

**IMPROVEMENT PICTURES WITH LOW CELERATIONS: AN
EARLY FORAY
INTO THE USE OF SAFMEDS**

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Ogden Lindsley coined the neologism "SAFMEDS" to stand for "Say All Fast a Minute Each Day Shuffled" (e.g. Lindsley, 1983). SAFMEDS is a functional substitute for the word "flashcards", for SAFMEDS specifies a procedure. Above and beyond this specification, SAFMEDS implies a particular instructional system. This system is relatively simple. First, one creates a set of SAFMEDS cards. These are usually 3 x 5 inch cards, with a problem, question, or premise written on the front and an answer written on the back of each card. Next, one "does" daily timings with the cards every day for several weeks. Prior to the timings, the cards are shuffled, so that one doesn't learn responses by the order of occurrence. During these timings, which are usually one minute in duration, one goes through as much of the deck as possible, looking at the front of a card, and attempting to say aloud what's on the back. After an answer is attempted, the card may be turned over, the answer checked, and the card put into either a "corrects" or "misses" pile. Provided a countdown timer is available, a timing can be done alone or with a friend. After the timing the number of cards in each pile is counted and the respective frequencies are plotted on standard celeration charts.

One of the distinct advantages of a SAFMEDS instructional system is that costs remain very low; a pack of 3 x 5 cards costs much less than a microcomputer. At the same time the system of SAFMEDS packs an educational "wallop". Moreover, it serves as a convenient way to study human operant behavior, specifically that category of verbal behavior that Skinner (1957) identified as "intraverbal". In addition, SAFMEDS can be used with any subject and educational level.

College students are perhaps the most difficult group to have as subjects in a SAFMEDS study. They already have an education history of at least 15 years. They may be quite "set in their ways", insofar as their learning and studying repertoires. After all, in 15 years, one is going to find

the "right" way to succeed in school, and the "best" way to study. So, instead of going through the entire deck at once, one might decide to peel off the top 10 and learn them well, and then the next 10 and so on (Lindsley, 1980, 1983). Some might decide to study the cards for a half-hour once a week, going through them slowly, while "flashing" back and forth between front and back (Lindsley, 1980, 1983). Plus, given a choice, college students will probably create SAFMEDS on a topic that they already know something about, rather than on an alien subject. These are only some of the reasons why they seem to be the most difficult subjects.

Procedure

Keeping the preceding precautions in mind, I conducted a SAFMEDS study where seven undergraduate education majors served as subjects. All were enrolled in one section of a large introductory behavior analysis course. Students had a choice of participating in several projects for credit, and these seven chose the "Precision Teaching Project". They received course credit for both participating and for improving their performance.

I met weekly with them. We did an in-class timing at each meeting, students pairing up with each other, with one the behavior and the other the recorder, and then switching roles. Frequencies were charted immediately after the timings. During the remainder of the meeting we covered some aspect of charting, decided upon interventions, and set aims. For the intervening days they were instructed to do the timings in the SAFMEDS style and chart their responses. To encourage honesty, they were allowed to choose the topic or subject matter of their SAFMEDS. Not too surprisingly, all chose topics relevant to courses they were taking. Also, they were instructed not to put a data point on their chart on days they missed--the same convention as "no-chance days." (q.v., Pennypacker, Koenig, & Lindsley, 1972). The weekly meetings and periodic timings with me as recorder calibrated honest charting, at least to the point where "faking it" would make little difference.

The range of topics for the SAFMEDS included: (1) atomic element symbols, (2) French vocabulary, (3) physics formulae, (4) physical education training terms, (5) voice concepts, (6) agricultural mechanics terms, and (7) herbicide names. The latter two topics were selected by two foreign students from central Africa who planned to go back to

their respective nations and teach agriculture.

Results

Most of the students reached their aims. Correct frequencies reached a high of 70/minute (see Chart 3), though most ended in the 40-60/minute range. Errors generally reached "below floor" (less than one/minute for the one minute). Overall celerations were low for both corrects and errors, with X1.1 or X1.3 common for the former, and /1.3 and /1.0 common for errors. In a couple of cases there were exceptional initial celerations: Texan (see Chart 1) produced a X3 for corrects over the first 9 days; Lee (see Chart 6) had X10 for errors over the first 5 timings. The data are displayed in Charts 1 through 7.

Event-following celerations are not drawn on the charts, even though events were changed during the course. There is no significant effect from drawing prediction lines or studying the cards before the timings. Furthermore, with the exception of Lee (see Chart 6), there are no major trend-following celerations worthy of display. Bounce is very low in all cases as well. Notably, for most students, bounce is greater for error responding than for correct responding. The resultant learning pictures are those of improvement, however: jaws, takeoff, and climb.

Follow-up

I was able to do a two-week follow-up with one of the students, Musa, after the semester had ended. We used a set of cards about behavior analysis, did two minute timings every day, and I served as timer. The second phase of Chart 7 shows his learning picture during the follow-up. He managed to achieve an overall crossover jaws, though his frequencies would be classified as low--no more than 13 correct per minute. A most-recent celeration indicates his errors, which never did reach the record floor, were increasing over the last four days.

