PUBLICATION TRENDS IN 25 YEARS OF THE JOURNAL OF APPLIED BEHAVIOR ANALYSIS

JOHN NORTHUP, TIMOTHY R. VOLLMER, AND KAREN SERRETT

LOUISIANA STATE UNIVERSITY

All articles published in the first 25 years of *JABA* (1968 to 1992) were reviewed to classify the percentage of articles published in the following categories: (a) type of article, (b) subjects, (c) setting, (d) behavior-change agent, (e) target behavior, (f) use of basic principles, and (g) miscellaneous procedures. Overall percentages and trends are reported in each category. Results indicate an increase in the percentage of articles with participants and target behaviors in developmental disabilities and a decrease in the percentage of studies targeting academic behavior, verbal behavior, and other child behavioral excesses. The most frequent setting continues to be a school; however, there is a clear trend towards community and other naturalistic settings. Results also highlight the increasing complexity and multicomponent nature of *JABA* interventions. Potential implications for future applications are discussed.

DESCRIPTORS: survey, publication trends, subjects, settings, target behaviors, procedures

The *Journal of Applied Behavior Analysis* (*JABA*) is a unique professional journal. In contrast to many professional journals, *JABA* is not dedicated solely to any particular problem area, population, procedure, or setting. Rather, *JABA* is dedicated to the application of behavioral principles to problems of social importance (*JABA*, Statement of Purpose). However, topographical considerations are also implicit in a definition of social importance, and determining the generality of behavioral principles requires application across a diversity of problem areas, participants, and settings. In addition, many professional positions and interests are commonly defined by topography, that is, by problem areas, settings, and subjects. It is probable that these parameters are often important controlling conditions for many professional behaviors, including journal reading and manuscript submission.

Topography also has presented a special problem for applied behavior analysis, because the field has often been criticized for the subjects or settings that are (or perceived to be) most frequently represented. Kunkel (1987) characterized this criticism as the study of "simple problem activities of children and mental patients in institutional settings" (p. 329). The emphasis in applied behavior analysis on developmental disabilities has also been a topic of concern (e.g., Schwartz & Lacey, 1982). Some have suggested that behavior analysts should focus more on other areas of social importance (e.g., Hopkins, 1987), whereas others have stressed the importance of repeated refinement of specific areas of research (e.g., Baer, 1987).

The purpose of this paper is to provide a review of the most frequent topographies (subjects, settings, target behaviors, etc.) represented in the first 25 years of *JABA*. It is suggested that a data-based review of where applied behavior analysis has been (as represented in the pages of *JABA*) may provide an important context for future directions.

All articles published in the first 25 years of *JABA* (1968 through 1992) were reviewed to classify the percentage of articles in the following categories: (a) type of article, (b) subjects, (c) setting, (d) behavior-change agent, (e) target behavior, (f) use of basic principles, and (g) miscellaneous procedures. Multiple subcategories were included within each general category. The range and scope of *JABA* literally defied classification. As a result, the present survey includes only the broadest of potential categories and a selected few that were perceived by the authors to be of interest. In all, 67 categories were included in the complete review.

Table 1
Definitions of Reported Categories

Type of article
  Research article: An experimental study that demonstrated the effect of an independent variable on some dependent
    variable (usually behavior).
  Methodological study: A study that was designed solely to improve research methods, such as demonstrating observa-
    tional procedures, comparing sampling methods, research equipment demonstrations, etc.
  Review/discussion: A paper that was not designed to present new experimental data, but functions as a literature
    review or discussion of a topic area.
  Other: Does not fit one of the above categories.

Participants
  Developmental disabilities: Individuals who were reported as having a diagnosis for some type of developmental dis-
    ability such as autism (childhood schizophrenia) or mental retardation. Individuals who exhibit some specific learn-
    ing disability or isolated deficit do not fit this category. If no diagnosis was reported, indicators such as IQ score <
    70 placed individual in this category.
  Psychiatric: Individuals who were diagnosed as having a psychiatric disorder such as schizophrenia (but not childhood
    schizophrenia), psychoses, etc. If no diagnosis was reported, behavior and setting could serve as prompt to score this
    category (i.e., hallucinations or psychiatric facility).
  Other children: Individuals under the age of 18 who do not fall into one of the above categories.
  Other adults: Individuals who do not fall into one of the above categories. Individuals who were targeted due to
    factors related to aging were not scored in this category.
  Geriatric: Individuals who were targeted due to factors related to aging.

Behavior-change agents
  Experimenter: The independent variables of interest were manipulated directly by the author of the study or by re-
    search assistants designated solely for that task. If the experimenter happened to serve another role (such as college
    teacher) in the study that role was scored instead.
  Teacher: Independent variables of interest were manipulated by an individual responsible for the academic education of
    the subject. Teachers for individuals with developmental disabilities were scored in another (unreported) category.
  Self: Independent variables of interest were manipulated by the subject.
  Parent: Independent variables of interest were manipulated by the subject's parent(s).

