A Comparison of Topography-based and Selection-based Verbal Behavior in Typically Developed Children and Developmentally Disabled Persons with Autism

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This study is a replication of Sundberg and Sundberg (1990) that compared topography-based verbal behavior with selection-based verbal behavior in terms of acquisition, accuracy, and testing for the emergence of a new verbal relation. Participants were three typical children and three developmentally disabled persons with autism. The study sought to determine which paradigm (topography-based or selection-based) resulted in more rapid acquisition of tacts and intraverbals, which was associated with the fewest errors, and which paradigm resulted in the emergence of the highest number of new verbal relations. The results of the study showed that the six participants performed quite differently from one another. Most importantly, the results from the person with autism contradicted previous findings favoring selection-based verbal behavior over topography-based approaches for teaching verbal behavior to low-functioning individuals.

Key words: topography-based vb, selection-based vb, typically developed children, children with autism.

Language development is predictive of quality of life in our culture. For persons with autism, language acquisition is often time-consuming and numerous repetitions of training sequences are needed. To optimize learning for less language-able persons with autism, augmentative or alternative communication systems are often considered appropriate. These are usually sign language or pointing systems. However, the basis for choosing is seldom clear (see Shafer, 1993; Sundberg, 1993).

Michael (1985) describes two different kinds of verbal behavior: selection-based and topography-based. Topography-based verbal behavior consists of performing a response with a unique, distinguishable topography. Both sign language and vocal speech exemplifies such distinctive topographies. Selection-based verbal behavior involves a nondistinctive response

that selects stimuli from a sample of such stimuli. The stimuli selected are usually pictures or printed words (although auditory stimuli can also be selected). Studies have shown that topography-based verbal behavior is acquired more rapidly and results in better maintenance and more accurate performance than selection-based verbal behavior in developmentally disabled persons and college students (Potter & Brown, 1997; Potter, Huber, & Michael, 1997; Sundberg & Sundberg, 1990; Wraikat, Sundberg, & Michael, 1991). The difference is demonstrated to be larger in verbally weak than in verbally strong persons (Potter & Brown, 1997; Shafer, 1993). Sundberg and Sundberg (1990) and Wraikat, et al. (1991) suggest that these results should lead to changes in the traditional teaching programs for verbally weak persons. Teachers and therapists should apply topography-based procedures for language acquisition, (e.g., sign language), but according to Shafer (1993), recommendations of selection-based systems for persons with autism are more common than recommendations of topography-based systems. One reason for this can be that many persons with autism are relatively skilled in learning by visual structures and patterns (Tsai, 1989). Following the conceptual analyses of Michael (1985) and the studies by Sundberg and Sundberg (1990) and Wraikat, et al. (1991), one might consider changing these systems to topography-based systems.

This article is part of a master's degree at Akershus University College in Norway, finished in May 2006. Data from the current study was previously used in an unpublished work at Akershus University College. The conclusion from an earlier study was misleading because it suggested that persons with autism would benefit most from selection-based verbal behavior grounded on a group analysis. This appears to be a generalization that goes beyond the presented data, which could be used to justify using picture systems with nonverbal persons with autism. The current study, based on a single case analysis, contradicts this conclusion. Address correspondence to: Tore Vignes, Elgveien 8, N-4323 Sandnes, Norway; e-mail: tore.vignes@lyse.net.

Sundberg and Sundberg (1990) and Wraikat, et al. (1991) emphasize the need for more studies of higher functioning persons with developmental delays. In particular, Wraikat, et al. (1991) recommend studies with typical children as participants. This might also increase the understanding of basic principles of acquisition of verbal behavior. Potter and Brown (1997) emphasize the importance of investigating topography- and selection-based programs for teaching verbal behavior in different populations. This is of theoretical significance, since Michael’s (1985) analysis, especially for the developmentally disabled persons, favors topography-based verbal behavior. However, it is not demonstrated that the differences between selection-based and topography-based verbal behavior apply to all populations (Potter & Brown, 1997). Studies of different populations are also of practical significance, since recommendations of systems vary considerably with population (Shafer, 1993).

Investigating the differences between topography-based and selection-based programs for teaching verbal behavior to persons with autism may clarify whether the findings for persons with developmental delays also apply to

persons with autism. There may be differences, but they may vary with different populations and across different individuals. If verbal learning for persons with autism differs from verbal learning for persons with developmental delays, then teaching persons with autism should differ from teaching other verbally weak populations. Another possibility is that verbal learning may be more individually based than population based, and in that case it should lead to individually based learning programs.

