The purpose of this study is to clarify the advantages and disadvantages of various research strategies. Part 2 addresses ideographic (or single-subject) and quality assurance research.

Ideographic Research

Although the experimental research strategy is clearly the most popular approach to scientific inquiry, the ideographic method is in far the oldest. Whereas experimental research involves comparing average individuals, the purpose of the ideographic model is the intensive study of one individual over a long period of time. Therefore, the outcome of an ideographic study is a precise description of an individual's behavior. The goal of ideographic research is to evaluate certain therapeutic interventions and to predict that person's behavior under various conditions of treatment. Consequently, ideographic research methods are most valuable to clinicians who routinely work with pathological populations and who need a systematic approach to understand their patients' behavior as well as to evaluate their own therapies.

Like the experimental research method, the classic ideographic paradigm involves the control and manipulation of behavior although it is not heavily dependent on statistical techniques for analyzing behavioral variance. Usually there is an A phase (baseline) where behavior is measured with no intervention. A manipulation is imposed which begins the B phase (intervention), and the chart of behavior (called the "cumulative record") developed during this phase is compared with baseline levels. If possible, the experiment should include a third phase where the intervention is removed to determine if behavior eventually returns to baseline levels. If all three phases are included in the design, then a causal statement can be made relating the intervention to changes in behavior. If the third phase is not included in the design, then the researcher can only conclude that a change in behavior during the B phase coincided with the manipulation. In either case, the researcher cannot generalize the results of the experiment beyond the individual being studied.

Single-case research methods were originally borrowed from the physical sciences by the medical and newly emerging psychiatric and psychological communities in the mid-1800s. Notables such as Johannes Müller and Claude Bernard were some of the first to use ideographic methods. These researchers had to hire people to steal bodies from cemeteries for autopsy and extirpation experiments in their basement. Other prominent researchers of the day such as the physiologist Ivan Pavlov and psychologist Hermann Ebbinghaus argued that an intensive study of the individual (rather than short-term experiments with hypothetical average people) was the only meaningful way to advance the sciences of physiology and psychology. In the United States, B. F. Skinner and other operant conditioning researchers have widely adopted the single-case design for what they call applied behavior analysis. In practice, clinicians with a behaviorist bent routinely use the single-case design to document change in their patients' functioning over extended periods of time.

There are several functional types of single-case experiments. Case studies simply document the
effectiveness of therapeutic procedures with an individual patient. These studies may include the quantitative measurement of the patient although they typically do not involve statistical analyses. True single-case experimental studies involve a planned structure (e.g., A-B-A), the measurement of behavior, and the graphic presentation of results (possibly statistics). Small sample methods involve elements of the single-case and individual difference methods. Groups of patients are studied individually, and then consistencies are noted among the individual single-case designs. The goal is to define the types of patients who are likely or unlikely to profit from a certain treatment regimen.

For the occupational therapist, ideographic research may be the only appropriate research method under highly irregular circumstances (e.g., for studying medical anomalies) when it is impossible to acquire a group of similar patients. It is also appropriate in time series studies where the goal is to document change over extended periods of time (e.g., several years), or the therapy is long term (e.g., the outpatient cognitive rehabilitation of head injury patients). The ideographic approach may be meaningfully used when the goal is to study the behavior of a nonhuman device such as an instrument for calibrating the output of an experimental machine under various conditions. Calibrating instruments are frequently used for pilot studies where the goal is to see if a treatment has any effect before a larger experimental study of groups is launched.

As an example, imagine that the therapist is working with a head trauma patient who exhibits memory loss. The researcher establishes a baseline using the digit span subscale of the Wechsler Adult Intelligence scale. Initially, the head-injured patient can only remember three numbers forward and two numbers backward after immediately hearing them. The therapist knows from the Wechsler norms that the average person can recite at least five to seven numbers forward and four to five backward. The therapist then begins working with the head-injured patient using computer training exercises to teach perceptual grouping strategies (1) to improve number recall, then carefully measures digit span weekly over a 3-month period. The patient gradually learns the strategy, and number recall eventually returns to average levels. This example was selected to illustrate a common ethical dilemma with single-case research. Obviously, the patient is not likely to return to baseline levels after the therapy is terminated. She or he has learned a new skill, and it is unethical to discontinue treatment just to see if the behavior returns to baseline. Therefore, when the goal is to maintain a treatment effect, the experiment should end on a treatment phase. If this design is impossible, patients may be monitored for several months, even years, after treatment to document that therapeutic gains have been retained.