These one-on-one daily timings (we even met on weekends) provided me a closer picture of some of the subtle events that must be considered part of the milieu of doing SAFMEDS. For example, if Musa came to a card for which he couldn't say an answer, or got it wrong, he tended to verbally punish himself, or say "I don't know this one." These self put-downs visibly slowed the frequency of responding. In another example, at a later time, he revealed that he was

beginning to attend to one or two key words on the front of the cards, or just the "form" or pattern of the words on the front.

Discussion

The data in Charts 1 through 7 illustrate a successful application of SAFMEDS technology. The figures help highlight several further considerations as well. First, ease of learning is colored by existing familiarity with the subject matter: all students selected topics with which they were already familiar. This was especially true in the case of Jackie (see Figure 3) who started out at 35/minute correct, and who never made more than two errors. Second, changing certain variables during the course--mid-course "corrections", as it were--had little, if any, apparent effect. Studying the cards before doing the timing, setting aims, or drawing prediction lines on standard behavior charts failed to result in either celeration turn-ups (multipliers) or frequency jump-ups (multipliers).

Perhaps the main benefit of this type of study are the questions it raises--questions I would not have entertained previously. For example, are bounce and celeration low for particular classes of behavior, for example see--says with SAFMEDS as opposed to other classes of verbal behavior? Are low bounce and celeration typical of college students doing SAFMEDS? In what ways does prior familiarity with a subject matter affect learning; that is, if prior familiarity does result in takeoff, climb, and jaws learning pictures, then how much prior familiarity is necessary to do so? This issue concerns the contributions to learning played by one's behavioral history, something often quoted as a "cause" of behavior, but rarely clarified and quantified. How does responding come under the control of the "form" or the pattern of the words on the front of a card, and what would happen if efforts were made to circumvent such control? These are only some of the questions suggested by the use of SAFMEDS.

References

- Lindsley, O. R. (1980, May). Charted daily learning of three different graduate courses. In S. Hayes (Chair), **Data-Based Decisions**. Symposium presented at the sixth annual meeting of the Association for Behavior Analysis, Dearborn, MI.
- Lindsley, O. R. (1983, March). **What we know about learning**. Keynote address presented



DAILY BEHAVIOR CHART (DCM-9EN)
 8 CYCLE - 140 DAYS (20 WKS.)
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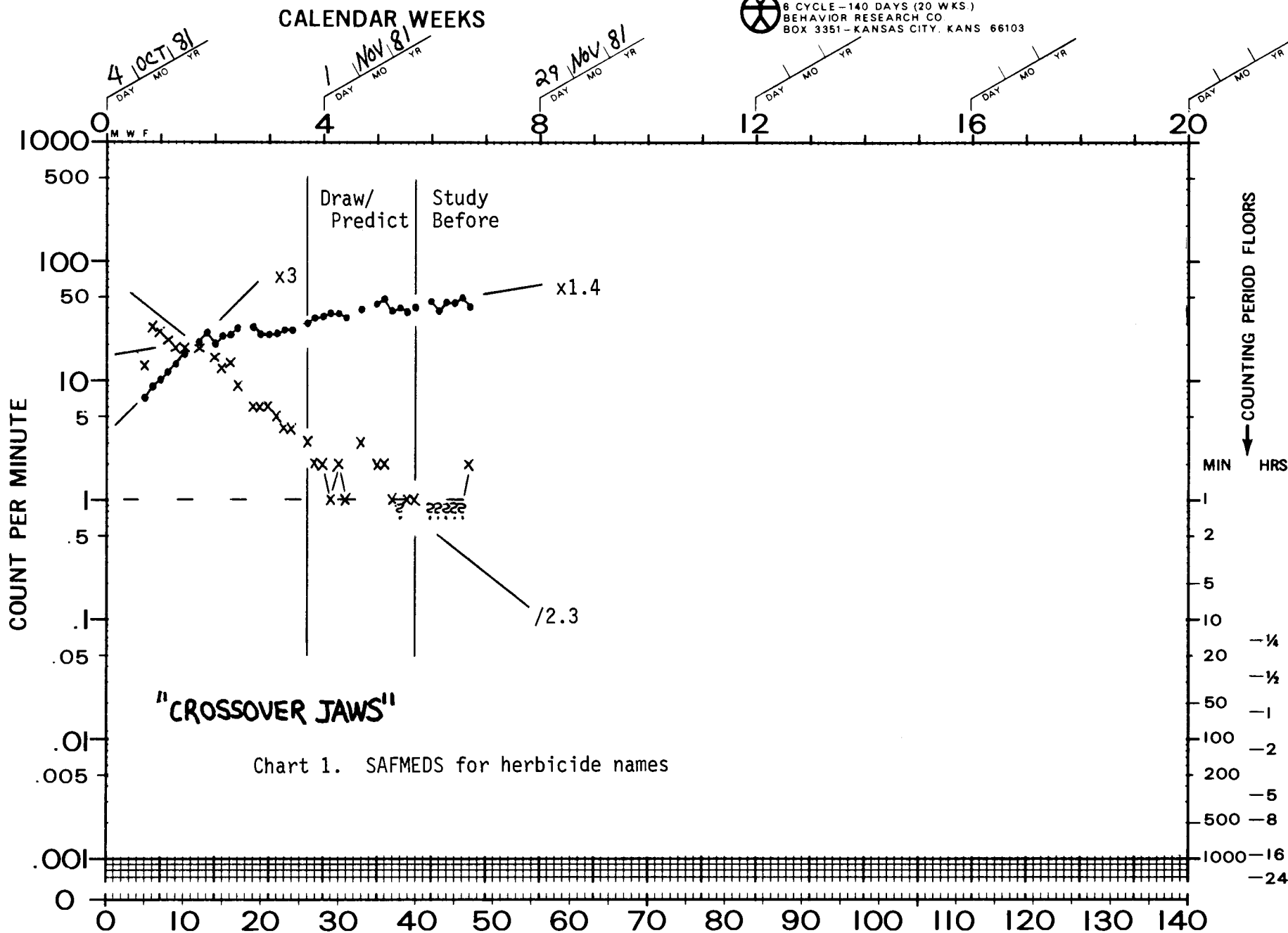