Sundberg and Sundberg (1990) taught four developmentally disabled adults to tact an object by selection-based verbal behavior or topography-based verbal behavior. They were then taught an intraverbal relation, and were tested for the emergence of new verbal relations. They found that signed responses were acquired more readily than pointing responses as measured by the acquisition of tacts and intraverbals, and by the formation of new verbal relations.

This study is a replication of Sundberg and Sundberg (1990), and compares programs for teaching topography-based and selection-based verbal behavior in typical children and persons with autism. The study seeks to determine

Table 1
Age and levels of verbal behavior of the three typically developed children.

Name	Age	Levels of VB	Vocal behavior
Anna	2 years, 5 months	Moderate	Lots of
Sunniva	6 years, 9 months	Rich	Lots of
Mathilde	8 years, 4 months	Rich	Lots of

Table 2
Age, diagnosis and levels of verbal behavior, participants with autism as primary diagnosis.

Pseudonym	Age	Secondary Diagnosis	Levels of VB	Vocal behavior
Judas	14 years	Severe mental retardation	Weak	Very little
Peter	14 years	Moderate mental retardation	Moderate	Little
Lukas	22 years	Mild mental retardation	Rich	Lots of

which paradigm (topography-based or selection-based) results in more rapid acquisition of tacts and intraverbals, which was associated with fewest errors, and which paradigm resulted in emergence of the highest number of new verbal relations.

METHOD

Participants and Setting

Three typical children and three developmentally disabled persons with autism participated (Table 1 and Table 2). The autism group consisted of persons with marked differences in cognitive functioning (i.e., severe, moderate, and mild mental retardation). In order to make comparison of the groups possible, each typical child was selected to match the "intellectual" level of one person with autism. Thus, group comparison is not the subject matter in the current study. The selection criterion consisted of performance on an identity-matching test. No participant had any formal experience with sign or pictorial language.

All participants received training in their natural environments. Arrangements were made to eliminate unnecessary disturbances during training and testing. Experimental sessions were conducted Monday through Friday. Sessions were conducted at various times, depending on each participant's daily schedule; with two to four sessions each day. Each session consisted of 30 trials and lasted 10 to 15 min.

Reinforcement Selection

For Anna, Sunniva, Mathilde, Peter, and Lukas a token economy system was applied. This consisted of eight small boxes forming a tower when completed. Peter and Lukas had a history of using token systems, the other three had not. The potential reinforcers were hidden underneath the tower. This was one NOK (about a dime) for Sunniva, Mathilde, and Lukas, chocolate for Anna, and candies for Peter. For Judas, peanuts, raisins, and chocolate were used as potential reinforcers. For all participants, tokens or edible consequences were correlated with praise such as "right," "good," "yes," and "excellent."

Apparatus and Materials

All participants were taught relations between nonsense objects and signs, nonsense names and signs, nonsense objects and symbols, and nonsense names and symbols. Nonsense names, symbols, and signs were used to guard against the possible influence of verbal history. The names were equal to, and the symbols and signs were based on, Sundberg and Sundberg's (1990) material. The signs and objects were also chosen so as to control for the differential ease of acquisition due to iconicity factors.

Table 3
*Verbal relations for Anna, Judas,
and Sunniva.*

Word	Object	TB Sign or SB Symbol
søgg	wood piece	hands up
sigpi	metal piece	hands on the back
kabbi	cloth	circling hands
pau	plastic piece	circle symbol
viglet	rubber piece	triangle symbol
krepåla	cylinder	square symbol

Table 4
*Verbal relations for Peter, Mathilde,
and Lukas.*

Word	Object	TB Sign or SB Symbol
søgg	wood piece	W symbol
sigpi	metal piece	X symbol
kabbi	cloth	U symbol
pau	plastic piece	finger to chest
viglet	rubber piece	nose pinch
krepåla	cylinder	open hand

Six objects made of differential material were used (Table 3 and Table 4). The objects were assigned an arbitrary geometric symbol drawn in black ink on a 5 cm × 5 cm piece of paper and assigned an arbitrary sign. Each object and symbol was randomly assigned a nonsense name for the selection-based paradigm, and each object and sign was randomly assigned a nonsense name for the topography-based paradigm (Table 3 and Table 4).

The name of each set was written on a 3 cm $\times$ 5 cm card and randomly drawn out of a box before each trial or probe to determine which set would be trained or tested for the particular trial or probe.