Setting
  School: Regular education environment. State schools for individuals with developmental disabilities were not scored in
    this category if the school was actually the subject's residence.
  DD residential: The study took place at the residence of an individual with developmental disabilities.
  Analogue setting: Analogue or laboratory setting arranged explicitly for the purposes of experimentation.
  Medical setting: Included doctor's office, dentist's office, nonpsychiatric or DD hospital.
  Home: Residence other than group living environment.
  Community: Applications in public settings other than those described above, such as cities, stores, restaurants, high-
    ways, neighborhoods, etc.

Target behavior
  DD skill acquisition: The procedure was explicitly designed to increase at least one desired behavior for an individual
    with developmental disabilities. This category contained a number of subcategories not reported in this paper (e.g.,
    DD academic, DD social skills).
  DD language: A subcategory of DD skill acquisition. Verbal behavior displayed by individuals with DD.
  Other academic: Traditional academic behavior such as math, reading, spelling, or college course work with target
    population other than DD.
  Other language: Verbal behavior (including manual, gestural, imitative, etc.) displayed by individuals other than DD.
  DD behavioral excess: The procedure was explicitly designed to decrease at least one undesired behavior for an individ-
    ual with developmental disabilities. This category contained a number of subcategories (e.g., DD aggression, self-
    injury, stereotypy, etc.).
  Other child behavioral excess: The procedure was explicitly designed to decrease at least one undesired behavior for an
    individual other than DD.
  Substance abuse: The study focused on variables influencing substance abuse including drugs, alcohol, and cigarettes.
  Child abuse: The study focused on variables influencing the verbal or physical mistreatment or neglect of children.

Table 1

(*Continued*)

SIB: A subcategory of DD behavioral excess (all articles scored in this category also were scored in the larger category). The study focused on variables influencing behavior that results in self-injury displayed by individuals with developmental disabilities.

Behavioral procedures

Positive reinforcement: A consequence was delivered that resulted in an increased probability of behavior.

Negative reinforcement: The removal of stimulation as a consequence of behavior resulted in an increased probability of behavior.

Punishment: A consequence of behavior was delivered that resulted in a decreased probability of behavior. Also, the removal or withdrawal of a stimulus as a consequence of behavior resulted in a decreased probability of behavior (i.e., response cost and time-out).

Verbal instruction: Written or vocal information was presented to the subject regarding either the contingencies in effect or the behavior that was desired/undesired.

Tokens: A medium of exchange was delivered as a consequence to behavior and resulted in an increased probability of behavior (and was therefore also scored as positive reinforcement). If the tokens were removed contingent on undesired behavior, the article was also scored as response cost/time-out.

Modeling: An individual (behavior-change agent) engaged in antecedent behavior that was intended to match the target behavior topographically along some dimension.

Generalization: Data were presented to demonstrate a success or failure of behavior to generalize across settings, situations, contexts, new topographies, etc.

Follow-up: Measures of the target behavior were reported from at least 6 months following the initial implementation of an intervention.

METHOD

The general categories of type of article, subjects, setting, behavior-change agent, target behavior, and use of basic principles and specific procedures were selected by the authors as representing the most basic defining features of a *JABA* article. Subcategories were selected on both an empirical and a rational basis. Initially, five volumes were selected at random. All articles in these five volumes were reviewed and for each the type of article, subjects, setting, behavior-change agent, target behavior, use of basic principles, and general procedures were recorded. Categories that occurred most frequently were identified and included in the complete review. Additional subcategories were included on the basis of potential interest to *JABA* readers (e.g., academic behavior), potential practice implications (e.g., use of reinforcer assessments), and for comparison to prevalence in the general population (e.g., geriatric issues, substance abuse). (A list of all 67 categories is available from the authors.) Operational definitions of all reported categories are presented in Table 1. Some categories are not reported either because the results did not produce

any particular trends or because of low interrater agreement.

All articles published in *JABA* between 1968 and 1992 were reviewed and the total number of each category was tallied. These data were converted to a percentage of total research articles for each volume (year). In addition, some volumes contained abstracts. Abstracts were scored for their content and were tallied as research articles. Categories were not mutually exclusive. For example, interventions could occur at both school and home and be implemented by both teachers and parents. Thus, most category totals exceed 100%.

Interrater agreement was assessed separately for each dependent measure by having two of the authors independently score the same five volumes (20% of total volumes). For each volume scored by two raters, the smaller number of articles scored in a category was divided by the larger number of articles scored in that category for each year. An average agreement score was first obtained for each category, and overall agreement was calculated by obtaining an average of all categories. The five volumes used to assess interrater agreement were randomly dispersed throughout the 25 volumes.

