Behavior

Research foul-ups and blunders

Researchers of personality and social psychology have a lot in common, says psychologist Rae Carlson; both groups have little of significance to say either about persons in society or individual personality because they rely on faulty assumptions and inadequate research methods.

These defects are apparent in studies filling a major professional journal, contends Carlson, herself a personality researcher at Rutgers — The State University in New Brunswick, N.J. Social psychologists largely fail to study people drawn from meaningfully defined social groups (such as religious congregations or occupational groups), to consider socioeconomic variables (such as ethnicity and social class), to study genuine social interaction that is not experimentally manipulated, to observe social influences on psychological functioning or to ask subjects about social issues. With few exceptions, Carlson says, personality researchers fail to study other than college students, to use biographical material or personal documents, to tailor experimental treatments to subjects' personal characteristics, to study persons over time or to analyze individuals rather than groups.

Carlson's conclusions, reported in the December 1984 JOURNAL OF PERSONALITY AND SOCIAL PSYCHOLOGY, are based on a content analysis of articles published in the same journal during 1982. Almost nine out of 10 social psychology studies failed to meet more than one of the five criteria outlined above. The picture was about the same for personality studies.

The problem, notes Carlson, is that researchers concentrate on isolated variables that say little about the development and organization of personality and persons in society. The attraction of these variables, she says, is that they can easily be quantified in a "clean, scientific" way. Carlson published a similar critique of personality research about 14 years ago; several other psychologists also called for a revision of personality and social research during the 1970s. But not much has changed since then, asserts Carlson. There is no unifying intellectual force in these fields as there once was, she points out. For example, during the 1930s and 1940s, personality researchers developed broad theories relating culture to personality which were explored in field experiments.

"We have to face up to the intrinsic complexity of personality research," she told SCIENCE NEWS. "Our field has been far more anxious to demonstrate the purity of its measures than the explanatory power of its formulations."

Breaking behavioral boundaries

A particularly "hot" area of psychological research is concerned with cognition — how information from the environment enters a person and is processed so that it can affect actions. Advances in cognitive science over the past several years, says psychologist Philip S. Holzman of Harvard University, make it clear that investigators in that field should break down the institutional walls that separate them from working with neuroscientists and psychiatrists.

The solutions to many of psychiatry's clinical problems depend on the cognitive sciences, writes Holzman in the February AMERICAN JOURNAL OF PSYCHIATRY. For example, psychologists have developed ways to measure — down to microseconds — the slowed rate of information processing in schizophrenics. Further studies should indicate whether this problem is due to higher-level brain functions or to delays in visual processing, he observes.

Although neuroscientists can record details of impulse transmission across nerves, adds Holzman, they cannot yet understand how such events produce a specific memory, idea or anticipation. He believes that knowledge will emerge when they join forces with cognitive psychologists and psychiatrists.

Biology

Julie Ann Miller reports from San Francisco at the Annual Congress for Recombinant DNA Research

Body plan: From genes to embryo

A recently discovered segment of DNA, called a "homeo box," is thought to direct the development of the body plan in a wide variety of animals (SN: 7/14/84, p. 21). Walter Gehring of the University of Basel in Switzerland and colleagues are examining fruit fly embryos to determine when and where genes containing homeo boxes are active. They have studied three fruit fly genes containing homeo boxes and find that each is active in specific periods and locations in the early embryo. Gehring reports that these sites of activity correspond to the recognized roles of the genes. For example, flies with a defective form of one of these genes have legs instead of antennae extending from their heads. In normal embryos, the gene is active only in the region destined to become the head. Similar experiments on genes that influence segmentation produced stripes of gene activity. The gene necessary for development of the normal number of body segments, instead of half the normal number, is present in stripes the width of a segment. In another case, the gene is found to be active later in embryonic development and in the posterior, but not the anterior, portion of each segment. Gehring concludes, "We are actually seeing how the body plan is structured."

Quick sorting of human chromosomes

An automated method of sorting chromosomes is expected to speed genetic research and to allow genetic screening of more pregnancies. Yuet Wai Kan of the University of California at San Francisco described a dual laser, fluorescence-activated sorter in operation at Lawrence Livermore (Calif.) National Laboratory. Two stains are used such that chromosomes have characteristic ratios of blue to yellow fluorescence intensities.

The sorter can distinguish all of the human chromosomes except numbers 10, 11 and 12, Kan says. It also can be used to assign genes rapidly to chromosomes and often to a specific region of a chromosome. For example, the human "homeo box" (see above) has been assigned to the long arm of chromosome 17. Kan says the sorter can be employed to rapidly scan clinical samples for chromosomal abnormalities. It is currently being used to compile a library of DNA segments catalogued by chromosome. This 32-investigator project is directed by Marv Van Dilla of Lawrence Livermore and Larry L. Deaven of Los Alamos (N.M.) National Laboratory. The sets of segments will be available to scientists for use in mapping genes, diagnosing genetic diseases and analyzing patient pedigrees.

Loopy chromosomes

A new view of DNA packing in chromosomes was described by Ulrich Laemmli of the University of Geneva in Switzerland. Previously scientists had observed many loops of the DNA extending from a protein scaffold, but they had not detected fixed binding sites between the DNA and the scaffold. Now Laemmli reports specific, strategically located attachment sites.

For example, fruit flies have a cluster of histone genes that is repeated about a hundred times. Each copy of the cluster forms one loop. Laemmli finds the same pattern for other genes — but the loops are of different lengths. In each case, the attachment sites fall near the DNA segments, called promoters, that initiate gene activity. Thus the loop may represent a single gene or a set of adjacent genes that are coordinately expressed. Laemmli has recently determined that the major protein in the scaffold is an enzyme called topoisomerase II. This enzyme had previously been recognized for its activity in untangling DNA. Laemmli therefore suggests that the attachment sites he has identified are the sites where topoisomerase II binds DNA. The function of the attachment sites is still uncertain — they may maintain order in chromosome packing, may control the supercoiling of the chromosome or may form compartments for gene expression.