Response Definitions

Topography-based tact. When the participant was shown an object and asked "What is this?" the participant had to perform the right sign within 10 s of its presentation (e.g., when shown the plastic piece and asked "What is this?" the participant touches the chest within 10 s).

Topography-based intraverbal. When the experimenter spoke the word for an object, the participant had to perform the right sign within 10 s of its presentation (e.g., when the experimenter said "Show me pau" the participant touches the chest within 10 s).

Selection-based tact. When the participant was shown an object and asked "What is this?" the participant had to point to the right symbol (from a sample of three) within 10 s of its presentation (e.g., when shown the plastic piece and asked "What is this?" the participant points to the circle symbol within 10 s).

Selection-based intraverbal. When the experimenter said the word for an object the participant had to point at the corresponding symbol (from a sample of three) within 10 s of its presentation (e.g., when the experimenter says "Show me pau" the participant points to the circle symbol within 10 s).

Mand compliance. When the experimenter asked the participant to point to an object, the participant had to point at the right object (from a sample of three) within 10 s of the request (e.g., when the experimenter says "Which one is pau?" the participant points to the plastic piece within 10 s).

Experimental Design

Two relations, tacts and intraverbals, in both the topography- and selection-based paradigm were trained directly for each participant. Mand compliance was tested without direct training of this relation. After the tact and intraverbal relations were mastered, probe trials for mand compliance were interspersed with tact and intraverbal trials. Consequently, every third trial was a test of emergence of mand compliance.

Three participants, Anna, Judas, and Sunniva, received training in topography-based tacts and intraverbals, and were tested for mand compliance with a three stimulus sets (Table 3). Thereafter, selection-based tact and intraverbal were trained, and mand compliance was tested with the other three stimulus sets (Table 3). The other participants, Peter, Mathilde, and Lukas, were first trained in selection-based verbal behavior and then in topography-based verbal behavior (Table 4). Symbols were randomized from one trail to the next trail during the whole experiment.

Dependent Variables

The two paradigms were compared by looking at the number of trials and correct responses before mastery of tacts and intraverbals, respectively. Number of trials before mastery was defined as the number of trials before the mastery criterion was reached for each verbal relation in each phase. The mastery criterion was 9 out of 10 correct and the cut-off criterion was 150 trials. Correct responses before mastery were measured by calculating the percentage. Only trials conducted before the mastery criterion was reached were included. Percent correct responses was calculated for all relations, and the paradigms were compared by tests of mand compliance. The mastery criterion was five correct out of five (i.e., complete mastery).

Procedure

Pretraining. Pretraining for the topography-based tact consisted of the experimenter placing an object before the participant, making the corresponding sign, and saying: "This (showing the object) is equal to this (making the sign)." The participants were requested to imitate the sign. This procedure was then repeated for the other two objects. All relations were demonstrated three times at the beginning of each phase, and repeated once at the beginning of every training session.

Pretraining for the topography-based intraverbal consisted of the experimenter saying the word related to a sign and an object, making the corresponding sign and saying: "(saying the word) is equal to this (making the sign)." Then the procedure described above was followed.

Pretraining for the selection-based tact con-

sisted of the experimenter placing an object before the participant, pointing at the corresponding symbol and saying: "This (showing the object) is equal to this (pointing at the symbol)." Then the procedure described above was followed.

Pretraining for the selection-based intraverbal consisted of the experimenter saying the word related to a symbol and an object, pointing at the corresponding symbol and saying: "(saying the word) is equal to this (pointing at the symbol)." Then the procedure described above was followed.

Tact and intraverbal training. Tact training was initiated after pretraining. In this training sequence, the experimenter pulled a written name out of a box and presented the corresponding object and said: "What is this?" Correct responses were reinforced with praise and tokens (praise and edibles for Judas). When the participant did not respond or responded incorrectly, the correct response was demonstrated together with a verbal prompt: "This (pointing to the object or saying the word) is this (making the sign or pointing to the corresponding symbol)." This sequence was repeated until the mastery criterion (9 out of 10 correct trials) was reached or the cut-off criterion (150 trials) was reached. Then the next phase was introduced. The sequence of the phases was: tact, intraverbal, and test for one paradigm, and tact, intraverbal, and test for the other paradigm.

Intraverbal training was the same as tact training except when pulling the written name out of the box the experimenter asked the participant to make a sign or select a symbol.

