Effects of Hypnosis and Imagery Training on Naming in Aphasia

Cynthia K. Thompson, Howard R. Hall, and Cecile E. Sison
The Pennsylvania State University, University Park, Pennsylvania

Imagery has been discussed within the domain of mediational strategies for language retraining in aphasia by West (1977, 1978), Hoit-Dalgaard, Katz, and Newhoff (1982), and others. This postulate is based on cognitive theories that have indicated a relationship between imagery and language. According to dual coding theory, advanced by Paivio (1971, 1982, 1975, 1983), two symbolic or representational systems are functional in encoding, storing, and processing information. These systems include a verbal system which is instrumental in processing abstract information, and an imagery system which functions in processing concrete information. While this theory is not unopposed (Anderson, 1978; Anderson and Bower, 1980; Pylyshyn, 1972), it has been suggested that some aphasic individuals with an impaired verbal system may not be impaired in imagery. Further, since imagery may be mediated, at least in part, by the nondominant hemisphere (Levy, 1974; Paivio and teLinde, 1982) secondary to the visual and spatial nature of imagery (Springer and Deutsch, 1981), persons with left hemisphere (dominant) brain damage may exhibit residual imaginal functioning.

Experimental research aimed at the effects of imagery training on verbal behavior in aphasic patients is limited. In one series of case studies reported by Hoit-Dalgaard et al. (1982), imagery or visualization training did not improve the verbal behavior of aphasic subjects. This result may have been related to the nature of the independent and dependent variables in that visualization training was focused on one set of objects, while treatment effects were measured using a different set of objects. Therefore, further investigation of the effects of imagery on the verbal behavior of aphasic individuals is needed.

Hypnosis is a process which has been associated with imagery in both clinical and experimental settings. Research has shown that hypnosis and imagery training have effected change in a variety of psychological and medical disorders (Bowers and Kelly, 1981; Hall, 1984; Hall, Longo, and Dixon, 1982). Further, hypnosis, like relaxation, may improve language functioning in aphasic patients (Davidson and Coleman, 1977; McNeil, Prescott and Lemme, 1976).

In the present study, hypnosis and imagery were paired and used to train object imaging. The purpose of this research was to investigate the effects of hypnosis and imagery training on naming behavior in aphasic subjects.

METHOD

Subjects. Three Broca's aphasic individuals, one female and two males, ranging in age from 46 to 59 years participated in the study. All subjects were at least 12 months post onset of a single, left hemisphere cerebrovascular accident (CVA) and exhibited residual right hemiparesis. They were native English speakers, right-handed and had completed high school. All subjects passed an air conduction audiometric screening at 30 dB HL at 500, 1000, and 2000 Hz in at least one ear. All subjects had received prior treatment which did not significantly improve word retrieval behavior.

The diagnosis of Broca's aphasia was based upon the Western Aphasia Battery (Kertesz, 1982), and testing for apraxia of speech showed a moderately severe apractic component for all subjects. Additional pretesting using the experimental stimuli revealed comprehension of all items.

The shortened form of the Betts Questionnaire Upon Mental Imagery (Sheehan, 1967) was administered to estimate the subjects' ability to formulate images. This test is a self-report paper and pencil measure in which subjects are asked to image items such as the sun rising on the horizon and to rate the vividness of their image on a scale from 1-7, with 1 being a very clear image and 7 being no image at all. The overall score on this test reflects the mean of all responses. For the aphasic subjects, administration of the test was modified; the test items were spoken and the subjects responded by pointing to a number (1-7). Results of testing revealed ratings ranging from 1 to 3.

The Stanford Scale for Hypnotic Susceptibility, Form C, a measure of hypnotizability, was also administered. This test consists of a series of items which are administered following hypnotic induction, with credit being given for items performed correctly. Items requiring a verbal response were either modified or deleted. Subjects scored between 3 and 5 on this measure, the maximum score on the modified test being 11. A summary of subject characteristics and test score performance is presented in Table 1.

Table 1. Subject characteristics and performance on the Western Aphasia Battery (WAB), Betts Questionnaire Upon Mental Imagery, and Stanford Scale for Hypnotic Susceptibility.

Sub-				Western Aphasia Battery					Betts	Stanford
ject	Age	Sex	MPO	Fluency	Comp	Rep	Naming	AQ	Imagery	Hypnosis
1	46	F	27	1.0	6.9	3.2	2.9	28	2.4	5
2	55	M	64	2.0	7.9	3.9	3.4	34	1.0	3
3	59	M	12	1.0	6.3	3.0	2.2	26	3.0	4

Experimental Stimuli and Setting. Ten 5X7 inch black and white photographs of concrete objects (nouns consisting of three syllables or less) were used to elicit naming responses. Stimuli were randomly divided into two groups of five items, with one group for training and the other for probing generalization. Baseline, treatment, and generalization probe sessions were conducted in a quiet, dimly lit observable room. The subject was seated in a comfortable reclining chair next to the examiner.