Chart 1. SAFMEDS for herbicide names

SUPERVISOR			J. Eshleman			TEXAN R.			see-say herbicide names		
ADVISER			MANAGER			BEHAVIOR			COUNTED		
DEPOSITOR			AGENCY			TIMER			CHARTER		



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CALENDAR WEEKS

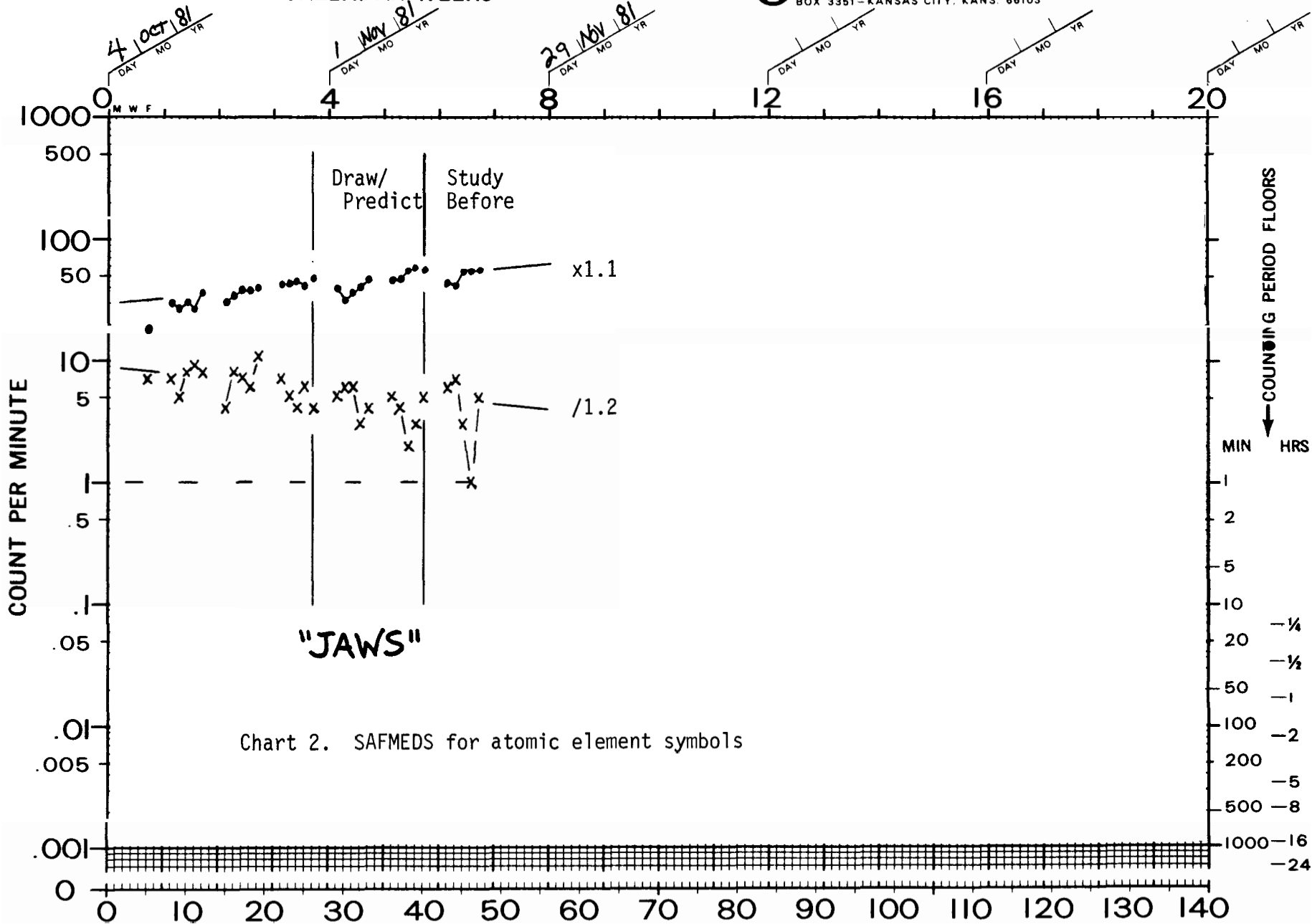


