The History and Future of Precision Teaching

by

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Certain historical trends in a science can be discerned from a frequency and celeration analysis of its literature base. Such analysis could be performed by compiling an exhaustive list of references pertaining to that science, next coding them with various keywords and by various attribute, and then sorting them by year to give a count per year frequencies. This paper describes just such a compilation of Precision Teaching literature. Assembled into a HyperCard stack database are 1200 references to works pertaining to Precision Teaching and standard celeration charting. These works include publications, conference presentations, dissertations, and unpublished documents. Spanning the years 1964 to 1990, the data indicate (1) that there was an overall acceleration of references until 1981, which was followed by an overall deceleration, and (2) that conference presentations greatly outnumber publications by more than two to one. The data support a contention that Precision Teaching has become largely an "oral tradition," with possible adverse effects on the long-term prospects of the field.

Any scientific discipline has many aspects, including an archival literature base comprised of journal articles, books, and other published functions as a means of communication. Such a literature base not only helps define a science, it also functions as a means of communication. Scientific disciplines are also verbal communities, and it is characteristic for the members of a particular scientific community to meet periodically and share what they have done or what they have to say in regard to the science. Papers presented at conferences are thus at least quasi-members of the archival literature base of a science. Citing such presentations is certainly as proper a scholarly activity as referring to publications. In any event, publications and presentations are the two primary modes by which scientific discussion and communication proceeds.

A reference points to a particular work, be it published, presented, unpublished or some other achievement. References typically include the name of the author(s), the title and publication data, and most importantly for historical research purposes, the year during which the work was either developed or shared. Since any healthy science generates a certain number of works that can be referenced, the year of every reference can be noted. Accordingly from that a count per year can be obtained. Plotting the yearly counts of references will thus present an overview of the amount of activity in a science. We can determine whether scientific activity is increasing or decreasing, or whether stability exists. Further, once the references are compiled, if they are coded using certain key words or attributes, a finer examination of historical trends is possible. Such an historical analysis, based on counts per year of references, has been done with that part of behavior analysis known as Precision Teaching and forms the basis of this paper.

As a part of behavior analysis, the roots of Precision Teaching extend back to Skinner's early work in operant conditioning (e.g., Lindsley, 1981). For practical purposes, however, Precision Teaching can be given an arbitrary starting date of 1964 with the publication of Lindsley's paper "Direct Measurement and Prosthesis of Retarded Behavior." This publication articulated many of the foundational precepts of Precision Teaching. Within a couple of years of this article came the other principal feature of Precision Teaching, the standard celeration chart (e.g., Pennypacker, Koenig, & Lindsley, 1972). With that arrival, Precision Teaching was on its way to becoming a distinctly identifiable area of research and application.

Historical trends in Precision Teaching can be discerned from a frequency and celeration analysis of its publication and presentation archival literature base. To accomplish this analysis, for the past decade I have compiled a data base in excess of 1,200 references pertaining to Precision Teaching works, or works using the standard celeration chart. These references include published articles, books and other items, unpublished manuscripts, dissertations, theses, and conference presentations. The data base covers the years 1964 to the present, and represents an updated revision of an earlier data base that had been assembled several years ago (Eshleman, 1983).

Method

Sources. The "subjects" of the present research were references to works pertaining to Precision Teaching and/ or the standard celeration chart, and the objective was to find them. The main objective was to find and compile them. No previous comprehensive bibliography of the work done in the area of Precision Teaching existed. Early searches of *Psychological Abstracts* and ERIC proved largely fruitless. Two early but small compilations done by others in the mid-1970's provided a couple hundred references (Rutherford, 1975; Precision Media, 1976). Reference listings at the end of journal articles or bibliographies in books provided another source. The *Journal of Precision Teaching* provided a discrete set of articles, as did a scattering of papers in other journals (mostly special education publications), including *Teaching Exceptional Children.* Relevant conference presentations were relatively easy to find in the conference program guides of both the Association for Behavior Analysis and the Precision Learning/Precision Teaching meetings. Finally, the publication of the article about the earlier Precision Teaching data base included a request for persons in the field to send in references, and several did so (sending their vitae).

Procedure. The goal in assembling the data base was to be exhaustive. I believe the data base discussed in this paper to be the most complete and extensive data base of Precision Teaching works in existence. For inclusion a work had to be about either (1) some aspect of Precision Teaching or the standard celeration chart, or (2) present data on standard celeration charts. The two categories are not necessarily identical or coterminous.