Table 2
Number of Research Articles

1968	30
1969	31
1970	34
1971	33
1972	47
1973	61
1974	61
1975	46
1976	57
1977	69
1978	47
1979	38
1980	50
1981	42
1982	40
1983	31
1984	46
1985	33
1986	48
1987	30
1988	38
1989	31
1990	40
1991	51
1992	53

Agreement was assessed early in the investigation so that we could identify definitional nuances and correct the scoring method. At times, we made notes on our data sheets so that we could later come to a consensus on which category a topic fit (e.g., is an older student a peer?). We did not score such notes as disagreements (Sulzer-Azaroff & Gillat, 1990). Overall average agreement across all reported categories for the five volumes was 86.6%. The lowest agreement score for any single reported category was 76.9% (analogue setting), and the highest agreement score was 99.7% (research article).

RESULTS

Results are reported as a percentage of the total number of research articles rather than as the numbers of articles within each category. Although changes in the number of articles within a given category for any given year could be obscured by a percentage measure as a function of the total number of research articles, our results indicate that there is no trend in the total number of research articles. Thus, overall trends would be similar. Table 2 shows the total number of research articles, including abstracts, by year.

Type of Article

Review and discussion articles have been a small but consistent contribution to *JABA*. They represent an average of 12% of all articles, with no observable trend. Methodological studies have been similarly consistently represented, but are a smaller percentage (4%); there has been a small decrease in frequency since 1980. Of all *JABA* articles, 74% are experimental research articles.

Participants

Figure 1 (upper panel) shows the percentage of research articles in which individuals with developmental disabilities (DD), other children, other adults, and psychiatric patients were participants. From 1968 until approximately 1977, other children were clearly the most frequent participants. Recently, individuals with developmental disabilities have become the most frequent participants, and there was an upward trend from 1989 to 1992. A crossover between the percentage of other children and the percentage of individuals with DD occurred at about 1980. Other adults have been consistently and frequently represented in *JABA*, and have been the second most frequent participants in recent years. Psychiatric patients were consistently represented as participants during the earlier years of *JABA*, but have been rare since about 1980. Although older individuals (geriatric) are not represented in Figure 1, our data show few articles in which they were participants (with the exception of a special issue in 1986).

Behavior-Change Agent

Figure 1 (lower panel) shows that experimenters (authors) have been responsible for implementing the experimental procedures for the majority of *JABA* studies. This percentage would be higher if students and unidentified "trainers" or "therapists" were included as experimenters. If an author also served in an additional capacity (e.g., teacher), that capacity was scored rather than the role of exper-
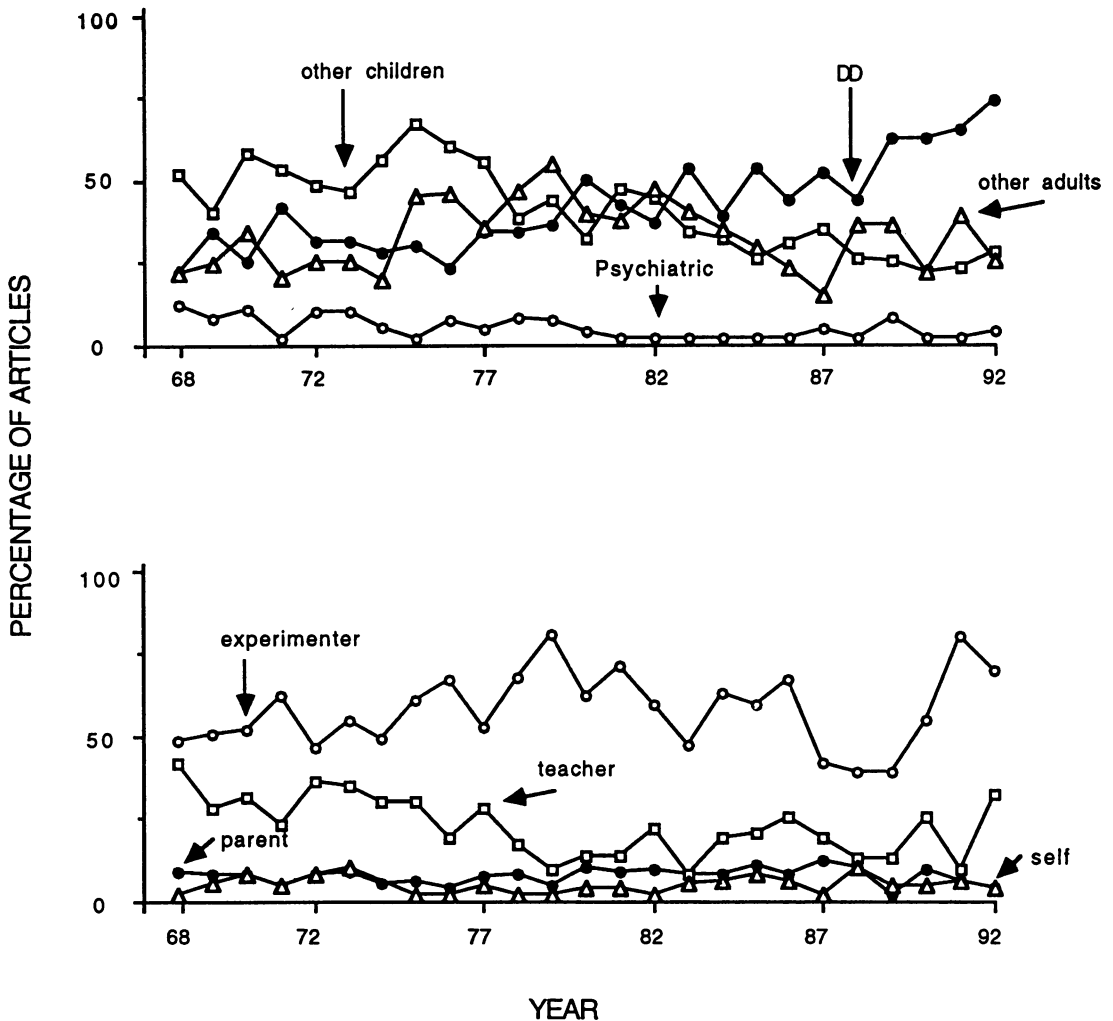
Figure 1. Percentage of articles across 25 years of *JABA* by participants (upper panel) and behavior-change agents (lower panel).