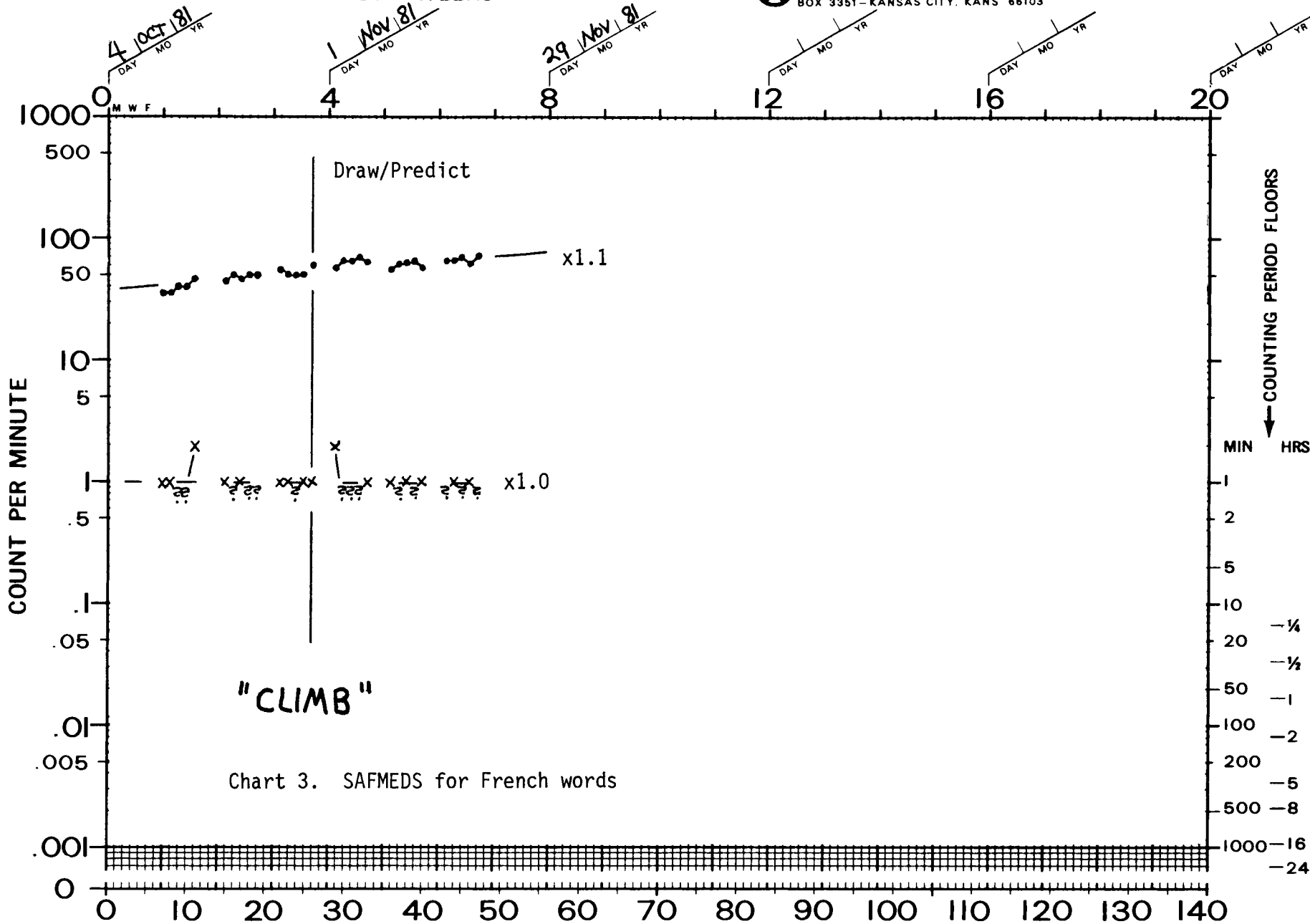
Chart 2. SAFMEDS for atomic element symbols

SUPERVISOR _____ ADVISER J. Eshleman _____ MANAGER _____
 DEPOSITOR _____ AGENCY _____ TIMER _____ COUNTER _____ CHARTER _____
 Odi 0. _____ see-say atomic element symbol _____
 BEHAVIOR _____ COUNTED _____