Whereas the earlier 1983 version was simply a text listing constructed using a word processor, this new version has been entered into a HyperCard stack on a Macintosh computer (see Goodman, 1987 for a discussion of HyperCard). The new version contains data that the earlier version lacked, including (1) keywords, (2) type of reference (publication, conference presentation, dissertation, thesis), (3) reference source, and (4) a capability to sort the references by any of these data types or by author or year. Such a capability permits one to ask various questions about trends in the field.

Figure 1 illustrates how a reference card appears in the HyperCard data base and explains the various features of each card and of the stack. Each reference card contains (1) a sequential code number that indicates the location of the card in the stack, (2) a reference field containing a reference entered using a format similar to APA style, (3) a field indicating the type of work, whether it was a conference presentation or publication or dissertation, (4) a field containing additional data about the source (e.g., if it were a conference presentation, whether it was presented at ABA or the PL/PT conferences), (5) a separate year field for making sorting by year easier, (6) a "notes" field that can contain keywords and notes about the reference, (7) a "mark" button and field so that the user can "mark" the card for later searching, sorting, and retrieval, and (8) various HyperCard navigational buttons as well as buttons that perform other functions.

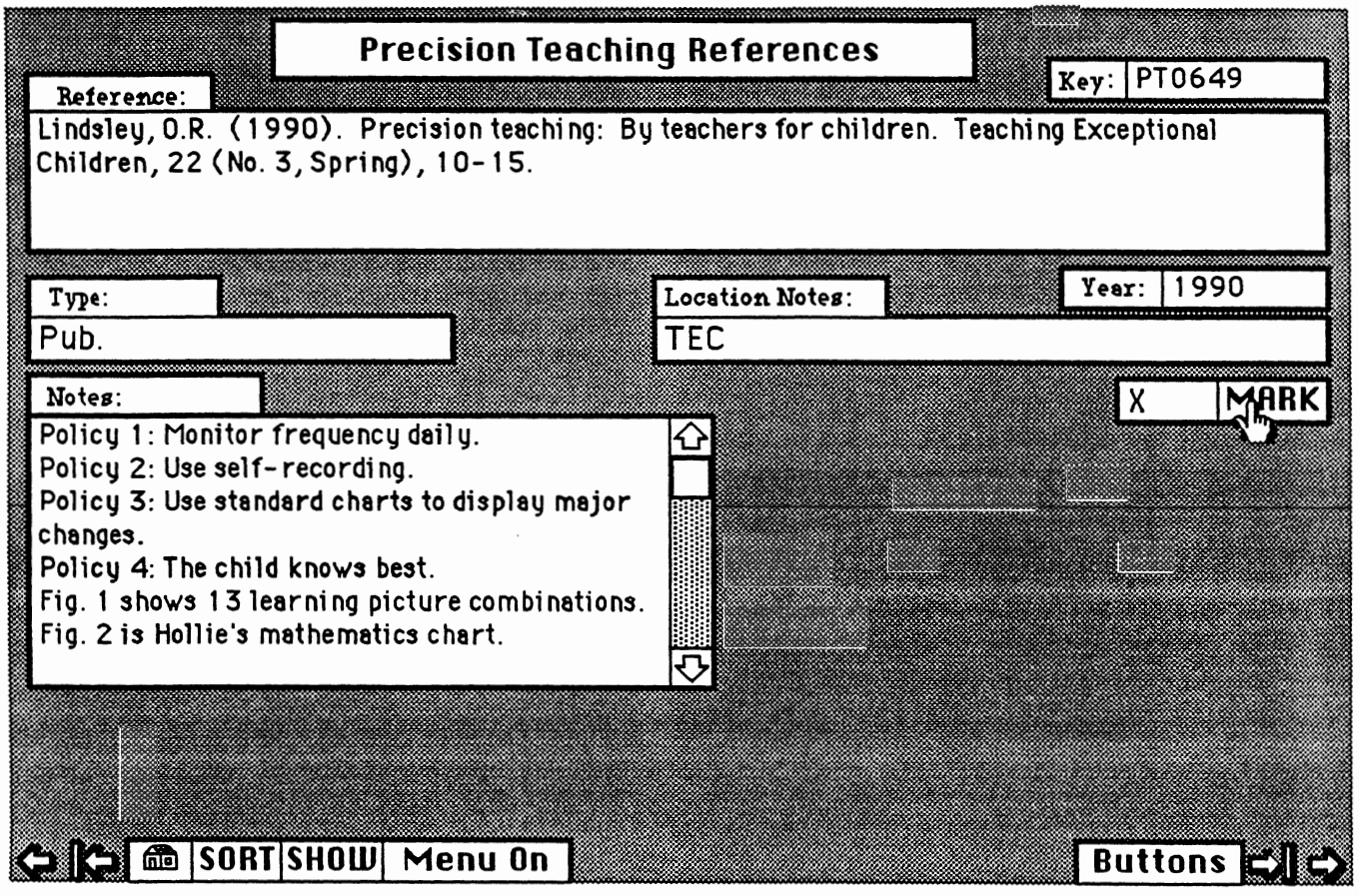
On top of the Macintosh, buttons are activated by placing the cursor on top of them and pressing the mouse, a hand-driven input device. The button labeled "Buttons" changes the visibility of 17 additional buttons, which are not shown in the figure. These additional buttons were programmed to either (1) put data into the text fields, and thereby semi-automate the data entry process, or (2) tally and compute yearly frequencies (the "Count" buttons).

