

## A PROCEDURE FOR STUDYING ECHOIC CONTROL IN VERBAL BEHAVIOR<sup>1</sup>

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Male and female college students answered standard questions about the women's liberation movement on three occasions. A set of target words was embedded in the questions, with one set used in Sessions 1 and 3, and a synonymous, but different set used in Session 2. The relative frequencies of usage of a given target word were directly related to whether the questions for that session contained the word. The results supported the hypothesis of echoics as proposed in Skinner's theory of verbal behavior.

*Key words:* echoic, verbal behavior, imitation, humans

Despite the considerable controversy aroused by Skinner's 1957 book, *Verbal Behavior* (Chomsky, 1959; MacCorquodale, 1970), it has failed to inspire much research. Most of the studies evoked by Skinner's account have sought changes in the frequencies of various words or phrases by making reinforcement or punishment contingent on verbal responses (Holz and Azrin, 1965). Other aspects of Skinner's theory have been neglected (Winokur, 1976).

An example of a variable that was considered important by Skinner, but which has not been empirically studied is the echoic. Skinner (1957) defined an echoic as the "case in which verbal behavior is under the control of verbal stimuli [and] the response generates a sound pattern similar to that of the stimulus" (p. 55). Thus, any verbal response such as a phoneme, inflection, pronunciation, or even a whole sentence may be under echoic control.

Controversy surrounding the echoic has been concerned mainly with whether echoics exist due to an innate tendency for humans to imitate (Chomsky, 1959), or if they exist due to a learning process whereby a person's imitations

are reinforced (Miller and Dollard, 1941; Skinner, 1957). In the latter case, echoic repertoires are explicitly reinforced during the course of language acquisition, as well as in the subsequent schooling of the child.

There is another aspect of echoics that deserves consideration: do echoics exist outside tutorial situations in which they are explicitly reinforced? It seems likely that after an extensive history of reinforcement for echoing within instructional settings, echoic responses will generalize to other situations of a less explicitly educational form, such as a conversation or an interview.

Matarazzo and Wiens (1972) reported studies that dealt mainly with nonword echoics, such as frequencies and durations of single units of utterance, latency of speech initiation, and frequency of interruption in two and multiperson groups. These researchers found that an interviewee's speech is extremely responsive to variations in the same variables in the speech of the interviewer. Without elaborating on the vast amount of data collected by Matarazzo and his colleagues, it should be noted that their studies provide ample evidence for the existence of echoic control over several aspects of the production of speech, but ignore speech content (*i.e.*, words). It is, therefore, appropriate to determine whether echoics occur at the content (word) level, as Skinner (1957) asserted.

In the present experiment, verbal behavior was controlled in an interview situation by manipulating verbal discriminative stimuli for echoic responses. An interviewer asked the subject three different series of questions about

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the women's liberation movement on three separate occasions. The questions asked on the first and third occasions contained one set of target words; questions asked on the second occasion contained a different, but synonymous, set of target words. Responses were analyzed in terms of the relative frequencies of use of the alternative target words.

METHOD

*Subjects*

Eighteen male and 21 female college students at Texas Christian University served as a requirement of their introductory psychology classes.

*Apparatus*

Tape recordings were made in a sound-insulated chamber. A screen separated the subject and the interviewer.

*Procedure*

Two male psychology graduate students were the interviewers. Since training the interviewers did not require revealing the purpose of the study, a double-blind procedure was employed, in which neither the subjects nor the interviewers were told the exact purpose of the experiment.

An ABA design was utilized in which each subject was seen on three occasions by the same interviewer with about a week between sessions. Each session involved a different set of three questions. Six target words were contained in the questions during Sessions 1 and 3 (A-words) and six different target words during Session 2 (B-words). The words and the number of times each was used in the questions are given in Table 1. The actual number is only approximate because questions were occasionally repeated at the request of a subject.

Table 1

List of target words. Numbers in parentheses refer to the number of times the word was used in each session.

<i>Session 1 A-Words</i>	<i>Session 2 B-Words</i>	<i>Session 3 A-Words</i>
changes (1)	effects (1)	changes (1)
feel (3)	believe (3)	feel (2)
society (2)	culture (2)	society (2)
employment (1)	hiring (1)	employment (1)
wages (1)	salaries (1)	wages (1)
training (1)	preparation (1)	training (1)

The following instructions were read by the interviewer to each subject at the start of each session:

This is a study of speech and conversational habits. Upon a signal from me I would like you to talk to me for approximately 15 minutes on the woman's liberation movement. I have a set of questions that I will ask you at various points, but you need not stick entirely to the questions if you have other points you would also like to make. I would like you to answer each question as fully as possible, however. Do you have any questions you would like to ask me before we start? Well, then, I'll start by asking you a question.