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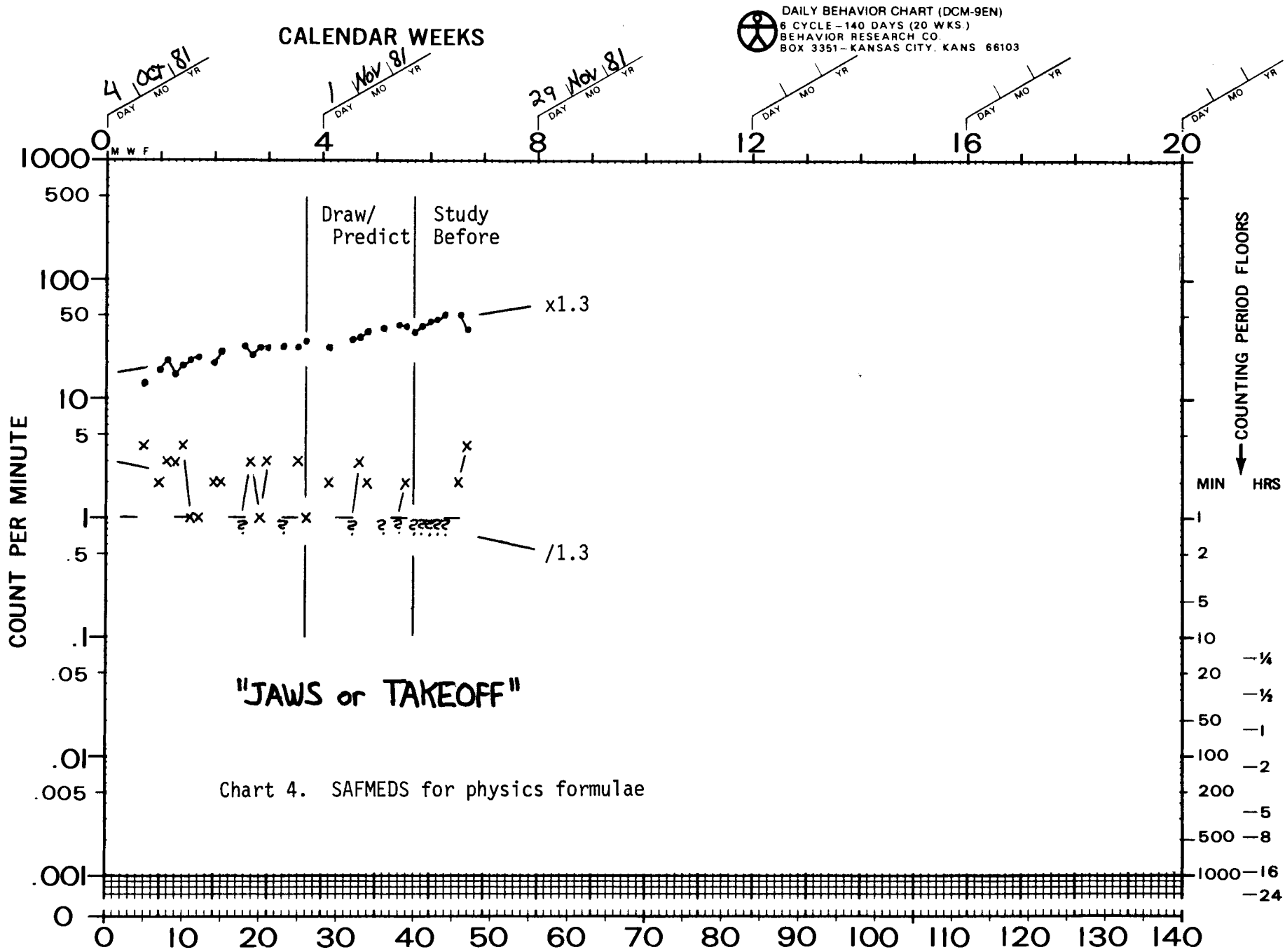
CALENDAR WEEKS



"CLIMB"