Test for mand compliance. When the mastery criterion was reached for the intraverbal relation, eventual emergence of mand compliance, an untrained relation, was tested. Two successive tact or intraverbal trials were conducted prior to every mand compliance trial. They were chosen randomly and conducted in the same way as in the training sessions. In the mand compliance probes, the experimenter asked the participant to point to one of three objects. Correct identification of an object indicated emergence of a new verbal relation. The mastery criterion was five correct out of five probes.

For Sunniva, Mathilde, and Lukas the mand compliance test were conducted without reinforcement. However, the participants were in-

structed before the test session (15 mand compliance probes) that they would receive one NOK (about a dime) for each correct response. For Anna, Judas, and Peter, reinforcement was delivered in the same manner as during the training sessions.

Data Collection and Reliability

For a topography-based response to be scored as correct, the response had to be a close enough approximation to the targeted response, and be distinguishable from the other responses the participant was trained to perform during the experiment. For a selection-based response to be scored as correct, a finger or hand had to touch the right symbol. Only the first symbol touched or the first sign made was scored. The mastery criterion was defined as 9 correct responses in a series of 10 trials. Five training sessions (150 trials) without mastery was used as a cut-off value.

Interrater reliability was calculated by trials scored in agreement divided by trials scored in agreement plus trials scored in disagreement multiplied by one hundred. Fifty-one of the total 65 training sessions were video recorded. The experimenter later watched the videos and scored the sessions once more. For Peter interrater reliability was checked by an observer that was present during all sessions, but it did not show any difference from the sessions with video recording. The interrater reliability showed an average of 97.8%, and ranged between 100% to 90%.

RESULTS

Trials to Reach Criterion and Percent Correct Responding

Four participants needed fewer trials before mastery with the selection-based paradigm than with the topography-based paradigm (Table 5). This was the case for all three participants with autism. In sum, only two participants (Anna and Peter) showed clear distinction with respect to trials to criterion. As shown in Table 5, Anna and Mathilde needed the least number of trials before mastery when training was conducted according to the topography-based paradigm, but only Anna showed a significant difference. Sunniva needed fewer trials before mastery when the selection-based program was applied.

Table 5
Individual performance for topography-based (TB) versus selection-based (SB) verbal behavior in terms of trials to criterion.

Participant	TB Tact	SB Tact	TB Intraverbal	SB Intraverbal
Anna	51 trials	109 trials	63 trials	98 trials
Sunniva	40 trials	30 trials	83 trials	45 trials
Mathilde	28 trials	32 trials	27 trials	48 trials
Judas	150 trials*	123 trials*	150 trials*	142 trials*
Peter	59 trials	28 trials	94 trials*	77 trials
Lukas	30 trials	28 trials	35 trials	27 trials

* Did not meet criterion.

Table 6
Individual performance for topography-based (TB) versus selection-based (SB) verbal behavior in terms of percent correct responding.

Participant	TB Tact	SB Tact	TB Intraverbal	SB Intraverbal
Anna	70%	57%	65%	59%
Sunniva	87%	94%	72%	85%
Mathilde	97%	95%	100%	79%
Judas	2%*	33%*	8%*	36%*
Peter	65%	97%	49%*	59%
Lukas	94%	97%	81%	100%

* Did not meet criterion.

All persons with autism needed fewer trials before mastery with the selection-based paradigm. That was the case for both tacts and intraverbals (Table 5). Judas did not reach criterion for any relations with the topography-based program, but mastered three out of six relations when the stimulus-based paradigm was applied (Table 5). Peter reached criterion for five out of six relations with the topography-based paradigm and for all relations with the selection-based program (Table 5). Lukas did not show any clear differences, but he needed fewest trials to criterion when trained in the selection-based paradigm (Table 5). The data showed consistency with respect to tact versus intraverbal for all six participants. If a participant had the fewest trials to criterion for the topography-based tact relation, he/she also had the fewest trials to criterion for the topography-based intraverbal relation, and the same if it was the selection-based paradigm that was favored. The results showed (Table 5), when trials to reach criterion was used as the measure of accuracy (Table 6), that four participants performed better with the selection-based

paradigm. All three persons with autism were in this group. The other two (Mathilde and Anna) had greater precision in topography-based than in selection-based relations (Table 6). Sunniva performed better with the selection-based program, while Anna and Mathilde showed higher precision with the topography-based rather than with the selection-based program (Table 6). All persons with autism had a higher percentage of correct responses in the selection-based than in the topography-based program. This applied to both tacts and intraverbals (Table 6). However, it is important to mention that selection-based verbal behavior had a 33 percent chance of being correct by guessing, and this could possibly increase the score for selection-based verbal behavior.