If subjects asked questions the instructions were repeated. The tape recorder then was started and the subject was asked the three questions. Time was provided to answer each question as fully as possible before the next question was asked.

Questions for each session were as follows (target words are in italics):

*Session 1 questions (A-words):*

1. What *changes* do you feel the women's liberation movement can be expected to make in our *society*, especially in the areas of *employment* and education?
2. Do you *feel* that women's *wages* are equivalent to those for men with the same *training*?
3. Do you *feel* that education is as essential for women as it is for men in our *society*?

*Session 2 questions (B-words):*

1. Do you *believe* the *effects* of the women's liberation movement are already being noticed in any significant way in our *culture*, such as in its education system and in its *hiring* of women?
2. Do you *believe* *salaries* for women are getting more nearly equal to those for men with the same *preparation*?
3. Do you *believe* women are now emphasizing education for themselves as a way of better competing in our *culture*?

*Session 3 questions (A-words):*

1. Do you think that *changes* which may be brought about or have already been brought about by the women's liberation movement regarding *employment*

and education have been beneficial to *society*?

2. How do you *feel* it would be for our economy if women's *wages* were the same as those for men in every position where the women have the same *training*?
3. Do you *feel* that men and women receive equal treatment in the education they receive in our *society*?

During the course of the interview, the interviewer attempted to keep the subject talking for at least 2 min for the entire set of three questions. This was done by the interviewer asking questions such as: "Can you elaborate on that?", "Can you give me some examples?",

"Can you be more specific?", and so forth. After each subject finished answering all the questions in the third session, he/she was asked about the purpose of the experiment.

## RESULTS

Although speech samples were collected from a total of 39 subjects, data from eight subjects were lost through equipment malfunction. The actual analysis is based on the data from 13 males and 18 females. Since there did not appear to be any major differences between the data of males and females or between the data obtained by the two interviewers, a common analysis was conducted. Transcriptions of the recordings were made by a secretary who

Table 2

Number of times an A-word or a B-word was emitted and the total number of words emitted for each subject each session.

		Sessions											
		1	2	3	1	2	3	1	2	3	1	2	3
S1		S2			S3			S4					
A	4	10	2	6	2	2	5	3	6	14	1	3	
B	0	2	0	6	5	0	0	7	0	1	12	5	
T	254	249	187	441	419	187	590	405	576	349	474	374	
S5		S6			S7			S8					
A	6	3	4	2	0	10	0	0	4	3	2	0	
B	0	2	0	0	2	3	0	1	0	3	1	1	
T	313	101	307	373	189	890	54	33	101	300	174	299	
S9		S10			S11			S12					
A	2	1	2	13	2	3	6	3	6	2	0	3	
B	3	5	1	2	4	0	0	0	1	0	0	0	
T	1007	377	487	1024	406	456	342	222	422	171	67	151	
S13		S14			S15			S16					
A	6	2	4	3	0	3	3	2	4	3	2	8	
B	0	3	3	1	2	1	1	5	0	0	0	0	
T	908	603	624	523	188	311	338	204	287	221	209	182	
S17		S18			S19			S20					
A	0	0	4	4	0	0	4	1	3	2	0	2	
B	0	0	0	2	0	0	7	3	10	0	0	0	
T	192	365	552	265	219	152	1012	303	808	407	578	545	
S21		S22			S23			S24					
A	10	4	9	4	2	4	6	5	4	4	1	7	
B	5	8	5	0	0	1	0	2	1	1	2	0	
T	911	276	602	376	270	474	543	728	635	254	301	237	
S25		S26			S27			S28					
A	1	1	3	2	1	0	5	1	1	1	0	3	
B	0	6	1	0	1	1	3	2	1	4	1	0	
T	439	890	474	250	316	301	563	126	1262	221	211	206	
S29		S30			S31			KEY:					
A	1	1	2	4	0	2	0	3	1	A = A-words			
B	1	1	0	0	3	0	0	2	1	B = B-words			
T	293	179	450	159	163	246	270	324	239	T = Total words			
										S = Speaker			

was unaware of the purpose of the study. Word counts were made by counting the actual number of times each subject used an A-word or a B-word in the total discourse for each session. A check on the accuracy of word counts was made by having a second person independently perform word counts for five randomly selected subjects. First and second word counts were in complete agreement in all cases.

The amount of time each person spoke and the number of words emitted varied considerably from speaker to speaker and from session to session for a given speaker. The results are summarized in Table 2, which presents the absolute frequencies of A-words, B-words, and total words used by each subject for each session of the study. Total words used by any one subject for a single session ranged from 33 to 1262 words, with a mean of 387 words per subject per session. As Table 2 shows, A-words and B-words occurred relatively infrequently in comparison to total words emitted per subject, and for six subjects there was at least one session in which no A- or B-words were given.