Chart 3. SAFMEDS for French words

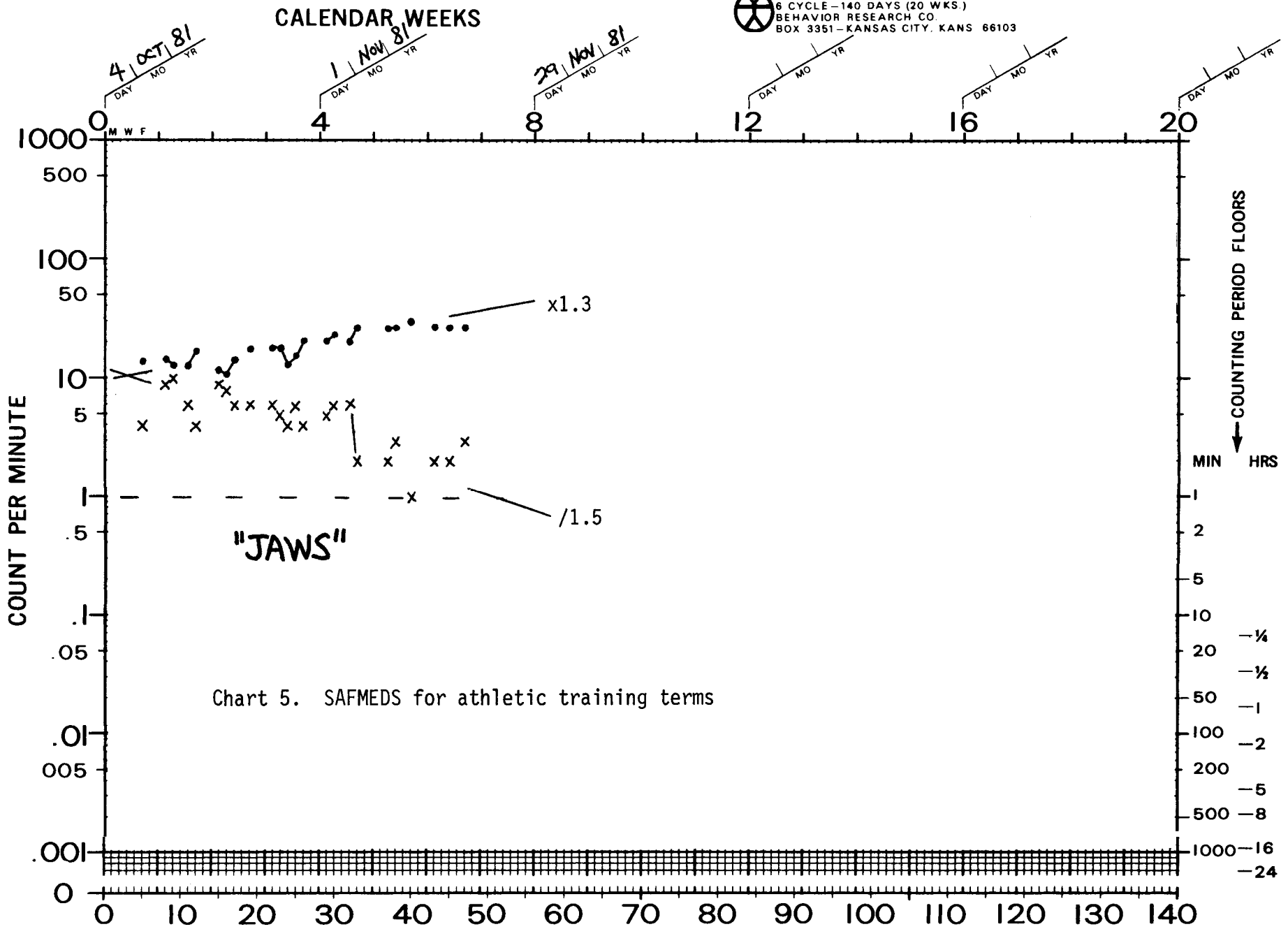
J. Eshleman			SUCCESSIVE CALENDAR DAYS		Jackie S.	see-say French words
SUPERVISOR	ADVISER	MANAGER			BEHAVIOR	COUNTED
DEPOSITOR	AGENCY	TIMER	COUNTER	CHARTER		



J. Eshleman			Don W.			see-say physics formulae		
SUPERVISOR	ADVISER	MANAGER	BEHAVIOR			COUNTED		
DEPOSITOR	AGENCY		TIMER	COUNTER	CHARTER			



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SUPERVISOR		J. Eshleman MANAGER		Lois M. BEHAVIOR		see-say athletic training terms COUNTED	
DEPOSITOR		AGENCY		TIMER		CHARTER	