imenter. The percentage of experimenters who were the behavior-change agents increased throughout the 1970s, decreased from 1979 to 1989, and has again increased since that time. The percentage of teachers (not including those in developmental disabilities) acting as the behavior-change agent steadily decreased from 1968 to 1983, and has been variable since that time. The direct involvement of parents and peers has increased slightly. The percentage of developmental disabilities staff and teachers (not shown in Figure 1) showed little change, despite the substantial increase in participants with developmental disabilities. Few appli-

cations have involved participants as agents of their own behavior change. The other recorded categories remained relatively constant.

Setting

Figure 2 shows that the school setting is the most frequently used setting for *JABA* studies; this has changed little in 25 years. In 1968, approximately 47% of all studies were conducted in a school setting, and in 1992 it was 49%. In comparison, residential facilities have not been a frequent setting. Figure 2 also contrasts applications in analogue settings with those in community set-
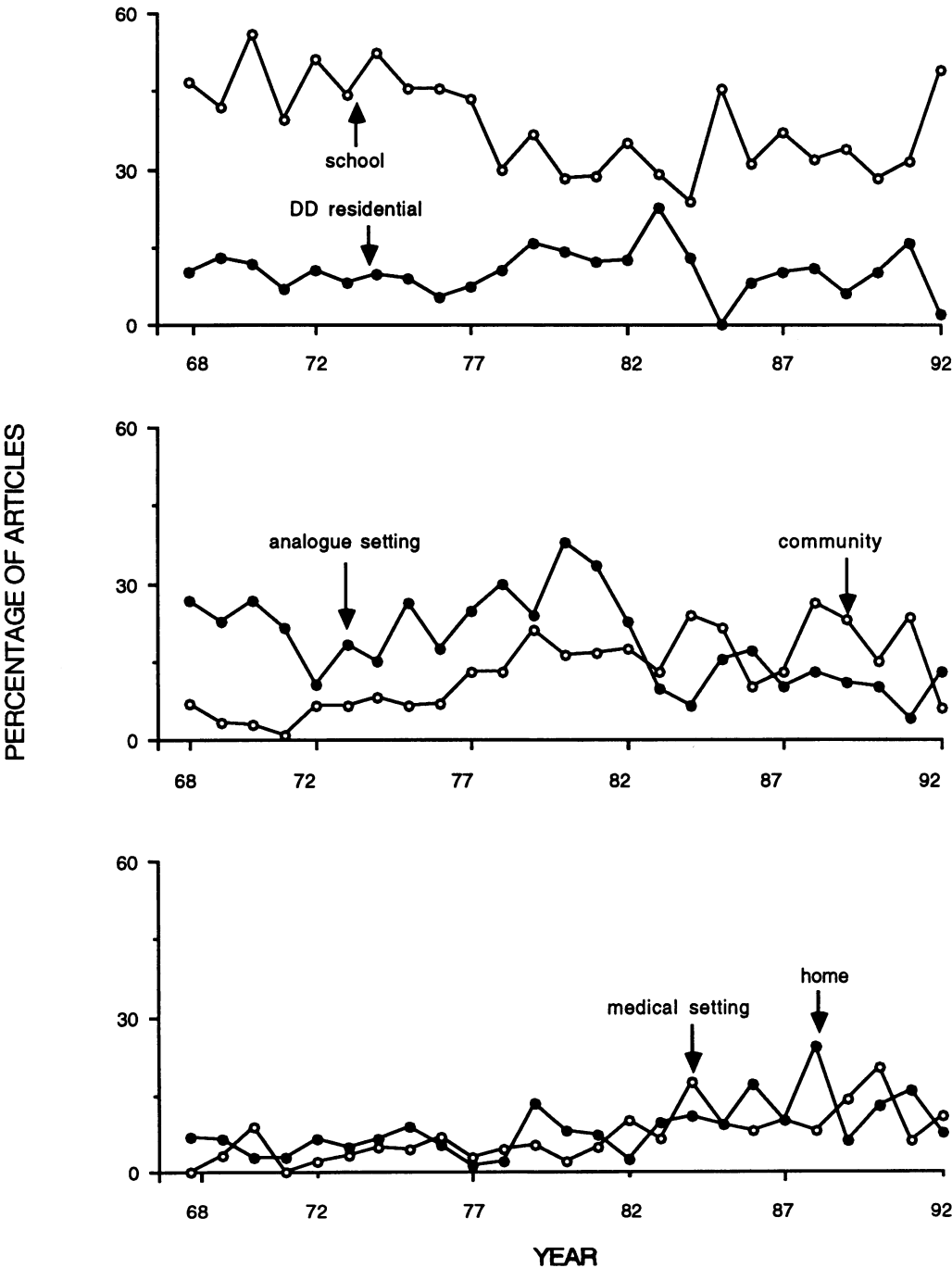
Figure 2.   Percentage of articles across 25 years of *JABA* by setting (all three panels).
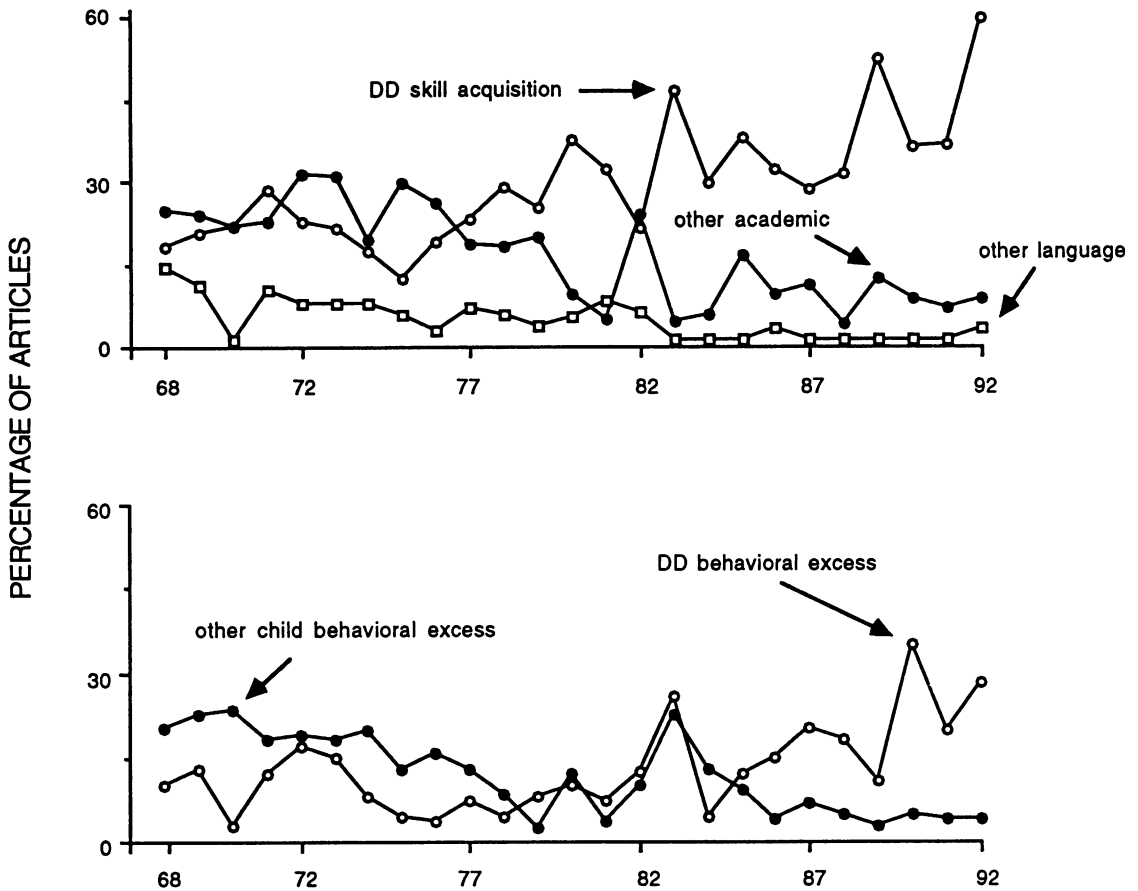
Figure 3.   Percentage of articles across 25 years of *JABA* by target behavior (both panels).

tings (center panel) and displays the results for home and medical settings (lower panel). The use of analogue settings has declined since 1982 and has been generally less frequent than applications in the community. Overall, there has been since that time an upward trend in community, home, and medical settings.