The following analyses revealed speech consistent with the presence of echoic control. If echoic responses occurred at the word level during interviews, in any given session the relative numbers of A- and B-word usages should vary as a function of which target words were used by the interviewer in that session. That is, in Sessions 1 and 3, where the A-words were embedded in the interviewer's questions, subjects should use more A-words than B-words; in Session 2, where the interviewer used B-words, the opposite effect should occur. The results of such an analysis are shown in Table 3. In all three sessions, the vast majority of the subjects responded in accord with these predictions, thus supporting an explanation based on echoic control.

Additionally, if echoic control occurred in this experiment, the relative numbers of tar-

get words emitted by subjects should vary across sessions, according to whether each session contained A- or B-words in the questions. Thus, one would expect that from Session 1 to Session 2, the number of A-word responses should decrease and the number of B-word responses should increase. In addition, one would expect that from Session 2 to Session 3 the number of A-word responses should increase and the number of B-word responses should decrease. Table 4 presents the number of subjects showing increases, decreases, or no change in numbers of A- and B-words used from the first to the second session and from the second to the third session. For both A- and B-words, the majority of the subjects' data indicated echoic control of word production. The mean number of A-words used by the 31 subjects in Sessions 1, 2, and 3 respectively was: 1.02, 0.65, and 1.08 respectively; for B-words, the means were: 0.28, 0.97, and 0.22.

None of the subjects could state correctly the purpose of the experiment.

## DISCUSSION

The present experiment demonstrated that verbal discriminative stimuli in the form of words can determine a speaker's use of words, thus supporting Skinner's hypothesis of echoics.

The subjects' use of target words was quite varied and idiosyncratic. However, it was quite rare for a subject to repeat a part of a question that contained a target word before starting the answer. Rather, the target words were emitted by subjects largely in the course of giving their answers. An example of one subject's answer to Question 2 of Session 1 ("Do you *feel* that women's *wages* are equivalent to those for men with the same *training?*") illus-

Table 3

Number of subjects during each session giving more A- than B-words, more B- than A-words, or equal numbers of A- and B-words.

Session	A > B	B > A	A = B
1	22	3	6(3)*
2	8	17	6(4)*
3	24	4	3(1)*

\*Neither an A- nor a B-word given.

Table 4

Number of subjects showing increases, decreases, or no change in numbers of A- and B-words from the first to the second session and from the second to the third session.

Word Type	Session 1 versus Session 2			Session 2 versus Session 3		
	Increase	Decrease	No Change	Increase	Decrease	No Change
A	2	25	4	24	4	3
B	19	5	7	4	19	8

trates use of target words (target words are in italics):

I'm not sure whether they are or not. I couldn't say. I'm not exactly sure how *wages* run for men compared to women. I *feel* that they should be given the same *wages* if they're qualified to do the same job. Of my personal knowledge I'm not sure whether they do actually get paid the same or not.

Since A-words and B-words were synonymous in the context in which they were used, the possibility that different thematic content was responsible for differences is remote. That thematic content was not responsible is further supported by the finding that several subjects, when asked the purpose of the experiment, responded that the same questions were asked each session, only worded differently. Although the questions were, in fact, different, they did deal with the same issues and presented opportunity for considerable overlap in the answers. Yet, the subjects showed large differences in their use of target words across sessions.

In summary, this study provided a method for the study of echoics and corroborates Skinner's proposal that echoics are an important source of verbal control in conversation.

#### REFERENCES

- Chomsky, N. Review of Skinner's "Verbal Behavior". *Language*, 1959, **35**, 26-58.
- Holz, W. C. and Azrin, N. H. Conditioning human verbal behavior. In W. K. Honig (Ed), *Operant behavior: areas of research and application*. New York: Appleton-Century-Crofts, 1966. Pp. 790-826.
- MacCorquodale, K. On Chomsky's review of Skinner's "Verbal Behavior". *Journal of the Experimental Analysis of Behavior*, 1970, **13**, 83-99.
- Matarazzo, J. D. and Wiens, A. N. *The interview*. Chicago: Aldine-Atherton, 1972.
- Miller, N. E. and Dollard, J. *Social learning and imitation*. New Haven: Yale University Press, 1941.
- Skinner, B. F. *Verbal behavior*. New York: Appleton-Century-Crofts, 1957.
- Winokur, S. *A primer of verbal behavior: an operant analysis*. Englewood Cliffs, New Jersey: Prentice-Hall, 1976.

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