Reliability. Since the objective of this undertaking has been to exhaustively capture everything ever published or presented in Precision Teaching, no explicit inter-rater reliability has been conducted. Improving accuracy of the data is an ongoing objective, however. References from the 1984 Precision Teaching conference are still not in the stack, and there may be data from one or more other conferences held within the past 15 years that are also missing. Readers are invited to inform me about references that should be either (1) deleted, (2) added, or (3) modified.

Results

Yearly frequencies are presented in Charts 1--5.

Overall Historical Trends. As Chart 1 shows, there has been an overall celeration of x1.8 per 5 years increase in Precision Teaching references. A trend-following celeration (e.g., Lindsley, 1980) reveals that this overall increase is characterized by a couple of celeration turn-ups and turn-downs. There was an early acceleration of x12 per 5 years from 1964 to 1971. This was followed by a turn-down of ÷1.5 per 5 years from 1971 to 1978. The beginning of the Association for Behavior Analysis (ABA--which began in 1975 as the Midwestern Association for Behavior Analysis) had no immediate effect on the frequency of Precision



YEARLY BEHAVIOR CHART (YCM-1EN)
6 CYCLE — 100 YEARS (10 DECADES)
BEHAVIOR RESEARCH CO.
BOX 3351 — KANSAS CITY, KANS. 66103
CALENDAR DECADES

Figure 1 Card # 635 in the Precision Teaching references data base. The stack is sorted by senior author last name and by year.