It is tempting to say that, for the occupational therapist, single-case research is more appropriate than experimental research. Yet such a statement can only be made with caution. Readable descriptions of the research designs and experimental procedures geared to occupational therapy are just now becoming available (2). There are far fewer journals that will publish the results of single-case research. The therapist will also have to deal with the mistaken attitude that these research studies are somehow "less scientific" than experimental research. It is important to remember that the results of an ideographic study cannot be applied to a larger population. Statistical analyses are uncommon in single-case studies (an attractive consideration for most clinicians) although an advanced knowledge of graphic display is advisable (3). Hersen and Barlow (4) have the best review of this literature.

Quality Assurance Research

This type of research is actually a form of evaluation research (5). The goal is to assess the quality of patient care. Quality assurance research is related to operations research although the purpose of quality assurance research is to determine whether health care benefits known to be achievable are actually achieved. As applied to the medical establishment, the term health accounting is usually used. The goal of health accounting is to improve health care delivery. The result is improved patient benefits and a list of interventions that have been shown to improve the outcomes. The usual impetus for a quality assurance study is a concern for correcting health or economic problems related to health care. Conceptually, quality assurance is a means-to-an-end process which may or may not have theoretical underpinnings. In other words, the goal is to assess how to best achieve health care management objectives.

Quality assurance is a relatively new field with major development
### Table 1
Characteristics of Four Alternative Research Methods

<table>
<thead>
<tr>
<th>Historical basis</th>
<th>Purpose/goal</th>
<th>Outcome/yield</th>
<th>Major user</th>
<th>Classic paradigm</th>
<th>Criteria for good research</th>
<th>Variations</th>
<th>Dependence on statistical methods</th>
<th>Basis for inference and generalization</th>
<th>Basis for causal statements</th>
<th>Single best reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agronomy, Psychology</td>
<td>Theory Development, Hypothesis testing</td>
<td>Explanation/prediction of natural phenomena</td>
<td>Social sciences</td>
<td>Experimental vs. control group</td>
<td>Internal and external validity</td>
<td>True and quasi-experimental designs</td>
<td>Heavy use of descriptive, inferential, and graphic display</td>
<td>Theory of statistical inference, Representative sampling</td>
<td>Manipulation of independent variables</td>
<td>Kerlinger (9)</td>
</tr>
<tr>
<td>Agronomy, Psychology, Intelligence, Achievement</td>
<td>Documentation of the range of “normal” behavior</td>
<td>Tables of standardized scores</td>
<td>Social sciences</td>
<td>Raw Score = “Normed” Score</td>
<td>Scaling of traits, ability, IQ, personality, etc.</td>
<td>Heavy use of descriptive statistics</td>
<td>Heavy use of graphic display, Some use of descriptive statistics</td>
<td>Representative sampling</td>
<td>Clinical interpretation of test scores</td>
<td>Anastasi (10)</td>
</tr>
<tr>
<td>Agronomy, Psychology, Intelligence, Achievement, Physical sciences</td>
<td>Tests of useful therapeutic interventions</td>
<td>Social sciences, Behaviorists</td>
<td>Social sciences</td>
<td>A-B-A or A-B-A-B</td>
<td>B-A, B-A-B, A-B plus extended follow-up, Small Sample</td>
<td>Heavy use of descriptive statistics</td>
<td>Heavy use of graphic display, Some use of descriptive statistics</td>
<td>Representative sampling</td>
<td>Behavior returns to baseline</td>
<td>Herson and Barlow (3)</td>
</tr>
<tr>
<td>Agronomy, Psychology, Intelligence, Achievement, Physical sciences, Systems analysis, Operations research</td>
<td>Intensive study of the individual</td>
<td>Social sciences, Behaviorists</td>
<td>Educators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Consensus of experts, agreement of results with previous research findings</td>
<td>Williamson, Ostrow, and Braswell (8)</td>
</tr>
</tbody>
</table>

There are two classic paradigms. One is based on the standard systems analysis approach whereby the input, processing, and output functions of the system are studied. The goal is to determine where the bottlenecks lie and then to correct them. The more commonly used model involves an assessment of objectives. This technique is actually a series of steps designed to evaluate health care delivery systems to identify problems, implement changes, then monitor the improvements. The criterion for success of the study is whether a set of intervention procedures is derived that solves or otherwise obviates a problem.