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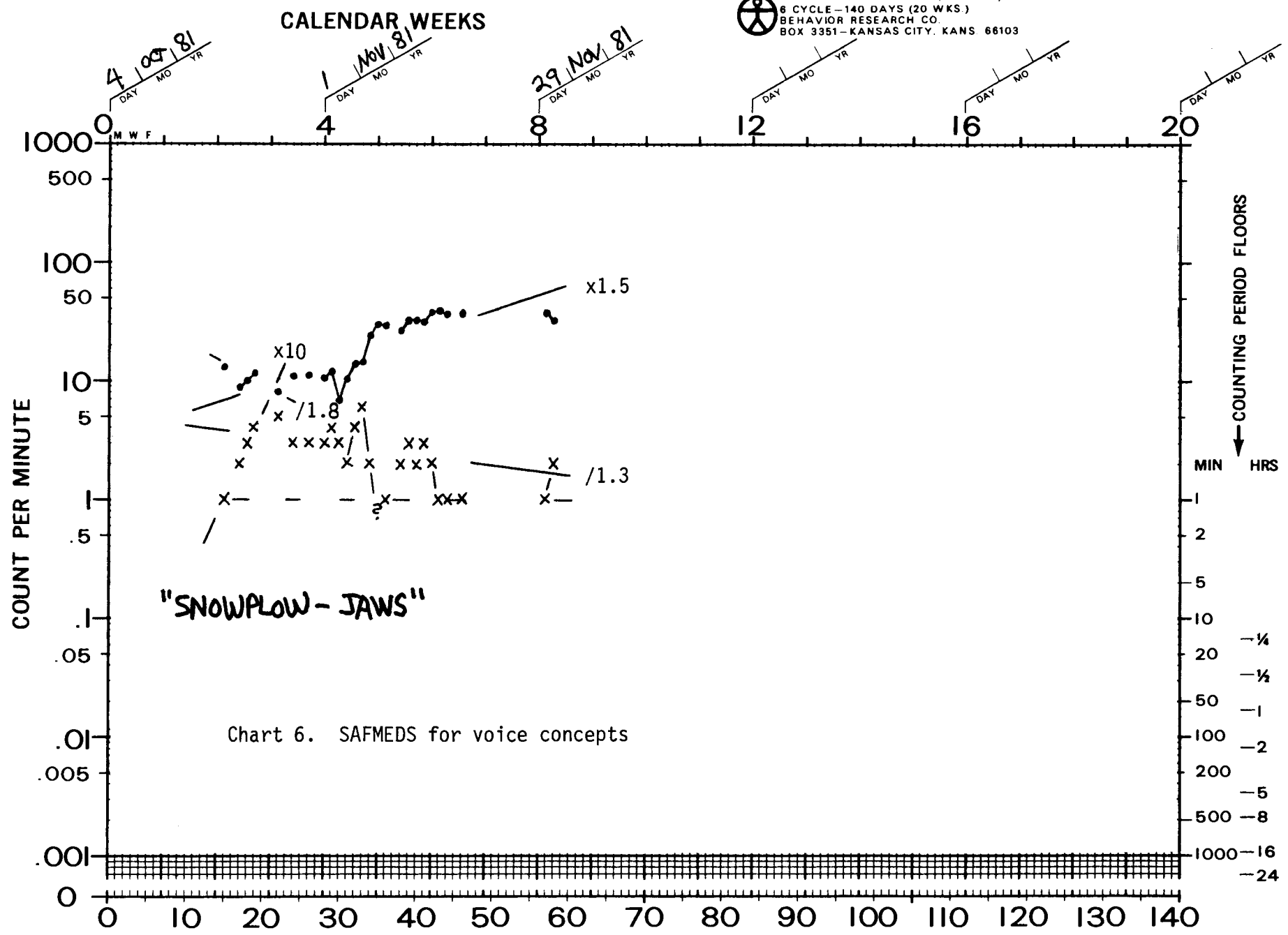


Chart 6. SAFMEDS for voice concepts

SUPERVISOR			J. Eshleman MANAGER			Lee S. BEHAVIOR		see-say voice concepts COUNTED	
DEPOSITOR			AGENCY			TIMER		COUNTER	
						CHARTER			

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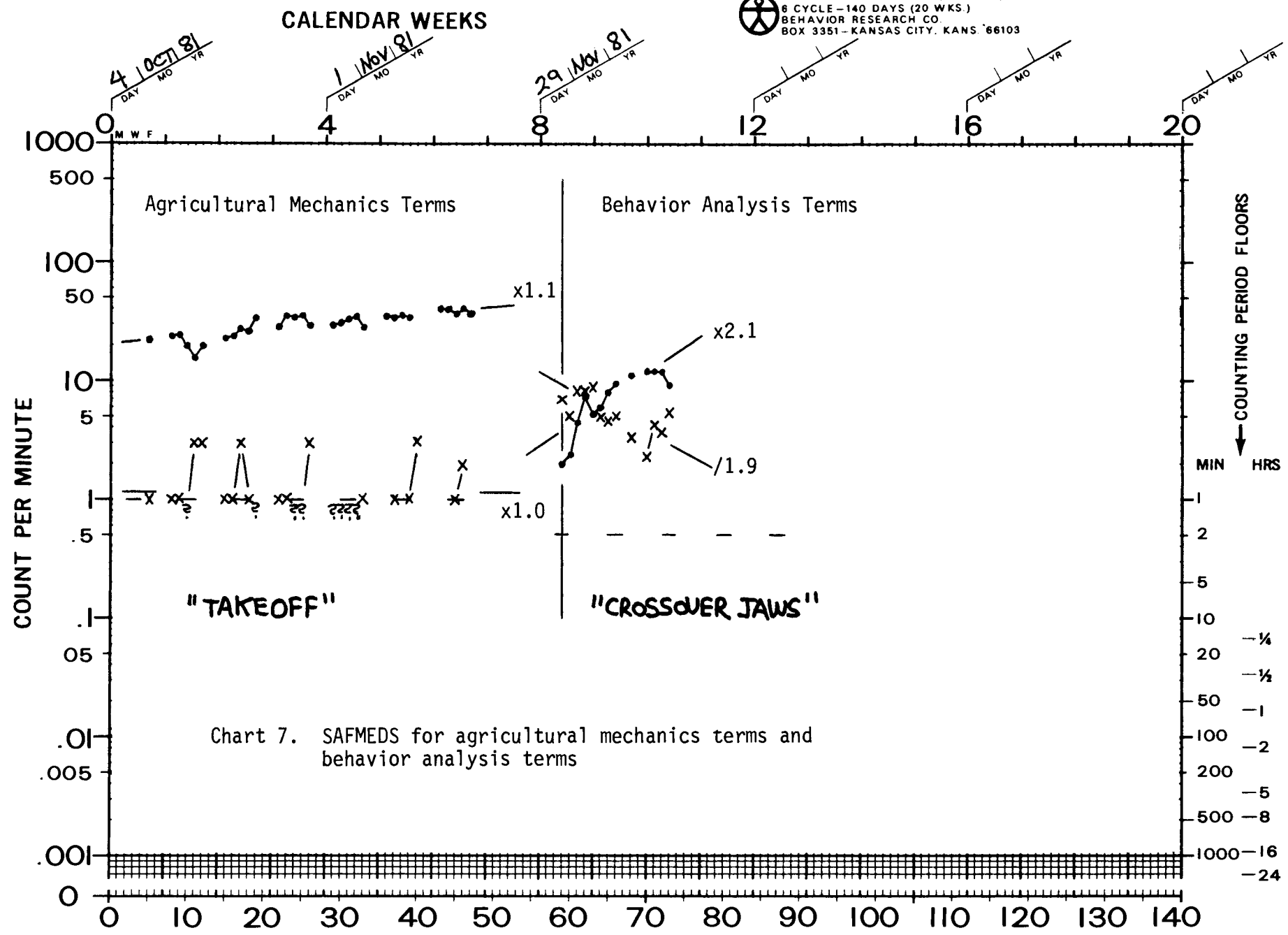