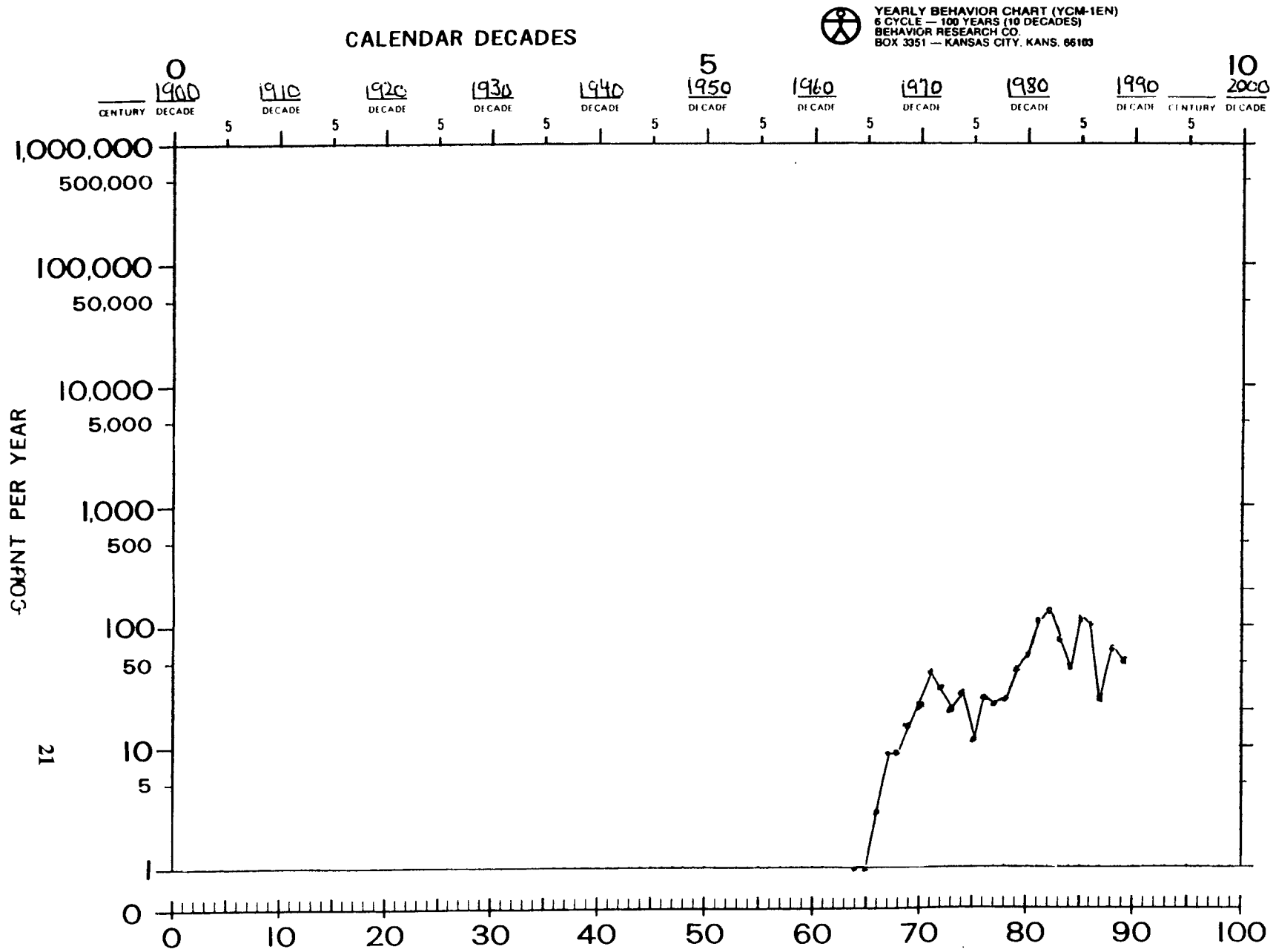


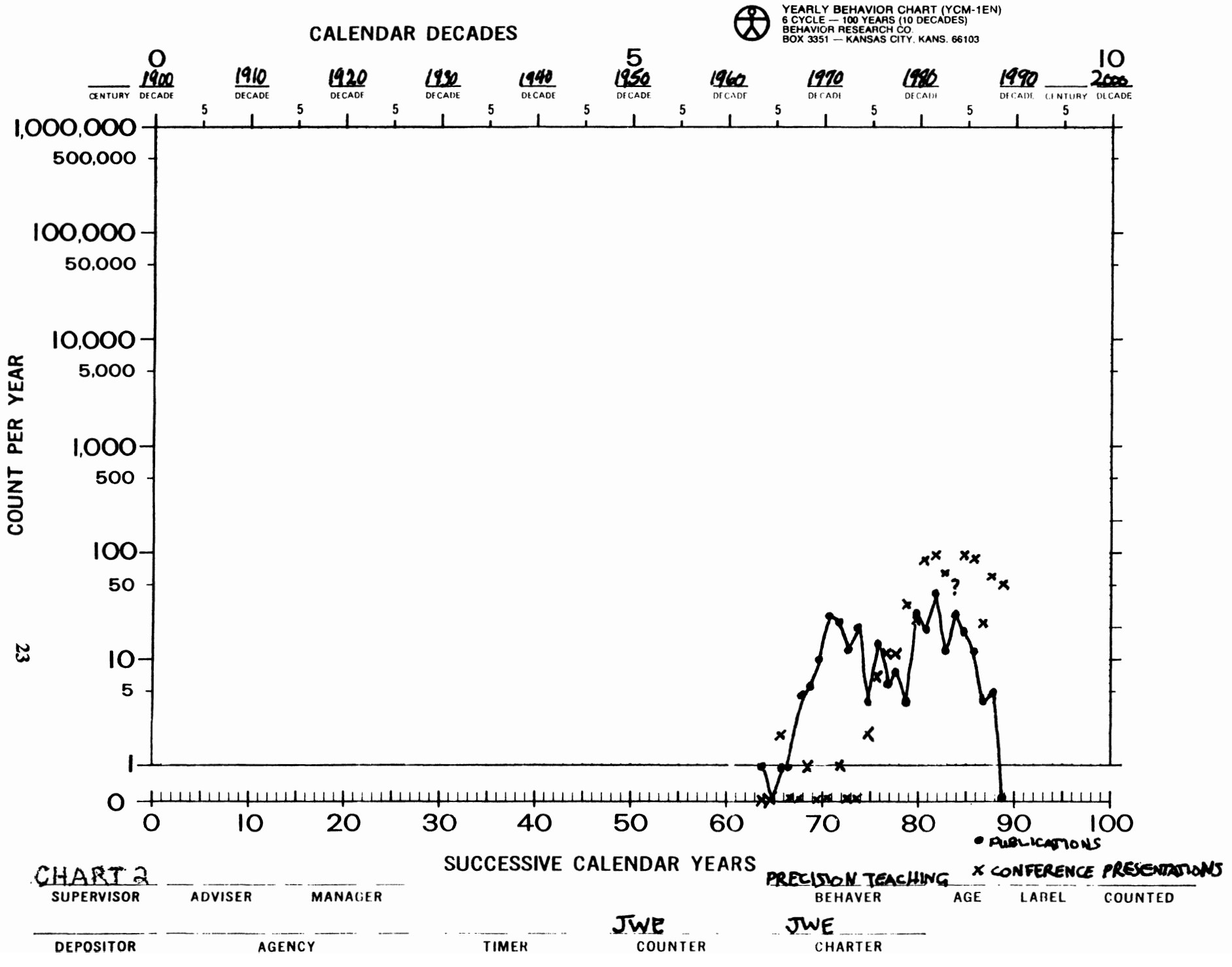
CHART 1

SUPERVISOR ADVISER MANAGER

TOTAL PRECISION TEACHING REFERENCES

BEHAVER AGE LABEL COUNTED

DEPOSITOR AGENCY TIMER JWF COUNTER JWF CHARTER



23

CHART 2

SUPERVISOR ADVISER MANAGER

PRECISION TEACHING

BEHAVER AGE LABEL COUNTED

DEPOSITOR AGENCY TIMER

JWE

COUNTER

JWE

CHARTER

Teaching works. From 1978 through 1982 there was a second flurry of activity, with an acceleration of x10 per 5 years. During the 1980's, however, there was a general turn-down of ÷1.8 per 5 years in the number of precision teaching works.

Trends in Publications. Chart 2 depicts the yearly frequencies and trend-following celerations with respect to publications. Of particular note was the effect of the start of the *Journal of Precision Teaching* in 1980, which not only halted the celeration turn-down of the 1970's, but also resulted in an immediate frequency jump-up of x7. When the *Journal* temporarily ceased publication after 1986, there was a frequency jump-down of ÷3.2 that accompanied a steep ÷9 per 5 years deceleration.

Trends in Presentations. The history with respect to conference presentations is somewhat more interesting, if only because there have been considerably more presentations than publications. Presentations outnumber publications by two to one. As Chart 2 shows, presentations began increasing in frequency in 1975, and by 1977 were already exceeding the number of publications. This trend has continued unabated. Chart 3 indicates the number of presentations at ABA conferences dealing with Precision Teaching. Even though there is an overall x1.3 acceleration, the trend-following celerations more accurately portray what has happened. After a rapid x18 per 5 years acceleration across the first seven years of ABA, there has been a slow, steady turn-down since 1981.

Precision Learning/Precision Teaching conference presentations, on the other hand, have been more stable. When conferences were held, approximately 45 presentations were made. Of additional note here is that data from at least one PL/PT conference are still not in the data base, but when these are added, the disparity between presentations and publications will only increase.

Discussion