Target Behavior

Figure 3 shows the progressive increase in the percentage of articles that include skill acquisition in developmental disabilities as target behaviors (upper panel). In contrast, investigations of academic behavior and other language skills (non-DD participants) have declined. Academic behavior was one of the most frequent topics until about 1976;

it declined steeply from a high of 32% in 1972 to 3% in 1981. Since then, it has increased slightly, averaging 8% of all articles. The study of language in other children and adults was also a frequent and consistent topic from the first issue of *JABA* until 1983 (14% of all articles). However, in contrast to the same area in developmental disabilities, these studies have been quite rare since that time. Studies of language and communication in developmental disabilities (not shown in Figure 3) have remained at an average of approximately 7% of all articles for 25 years.

The lower panel of Figure 3 shows an increase in studies that include DD behavioral excess as a target behavior and a corresponding decrease in behavioral excesses by other children as target be-

haviors. The category of behavioral excesses by other children was also a frequent topic in the early years of *JABA*, but progressively decreased until 1979; it has remained relatively constant in recent years at approximately 3% to 4% of all articles.

Compared to other socially important problem areas, articles targeting substance abuse or child abuse have been quite rare. Articles addressing substance abuse were found in only seven volumes and were always a very small percentage (1% to 6%). Child abuse was represented in only two volumes and totaled 3% and 4% of the articles. Studies involving self-injury (in DD) as the dependent variable have been a small but constant topic in *JABA*; however, they have increased substantially since 1989 (11% of all articles from 1989 through 1992).

Overall, other target behaviors (those that did not fit any of the 17 categories surveyed) represented 26% of all articles and was at times the single largest category (in 8 years). It is difficult to convey the scope of these articles; for example, they ranged from responding by a comatose patient and fetal monitoring to the driving skills of pizza delivery drivers and hitting curveballs.

Principles and Procedures

Figure 4 (upper panel) shows the frequent and constant inclusion of positive reinforcement in *JABA* articles. The status of positive reinforcement as the most basic and essential principle of applied behavior analysis is reflected in this survey. The overwhelming majority of studies in *JABA* describe, define, and explicitly program positive reinforcement. Studies of negative reinforcement, on the other hand, have been rare, although they have increased substantially in the past 5 years. The use of extinction procedures was not scored in this survey, primarily because of a perceived difficulty with accurate identification. For example, differential reinforcement procedures imply an extinction procedure that was often not stated. Anecdotally, it was noted that the explicit description of extinction procedures was rare.

Figure 4 also shows the percentage of articles that included punishment (response cost/time-out or other punishment). The effects of punishment have been a consistent, but declining, topic of study in *JABA*. Overall, studies that included some type of explicit punishment procedure represented 19% of all articles. It should be noted that these results are obtained for all participants, settings, and target behaviors. For example, studies of public safety interventions conducted in the community were particularly likely to include a punishment component (i.e., a fine).

Anecdotally, we noted that many of the interventions in *JABA* consisted of multiple components. Although positive reinforcement was the single most frequent component, a common intervention was actually a treatment package consisting of multiple components. The general model, perhaps most typical, might be characterized as: instruct, model, prompt, practice, feedback, and praise.

Explicit verbal instruction has been a frequent and consistent component of *JABA* interventions (38% of all articles; range, 15% to 53%). Although verbal instruction was a frequent component of intervention packages, it was itself rarely the independent variable of interest. Modeling has also frequently been a component of interventions in *JABA*, particularly since about 1975. (The average for all 25 years was 23% of articles; range, 0 to 36%.) However, we noted that modeling has itself more frequently been the independent variable of interest. Interestingly, the use of token reinforcement was quite frequent in the early years of *JABA* ($M = 33\%$ between 1970 and 1973), but has progressively declined and is currently relatively rare ($M = 2\%$ between 1988 and 1992).