Chart 7. SAFMEDS for agricultural mechanics terms and behavior analysis terms

J. Eshleman			Musa D.			see-say terms		
SUPERVISOR	ADVISER	MANAGER	BEHAVIOR			COUNTED		
DEPOSITOR	AGENCY	TIMER	COUNTER	CHARTER				

at the third annual Precision Teaching Winter Conference, Orlando, FL.

Pennypacker, H. S., Koenig, C. H., & Lindsley, O. R. (1972). **Handbook of the Standard Behavior Chart**. Kansas City, KS: Precision Media.

Skinner, B. F. (1957). **Verbal Behavior**. Englewood Cliffs, NJ: Prentice-Hall.

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Chart - sharing

THE EFFECTS OF PRECISION TEACHING ON CHILDREN WITH ACADEMIC DIFFICULTIES

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Precision Teaching, developed by Ogden Lindsley in 1967, has become widely known as an effective mode of remediation for underachieving students (Diviaio & Hefferan, 1983; Lovitt & Fantasia, 1983; McGreevy, 1982; Brandstetter & Merz, 1978). Precision Teaching may be described as a system which utilizes direct and continuous measurement in order to improve a student's performance in certain academic and social skills.

The primary aim of the present study was to increase performance in specific academic skills of 4 underachieving students. These students had previously received numerous forms of academic intervention, all of which had proved to be ineffective.

A precision teaching program was devised in which semi-logarithmic charts were utilized to record the daily one minute timings for each pinpointed skill. Each skill was recorded on a different chart by this author. The charts were shared and discussed with the students so that they would see a daily picture of their progress. The correct responses were marked with dots and connected daily. The incorrect responses were marked with x's and were also connected daily.

The modes of assessment used to measure each skill were probes on which the student's daily performance was measured and timed for one minute, and subsequently recorded on the semi-logarithmic chart. These probes were administered after the students had received direct instruction in the particular skill to be tested.

Charts 1-4 indicate that the implementation of this program proved beneficial to all of the students. Although few students achieved mastery of all the pinpointed skills, their learning pictures indicate considerable improvement during the eight week period.

Some conclusions which may be extracted from the results of this study, are as follows: (1) precision teaching was effective for improving performance in the pinpointed academic skills of the 4 students; (2) the student's learning pictures indicated that performance in the pinpointed academic skills will probably continue to increase, providing a similar type of program continues to be implemented in the student's educational setting; (3) improvement in the students' self concepts, "on task", and appropriate behavior, were also noted (though not charted), and believed to be due to the implementation of the program.

The results of this study provide numerous implications for educators involved in the teaching of underachieving students. First, in order for effective learning to take place, it is essential that each child be taught as an individual. Precision teaching offers educators a way of systematically monitoring each child's progress, so that when instruction is not effective, this will be illustrated on the student's chart immediately. Hence, rather than discovering (after a number of months) that the student is behind in a certain skill, the educator will see this instantly, and will hopefully be able to remedy the situation by providing a different type of instruction.

Second, it is important to note that the students in this study enjoyed observing their daily progress (as seen on the charts), and were constantly attempting to improve their performance from the previous day. Consequently, precision teaching may be viewed as a possible motivator for underachieving students, which can in turn lead to increased academic achievement. It is especially important for underachieving students to be able to actually see their academic progress, as they often tend to become discouraged due to frequent failure in the educational system. If they have the