The data illustrate two principal periods of growth in the field of Precision Teaching: an early one lasting from the mid-1960's to the early 70's, and another one from the late 70's to the early 80's. Both steep accelerations were followed by gradual declines. The source of the second acceleration is easily attributable to establishing the *Journal of Precision Teaching*, as well as convening conferences explicitly about the field. Both circumstances opened avenues of communication that previously did not exist, and both helped cause Precision Teaching to flourish.

Of even greater note, however, has been the enormous number of presentations compared to publications. This situation differs from behavior analysis in general, where the number of published works in the major behavioral journals exceeds or more closely approximates the number of presentations. The demise of the *Journal of Precision Teaching* from 1986 to 1990 only further exacerbated the disparity, which grows even larger if only the years during which presentations have been a factor (since 1975) are considered.

Of more general concern, however, is the data indicate that precision teaching has become largely an "oral" tradition. The science tends to be communicated orally via presentation much more than it does by print. The reason for concern is that unless presentations are recorded and made available, they are otherwise ephemeral, affecting only those in attendance. Publications, on the other hand, are more permanent vehicles for scientific communication, even if such communication is only one way. They provide the interested scholar or researcher a source of information--a set of verbal stimuli that function as discriminative stimuli for various verbal repertoires. These can be consulted and read, and thus reacted to in a way that the ephemeral presentation cannot function. Their effect is much more lasting than a presentation. This becomes critical, especially as long stretches of time--years and decades--pass. Researchers from later generations will not be able to learn from presentations when their only permanent product is a reference pointing to them. Considering that presentations have outnumbered publications by more than two to one, a vast amount of verbal behavior with respect to Precision Teaching has been lost.