A classic example of quality assurance as a strategy for planned change can be found in some of the early studies of hypertension (6). Previous research established the percentage of cases in which hypertension could be controlled with medication. That research was valuable for setting standards for the effectiveness of care in any given institution. In one quality assurance study in a health maintenance organization, the maximum acceptable standard for uncontrolled high blood pressure was 5%. However, 36% of their hypertensive patients had uncontrolled high blood pressure, which fell far short of the standard. A subsequent analysis indicated that a lack of follow-up care and poor compliance were major problems. Questionnaire responses from physicians and patients revealed that the physicians were well informed about the disease but did not consider patient education a necessary intervention. However, the patients were poorly informed about all aspects of their disease. Educational and follow-up programs for hypertensive patients were instituted and uncontrolled blood pressure dropped to 13%.

Quality assurance researchers usually work in teams. Once the quality assurance team is established, the project progresses according to five defined problemsolving stages. In stage 1, quality care problems are identified and ranked in order of importance. Often nominal group procedures (7) are used to identify problems when hard data are unavailable or difficult to collect. In stage 2, formal data collection begins with a literature search, study design plan, standards for the evaluation of care, and a preliminary data collection to measure the current levels of the problem outlined in stage 1. If the data do not reveal problems, the study may be terminated. If any revealed problem is significant, the study progresses to the next phase.

In stage 3, a formal description
of the likely causes of the deficiencies is compiled, either empirically (i.e., by direct measurement), or via a consensus of the quality assurance team. Team facilitators may then begin a group discussion about the most effective intervention plans (e.g., whether to focus the interventions on the patients, providers, administration, or hospital environment). In stage 4, the suggested improvements from stage 3 are implemented and evaluated. Data are collected to monitor change in the system.

Data collection continues into the fifth stage, and statistics may be computed on these data to determine if the changes were related to the proposed intervention. In most clinical settings, however, statistics are not used. Additional questions such as the following are evaluated: Has the action been in effect long enough for change to be expected? Do the actual costs for the improvement differ significantly from projected estimates? If so, is the increase acceptable? Which interventions resulted in improved outcomes? Were acceptable standards achieved or is further improvement necessary? Can outcome improvement be attributed to the interventions or would they have occurred anyway?

In occupational therapy quality assurance research is usually required for the routine monitoring of the quality and cost of care, but it is especially applicable when the focus is on achievable benefits that have not been achieved. The quality assurance data and process may be needed because the type of change required is unclear. Sometimes the remedy seems clear but the change process in the facility would be difficult, if not impossible, without an ongoing quality assurance program.

There are other conditions that may lead occupational therapists to use the quality assurance method. An ongoing quality assurance program may be mandatory for facility accreditation. Those therapists who have considerable experience with quality assurance methods, may use them for exploratory research. In this situation, the goal would be to evaluate the effectiveness of certain alternative treatments against expected outcomes and cost standards. Quality assurance could, on rare occasions, be used when hypotheses are being generated and/or for systematically evaluating various "I wonder what would happen if" interventions.

Quality assurance research is not the model of choice for testing theories. This type of project is more appropriately labeled experimental or quasi-experimental research and may not require the elaborate quality assurance team approach. In either model of research, the investigator will have to be familiar with statistical methods, graphic display, and experimental design considerations. Perhaps the major problem with quality assurance studies lies with the effort it takes to coordinate a large team of researchers. In many cases, the costs of maintaining the team may outweigh the benefits. For an excellent review of health accounting for quality assurance, the reader is referred to the study by Williamson, Ostrow, and Braswell (8).

None of the four research models discussed is uniquely suited to answer all the needs of occupational therapists. Each is useful for answering specific research questions. The models differ in their historical development, purpose, and outcomes. There are different variations of each paradigm, different criteria for "good" and "bad" studies, and some models place less emphasis on the statistical analysis of data. Other distinguishing features include the classic paradigms, ability to detect causal relationships, and ability to generalize those relationships to larger populations. Table 1 summarizes the differences and should help both students and professionals to select the appropriate model for their projects. We hope that our review will stimulate research in occupational therapy.

REFERENCES