Mand Compliance

In the mand compliance test, Anna reached criterion for one out of three topography-based relations and no selection-based relations. Sunniva reached criterion for one topography-

based relation and one selection-based relation, and Mathilde for all relations in the topography-based and for one relation in the selection-based program (Table 7). In the mand compliance test, Anna and Mathilde had higher percentages of correct responses when the training was topography-based, while the results favored selection-based training in Sunniva's case (Figure 1). The design of the mand compliance test gives a 33% chance of being correct by guessing, but this chance is the same for both paradigms.

Among the persons with autism, only Lukas reached the mastery criterion for any relations in the mand compliance test, i.e., three rela-

tions in the selection-based and three relations in the topography-based program (Table 7). As shown in Figure 1, for all persons with autism, the percent correct responses was higher when the training is selection-based. However, the results for Judas and Peter are not very distinct, even from each other or from the 33% chance of being correct.

DISCUSSION

The main research questions for this study were what paradigm (topography-based or selection-based) results in the most rapid acquisition of tacts and intraverbals, is associated

Figure 1. Mand compliance in terms of percent correct response during the tests (topography-based showed as black columns and selection-based showed as gray columns).

Table 7
Individual performance during test for mand compliance after topography-based (TB) and selection-based (SB) training for all participants (mastery criterion 5 out of 5 correct).

Participant	TB	SB
Anna	1 out of 3	0 out of 3
Sunniva	1 out of 3	1 out of 3
Mathilde	3 out of 3	1 out of 3
Judas	0 out of 3	0 out of 3
Peter	0 out of 3	0 out of 3
Lukas	1 out of 3	3 out of 3

with fewest errors, and resulted in the emergence of the highest number of new verbal relations. These data favored selection-based acquisition of verbal behavior for the persons with autism, but Peter accounted for most of the difference in the persons with autism group. The results for the typical children were somewhat inconsistent. Sunniva needed fewer trials before mastery and had a higher percent mastery when trained with the selection-based paradigm. It is interesting to note that Anna did the best in topography-based verbal behavior, and Sunniva did best in selection-based verbal behavior. This might suggest that there are differences between topography-based and selection-based training of verbal behavior within the normal population. The difference in these two typical girls seems to support the view that a person with weak verbal behavior may perform better on topography-based verbal behavior. This is in accord with the findings of Sundberg and Sundberg (1990) and Wraikat, et al. (1991) for persons with mental retardation. But, both Judas and Peter did the best in selection-based verbal behavior, and Judas was the participant with the weakest level of verbal behavior, while Peter was at the same level as Anna. It must be noted that Judas did not reach mastery criterion for any verbal relation during topography-based training. During selection-based training he mastered three out of six relations. This in itself favors selection-based training.

In sum, this study showed that the six verbal individuals performed quite differently from one another, which implies that it is important to do individual analyses, and that re-

sults can not be generalized to a whole population.

The test for mand-compliance did not show results that lead to any clear conclusion. Among the persons with autism, only Lukas reached the mastery criterion for some relations, and this was in favor of selection-based verbal behavior. Thus, in topography-based verbal behavior, even if the score was equal to the 33% chance, the participant was not guessing because the right responses were all the same verbal relation (pau). Both Judas and Peter, the persons with autism and very little or no vocal behavior, were close to the 33% possibility of being correct. Among the typically developing children, only Mathilde showed a clear difference in favor of topography-based verbal behavior. Anna mastered about 50%, and Sunniva about 80% for both the topography-based and selection-based paradigm. The test for mand-compliance did not show results favoring one paradigm over the other. Perhaps it shows that for the emergence of new relations a verbal repertoire is necessary.

There is some evidence suggesting that an existing topography-based verbal behavior can affect the acquisition of a selection-based repertoire (Lowenkron, 1991; Potter, et al., 1997). In the current study, the selection-based symbols had names (square, circle, triangle, and the letters W, X, and U), while the topography-based signs had no known names. This can favor selection-based verbal behavior by making it easier to emit mediating behavior for this paradigm. By observing the participants during training, this was easily observed in the typically developing children with rich levels of verbal behavior, especially Sunniva, who overtly constructed rules and told her self which object belongs to which symbol and word, but this was the case for both topography-based and selection-based verbal behavior. When asked after the training and testing was finished, both Sunniva and Mathilde said they constructed rules to help themselves. This verbal activity was not observed during the training of Lukas, Peter, Judas, or Anna. When asked after the training and testing was finished, Lukas didn't know how he managed the relations, and the other three didn't understand the question. It seems clear that an existing verbal repertoire has an effect on the acquisition of both topography-based and selection-based verbal behavior. For Sunniva and

Mathilde it seems to be the case that topography-based verbal behavior mediates (Potter, et al., 1997) or jointly controls (Lowenkron, 1991) selection-based responding, and perhaps also other topography-based verbal behavior.