Perhaps the temporary demise of the *Journal of Precision Teaching* and the deceleration in Precision Teaching presentations at ABA indicates that as a field Precision Teaching has lost its vitality and has fewer new ideas to offer. I beg to disagree. The data illustrate the effect of a journal on scientific communication. Now that the *Journal of Precision Teaching* has resumed publication, we may yet see a third acceleration in Precision Teaching activity.

Data-based Literature Reviews. One other aspect of the present research deserves comment. This project demonstrates that a review of the literature

YEARLY BEHAVIOR CHART (YCM-1EN)

can be data oriented. Further, the literature review section of a paper or dissertation (e.g., Eshleman, 1988) can be just as data-based as the results section. A literature review that analyzes the growth or decline of a field in terms of frequency and celeration can give the reader an additional perspective with which to evaluate the field in general and the paper in particular.

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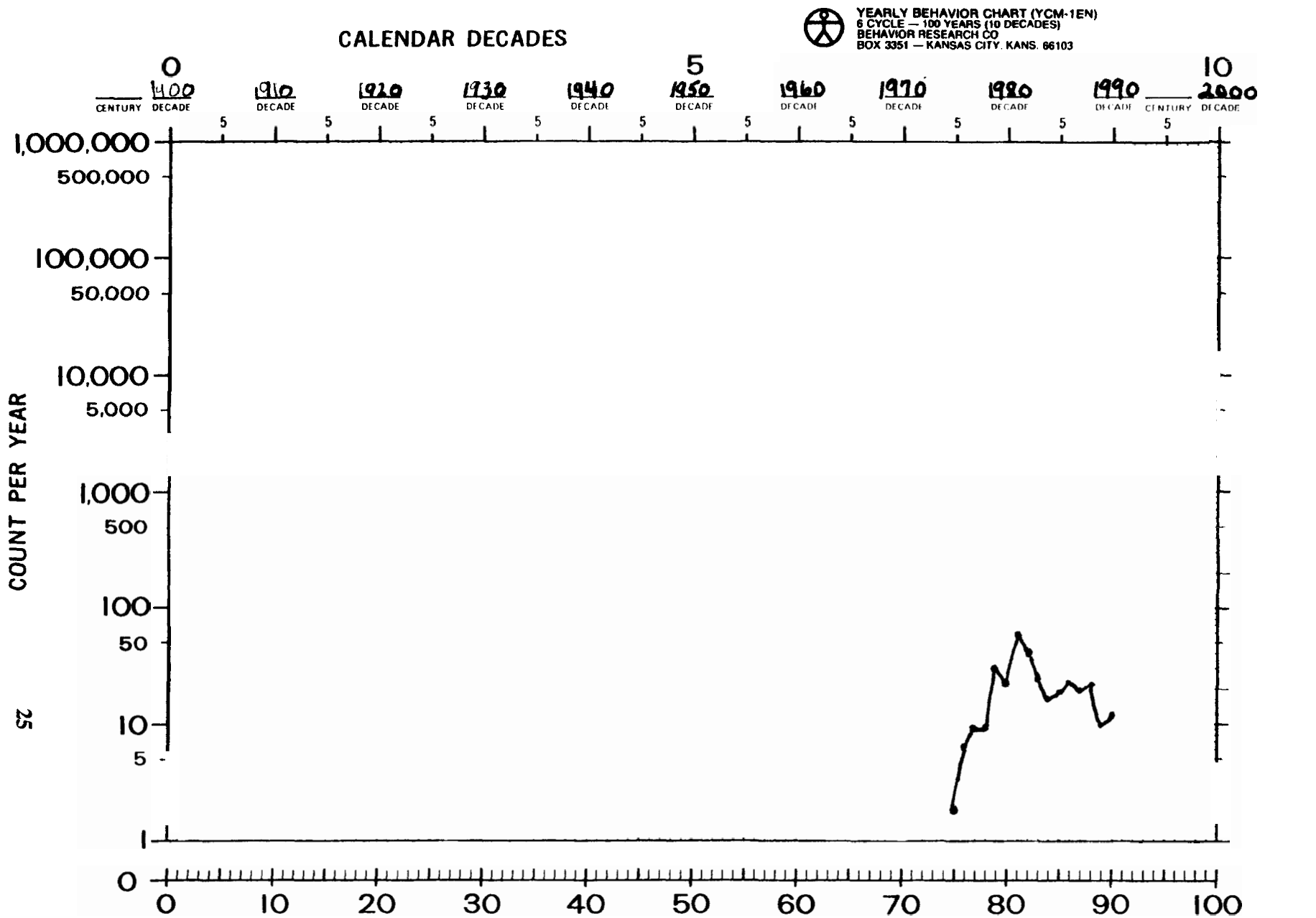