The bottom panel of Figure 4 shows the percentage of articles including generalization and at least 6-month follow-up data. An increased concern with generalization is clearly reflected by an increase in the percentage of articles that included generalization data. Although maintenance per se was not addressed in this survey, the number of articles that included at least a 6-month follow-up was tallied. Overall, the percentage of articles with 6-month follow-up data has increased slightly.
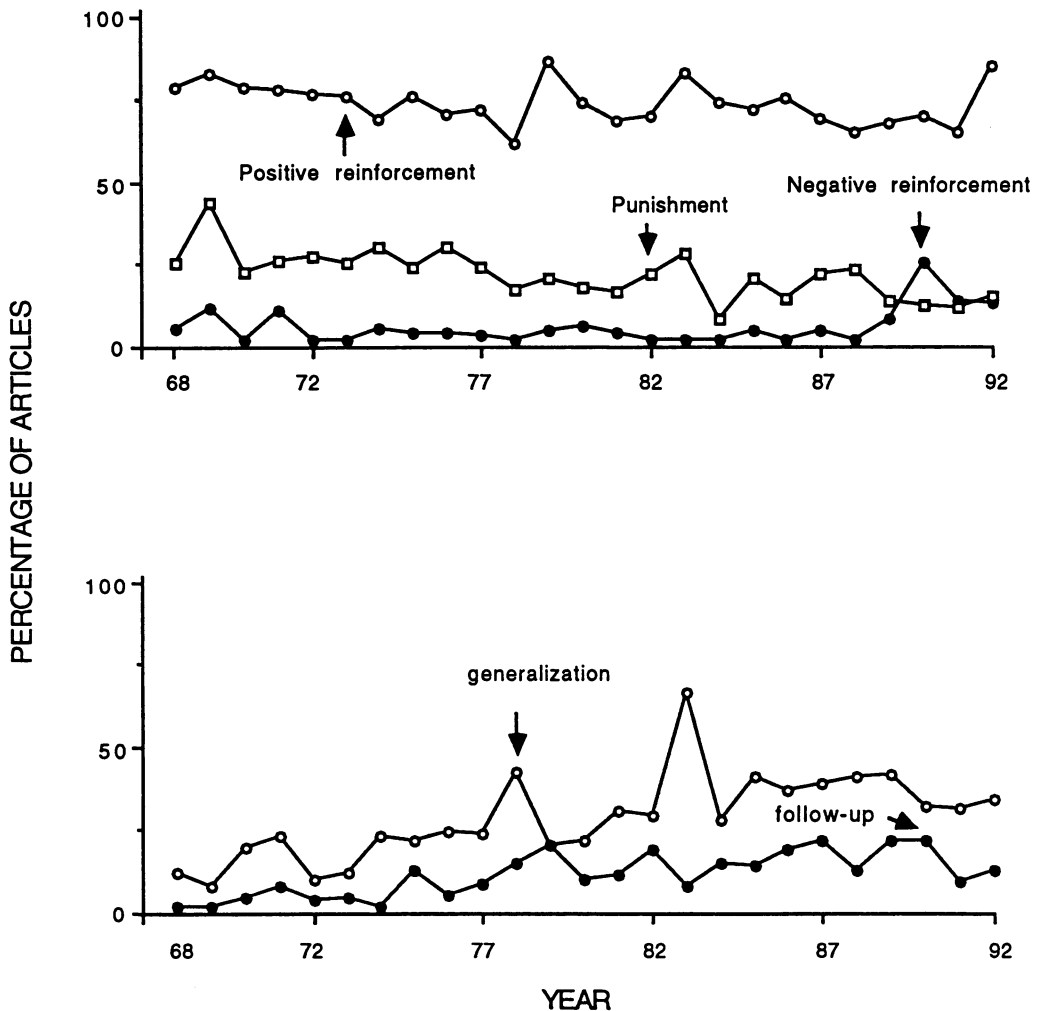
Figure 4. Percentage of articles across 25 years of *JABA* by behavioral process (upper panel) and maintenance issues (lower panel).

DISCUSSION

Over the course of its first 25 years, many of the topographies characterizing *JABA* articles have changed, and many have stayed the same. Perhaps most notable is the relative increase in the percentage of articles in developmental disabilities, especially between 1988 and 1992. Skills acquisition and behavioral excess in developmental disabilities have recently been the most frequent target behaviors. There has also been a corresponding decrease in studies targeting academic behavior, verbal behavior, and behavioral excesses of other children.

Although these developments may have been apparent to even a casual reader, the magnitude and trend of the changes may not have been so readily observed. It should be emphasized that these trends are not a result of editorial policies; in fact, there have been recent efforts to promote submissions involving diverse populations (Geller, 1990; Neef, 1993). Recent special issues have addressed a wide range of topics outside of developmental disabilities.

Although schools continue to be the most frequent setting, the trend towards community and other naturalistic settings is clear and robust. Com-

munity settings are also perhaps the antithesis to analogue experimental settings, which are declining in prevalence. Furthermore, residential institutions have never been the most frequent setting in *JABA*, which in some ways refutes a common stereotype. The increasing trends in home and medical settings are also encouraging.

