. It almost made me subtitle my comments "The Time of the Walrus," as those of you who know their Alice Through the Looking Glass can appreciate. The Walrus and the Carpenter invited a parcel of oysters to take a pleasant walk with them--and end: up having them for lunch. Thus, I thought I'd try a different way.

#### Detection

Psychology, in its current style of operation, deals with phenomena. Looking just at the local scene we have Cooper and Shepard dealing with the phenomenon of apparent rotation, Posner (Chapter 2) dealing with the phenomenon of coding, Klahr dealing with the phenomenon of subitizing, and so on. There is, today, an amazing number of such phenomena that we deal with. The number is so large it scares me. Figure 1 gives a list of some--hardly all--that I generated in a few minutes. With each I've associated a name or two, not so much as originators (for this is not a scholarly review I am writing), but simply as an aid to identification.

How are these phenomena dealt with by Experiment: Psychology, once brought into existence by some clever experimental discovery? Every time we find a new phenomenon--every time we find PI release, or marking, or linear search, or what-not--we produce a flurry of experiments to investigate it. We explore what it is

#### 6. 20 QUESTIONS WITH NATURE

##### PHENOMENA

1. Physical - name match difference (Posner)
2. Continuous rotation effect (Shepard)
3. Subitizing (Klahr)
4. Chess position perception (DeGroot)
5. Chunks in STM (Miller)
6. Recency effect in free recall (Hurdock)
7. Instructions to forget (Bjork)
8. PI release (Wickens)
9. Linear search in sets in STM (Sternberg)
10. Non-improvement of STM search on success (Sternberg)
11. Linear search on displays (Neisser)
12. Non-difference of single and multiple targets in display search (Neisser)
13. Rapid STM loss with interpolated task (Peterson and Peterson)
14. Acoustic confusions in STM (Conrad)
15. High recognition rates for large set of pictures (Teigtssoonian and Shepard)
16. Visual icon (Sperling)
17. LTM hierarchy (Collins and Quillian)
18. LTM principle of economy (Collins and Quillian)
19. Successive versus paired recall in dichotic listening (Broadbent)
20. Click shift in linguistic expressions (Ladefoged and Broadbent)
21. Consistent extra delay for negation (Wason)
22. Saturation effect on constrained free recall (?)
23. Conservative probabilistic behavior (Edwards)
24. Clustering in free recall (Bousefield)
25. Constant recall per category in free recall (Tulving)
26. Serial position effect in free recall (?)
27. Backward associations (Ebenholtz and Asch)
28. Einstellung (Luchins)
29. Functional fixity (Dunker)
30. Two-state concept models (all or none learning) (Hower and Trabasso)

Fig. 1. A partial list of psychological phenomena and investigators (parentheses).

function of, and the combinational variations flow from our experimental laboratories. Each of the items in Figure 1 has been the source of such a flurry. I insisted on knowing at least one "second study" in order to include the item in the figure; in general there are many more. Those phenomena form a veritable corn of plenty for our experimental life--the spiral of