CHART 3 | | | PRECISION TEACHING PRESENTATIONS AT ABA

SUPERVISOR | ADVISER | MANAGER | BEHAVER | AGE | LABEL | COUNTED

			JWE	JWE
DEPOSITOR	AGENCY	TIMER	COUNTER	CHARTER

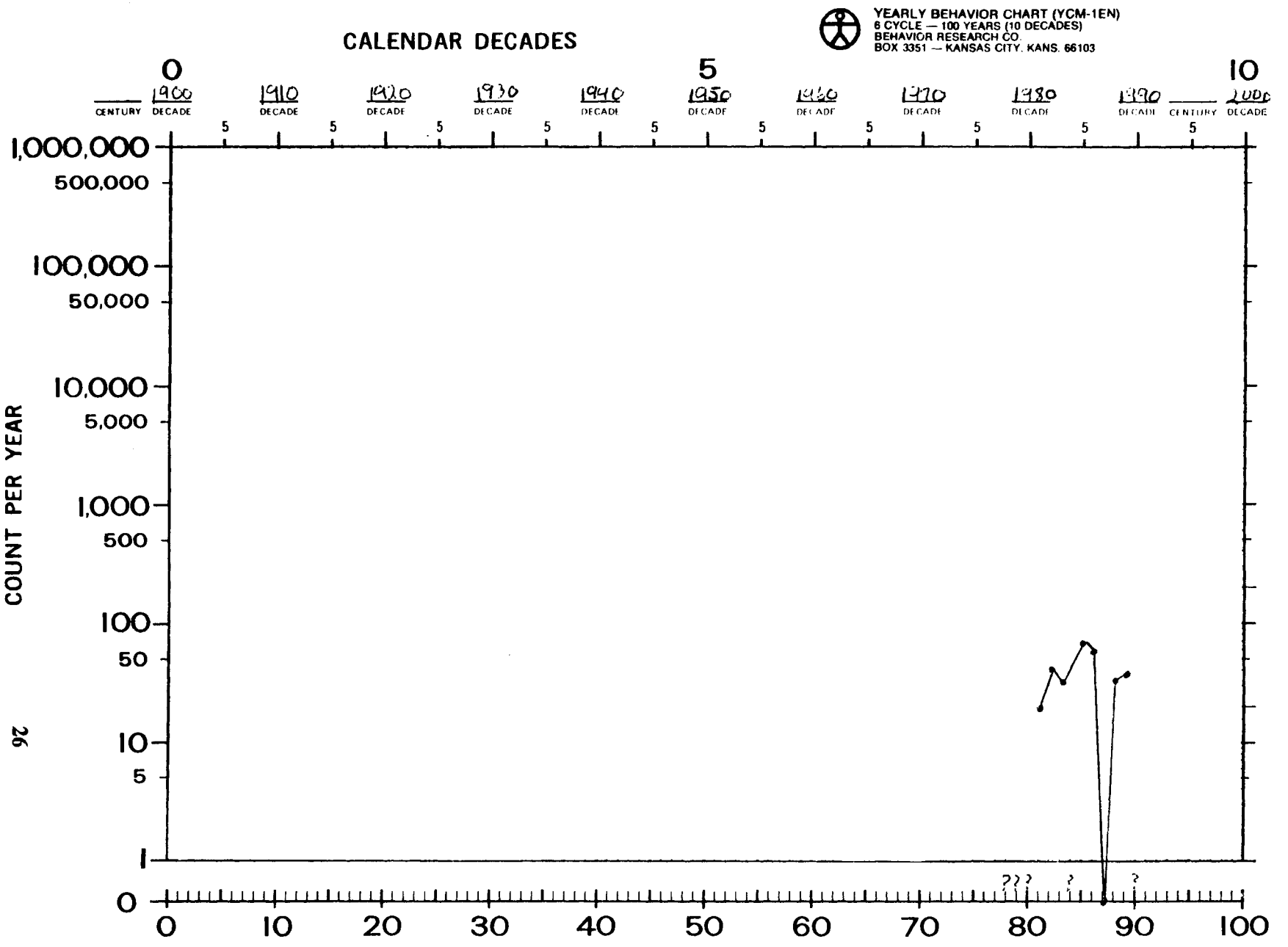

CHART 4 | | | PRECISION TEACHING PRESENTATIONS AT PT/PL | | | CONFERENCES

SUPERVISOR | ADVISER | MANAGER | BEHAVER | AGE | LABEL | COUNTED