The relative infrequency or absence of a number of topics of unquestioned social importance (e.g., substance abuse, geriatrics) supports suggestions that applied behavior analysis should continue to expand its focus to other socially important topics (e.g., Geller, 1990; Hopkins, 1987). The discrepancy between the number of studies on developmental disabilities and those on other topics is enhanced when one considers the incidence and prevalence of various socially important problems in the general population. The relative proliferation of articles in developmental disabilities must be seen as unusual, given that only about 1% of the general population is diagnosed with mental retardation (American Psychiatric Association, 1987). An analysis of the variables maintaining research and practice in developmental disabilities might prove instructive for other areas of application. For example, the topography of behavior (e.g., self-injury) in developmental disabilities research is often incidental to an investigation of more basic principles (e.g., extinction). In practice, behavioral applications have been somewhat uniquely incorporated within a variety of state and federal regulations involving developmental disabilities.

Other trends may also be relevant to the topic of social importance. Studies of all types of verbal behavior (e.g., language, academic skills) have declined. It has long been recognized that complex verbal repertoires can alter the effects of other behavior–environment relations. The study of child behavior excesses, particularly of nondisabled children in schools, was well represented in the early years of *JABA*. Yet surveys consistently report that discipline in the schools is a primary concern for both teachers and parents. *JABA*'s rich literature in this area remains in need of continued refinement and synthesis, particularly in the areas of technology

transfer and adoption (Hopkins, 1987), as well as more accurate identification of the true nature of the complaint (Witt, 1990). Other areas that are currently identified with applied behavior analysis appear to be relatively neglected or largely unexplored (e.g., pharmacological evaluations, rule-governed behavior).

Although it is not surprising that the majority of applications have been implemented by the experimenters, the overall frequency was somewhat unexpected. That the experimenters remain predominantly responsible for implementing the procedures of applied behavior analysis may be related to the problems the field is experiencing with effective transfer and large-scale dissemination and adoption. In general, models of effective technology transfer have been very rare. Although a controlled examination of procedures is an imperative for applied behavior analysis and is often a prerequisite to transfer, experimenter-implemented interventions may be especially susceptible to a neglect of the larger context and system in which an application occurs.

The current results suggest that the generality of behavioral applications has not been as widely demonstrated as might be expected. Positive reinforcement is, of course, the exception, and perhaps the model. Positive reinforcement effects have been demonstrated across the spectrum of populations, settings (cultures), problem behaviors, and use by potential consumers. However, the effects of few other behavioral principles have been so widely demonstrated. For example, the majority of studies including negative reinforcement have been with participants with developmental disabilities, primarily those with severe behavior problems. However, the increase in applications of negative reinforcement in recent years corresponds closely to an increase in functional assessment and demonstrations of the role of negative reinforcement in maintaining severe behavior disorders (e.g., self-injury). As functional analyses are conducted with other target behaviors, applications of negative reinforcement may expand further (Iwata, 1987). Many other specific applications, although perhaps

also demonstrated in the field of developmental disabilities, have not been widely extended to other populations, behaviors, and settings.

Frequency is, of course, a poor measure of the range of both the kinds of applications and the socially important topics that have been addressed by *JABA*. Perhaps the most auspicious finding of this survey is that the range and scope of *JABA* articles are so broad that it is impossible to accurately classify them all. It was repeatedly observed that *JABA* contains numerous exemplary studies that appear as "one of a kind," with little, if any, subsequent follow-up. This rich data base is promising for the future development of the field. It is also encouraging that none of the categories included in this survey have yet come to define a *JABA* article.

REFERENCES

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed. rev.). Washington, DC: Author.

Baer, D. M. (1987). Weak contingencies, strong contingencies, and many behaviors to change. *Journal of Applied Behavior Analysis, 20,* 335–337.

Geller, E. S. (1990). The editor's page. *Journal of Applied Behavior Analysis, 23,* 143–145.

Hopkins, B. L. (1987). Comments on the future of applied behavior analysis. *Journal of Applied Behavior Analysis, 20,* 339–346.

Iwata, B. A. (1987). Negative reinforcement in applied behavior analysis: An emerging technology. *Journal of Applied Behavior Analysis, 20,* 361–378.

Kunkel, J. H. (1987). The future of *JABA*: A comment. *Journal of Applied Behavior Analysis, 20,* 329–333.

Neef, N. A. (1993). Editorial. *Journal of Applied Behavior Analysis, 26,* 3–4.

Schwartz, B., & Lacey, H. (1982). *Behaviorism, science, and human nature.* New York: Norton.

Sulzer-Azaroff, B., & Gillat, A. (1990). Trends in behavior analysis in education. *Journal of Applied Behavior Analysis, 23,* 491–495.

Witt, J. C. (1990). Complaining, precopernican thought and the univariate linear mind: Questions for school based behavioral consultation research. *School Psychology Review, 19,* 367–377.