According to Shafer (1993), recommendations of selection-based systems for persons with autism are more common than recommendations of topography-based systems. One reason for this can be that many persons with autism are relatively skilled in learning by visual structures and patterns, and often have a long history of receptive discrimination tasks that are very similar to the selection-based verbal behavior tasks (Shafer, 1993). The training history for the participants with autism in the current study is not known, but we can assume that all of them had experience with receptive language training quite similar to the selection-based verbal behavior task. With respect to the history, several independent variables—motivational operations, discriminative stimuli, reinforcers, prompts, etc.—could have influenced the results in this study. For people with autism, it is possible that changes could affect one paradigm more than the other, because of their history with receptive language training, but for the typically developed children it seems unlikely that such differences should affect training based on one paradigm only.

In this study, only three verbal relations were trained or tested in each phase. This increases the probability that random responses could be correct, especially during selection-based training. Sundberg and Sundberg (1990) suggest that a larger number of relations might favor topography-based verbal behavior. However, this needs to be investigated further, particularly for persons with weak verbal repertoires who seem to profit most from selection-based systems. An important difference between topography-based and selection-based training is that comparison stimuli are presented successively and simultaneously, respectively. One possibility is that some persons, and perhaps especially persons with autism, respond better by the simultaneous presentation that characterizes selection-based training (for reviews, see Panyan & Hall, 1978; Schroeder & Baer, 1972).

Many persons with mental retardation acquire verbal skills more easily if topography-based systems are arranged (Sundberg & Sundberg, 1990; Wraikat, et al., 1991). The re-

sults of the present study suggest that this may apply to typical children as well. This indicates important differences between topography-based and selection-based training of verbal behavior. However, the present study seems to show that some persons with weak verbal repertoires profit most from training with selection-based systems. This may imply that the results of other studies (Michael, 1985; Potter & Brown, 1997; Sundberg & Sundberg, 1990; Wraikat, et al., 1991) cannot be generalized to all persons with weak verbal repertoires. If this holds true, it seems important to differentiate teaching recommendations according to verbal level, and recommend picture systems (e.g., the Picture-Exchange Communication System [Bondy & Frost, 1993]), for persons with weak verbal repertoires who seem to profit most from selection-based systems.

However, a combination of topography-based and selection-based systems may also be fruitful (Shafer, 1993). Further research is needed to clarify this. The aim must be to individualize recommendations as much as possible. Wraikat, et al. (1991) suggest that sign language may enhance speech, because words accompanied by signs are more easily understood by the listener. This point of view is also stated by Sundberg (1993), but it also appears that Picture-Exchange Communication Systems have a positive effect on vocal behavior acquisition. The test for mand-compliance may predict the emergence of speech or other behavior. Thus, the results from this current study should not be used as support for this hypothesis, but hopefully be the subject matter for further research on this topic. For persons with autism and other verbally weak persons who can learn to speak with current technology, it may be reasonable to choose a system that can be combined with speech.

SUMMARY

In sum, it appears that this study shows that six verbal individuals performed quite differently from each other. The results for persons with autism seem to contradict previous empirical findings for verbally weak persons (Sundberg & Sundberg, 1990; Wraikat et al., 1991), that favored topography-based verbal behavior. This is in line with large proportions of current practices for persons with autism (Shafer, 1993). The participants in Sundberg

and Sundberg (1990) and Wraikat, et al. (1991) were nonverbal; thus, it is inappropriate to compare the results of the current study to those of the previous studies based on disability. In addition, the decision to use augmentative communication is only relevant to nonverbal or low verbal persons. The results from the current study should not be used as support for decision making. Further studies may answer whether the differences between topography-based and selection-based training of verbal behavior remain unaltered across different training conditions. If selection-based systems were to be used as a form of augmentative communication, it would be necessary to use much more than three stimuli in the array. Would there still be better performance in selection-based verbal behavior for some persons if there are not three, but fifteen stimuli in the array as would occur as one's vocabulary increased?

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