DEPOSITOR | AGENCY | TIMER | JWE COUNTER | JWE CHARTER

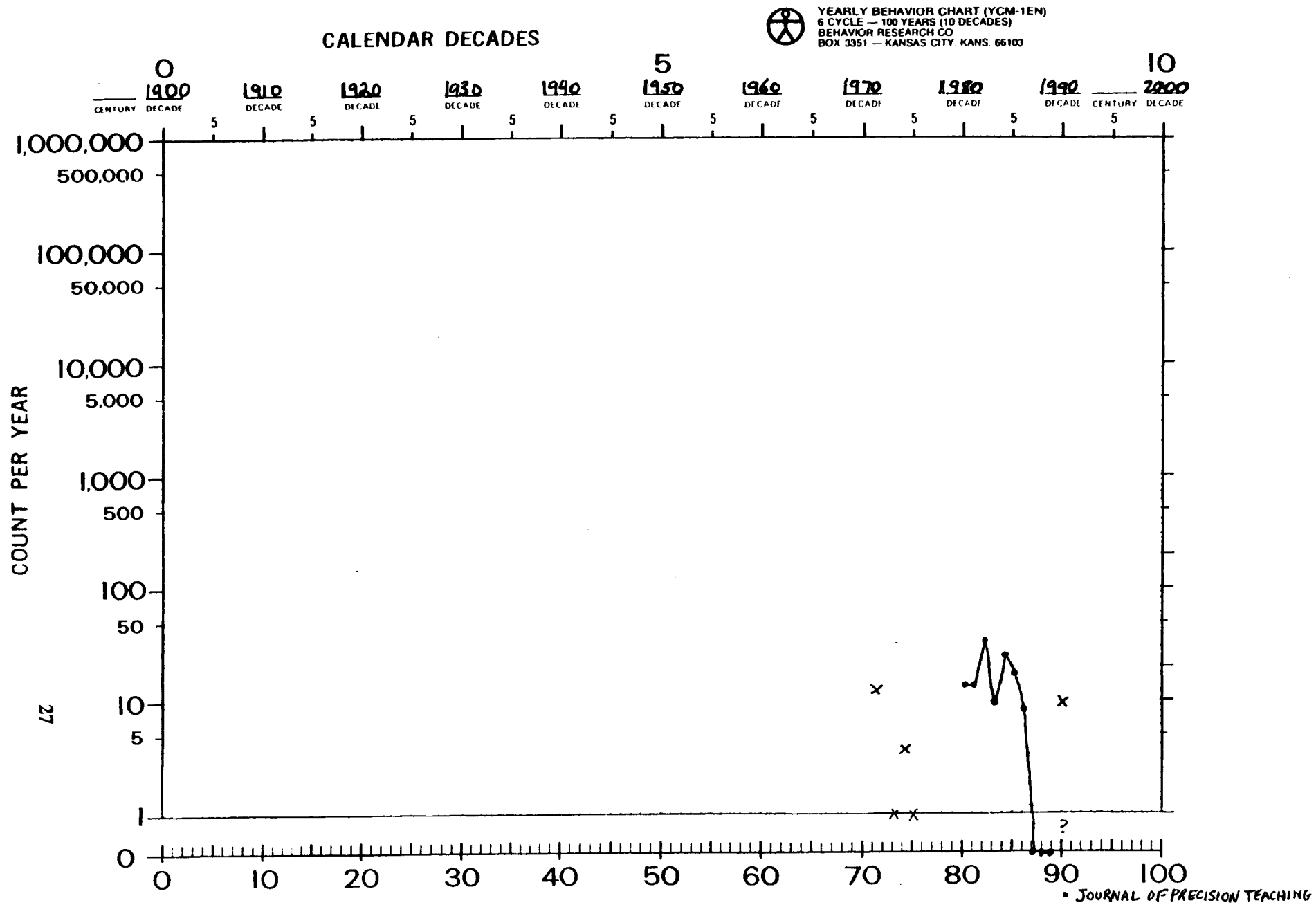

CHART 5

SUPERVISOR ADVISER MANAGER

DEPOSITOR AGENCY TIMER JWE COUNTER JWE CHARTER

• JOURNAL OF PRECISION TEACHING

X TEACHING EXCEPTIONAL CHILDREN

PRECISION TEACHING ARTICLES:

BEHAVER AGE LABEL COUNTED