Design. A single subject multiple baseline design across subjects (Hersen and Barlow, 1975; Kazdin, 1982; McReynolds and Kearns, 1983) was used to assess treatment effects.

During the baseline phase, each subject's ability to name pictured objects was examined in a confrontation naming task with the 10 experimental stimuli. Stimuli were individually presented in random order and instructions to "tell me the name of this" were given. A 10-second response interval was provided. Responses were considered correct when the target word was recognizably produced within the allotted time. Articulatory errors which did not influence intelligibility were permitted, but self-corrections were not. Verbal feedback was provided noncontingently. Baseline probes were conducted two times per day, in the morning and in the afternoon, for each subject. Baseline data were collected on 5 separate days for Subject 1, on 10 separate days for Subject 2, and on 15 separate days for Subject 3.

Subjects received treatment, consisting of hypnosis and guided imagery, two mornings per week. At the beginning of each session, hypnosis was induced employing a relaxation technique. Imagery training was then begun in which the five training stimuli were individually presented two times each in random order for a total of 10 trials per session. On each training trial, a stimulus was presented and the subject was instructed to "look carefully at this picture. Notice the shape, size, and texture of this object." The subject was then asked to close his or her eyes and to formulate an image of the object as the examiner guided the imaging process by reading a prepared script describing the physical attributes and function of the designated object. The verbal label was never given.

Following the reading of each script, the subject rated his or her ability to image each object by pointing to a number, 1 to 7, with 1 representing a clear image and 7 representing no image at all. The subject was taken out of hypnosis upon completion of the 10 training trials, by the experimenter counting backward from 10 to 1 and suggesting that the subject wake up at the count of 1.

Immediately after each training session, the ability to name all picture stimuli was assessed. Administration and scoring procedures were identical to those used during baseline. In addition, afternoon probe measures such as those administered during baseline were included to assess the effects of treatment well after the hypnotic state had subsided. Data derived from these confrontation naming probes served as the dependent variable throughout the study.

Reliability. Interobserver reliability was obtained during baseline and experimental phases of the study for all subjects. Thirty-eight of 154 probes (every fourth baseline and treatment probe) were observed and scored by an independent judge. Point-to-point agreement ranged from 94% to 100%, with a mean of 97% for all responses scored.

RESULTS AND CONCLUSIONS

Percent correct naming responses produced during morning and afternoon probes in baseline and treatment phases of the study are depicted in Figures 1, 2, and 3. Vividness of imagery ratings made during treatment sessions are shown in Table 2. Inspection of these data indicate that during baseline, naming performance was at a low and stable level for all subjects across all probes. The data indicated somewhat different performance across subjects and are discussed individually for each subject.

Subject 1. Examination of the data for Subject 1 (Figure 1) indicates that during training there was gradual acquisition of trained items. However, generalization to untrained items was not observed. Naming of training items ranged from 0% to 60% correct during both morning and afternoon probes, but naming of generalization items was consistently at 0% correct. With regard to vividness of imagery ratings, session means ranged from 3 to 5, with an overall mean of 4.4.

Subject 2. The data for Subject 2 (Figure 2) indicated results similar to those noted for Subject 1. Following a stable baseline, acquisition of trained items was seen during both morning and afternoon sessions. Responding ranged from 40% to 80% correct during the morning session and from 20% to 80% in the afternoon across 15 training days. In addition, Subject 2 showed generalization to untrained items, naming these items correctly 40% to 80% of the time in the morning and 20% to 60% of the time in the afternoon. Interestingly, Subject 2 consistently responded with a score of 1 when asked to rate

Table 2. Mean vividness of imagery ratings per treatment session made by Subjects 1, 2, and 3.

Session	Subject 1	Subject 2	Subject 3
6	3.8		
7	4.1		
8	5.0		
9	4.0		
10	4.8		
11	5.0	1.0	
12	4.8	1.0	
13	4.1	1.0	
14	4.1	1.0	
15	4.6	1.0	
16	4.6	1.0	5.8
17	4.5	1.0	5.7
18	5.0	1.0	5.6
19	3.0	1.0	5.2
20	3.9	1.0	6.0
21		1.0	6.2
22		1.0	5.7
23		1.0	5.0
24		1.0	5.8
25		1.0	5.9
26			5.9
27			5.8
29			5.6
30			5.7
31			5.7
32			5.7
Overall Mean	4.4	1.0	5.7

the vividness of his images for each item, indicating that he formulated clear and vivid images of objects during training.

Subject 3. For Subject 3, an acquisition curve was not noted when training was applied. These data (Figure 3) indicated no change in base rate performance for 10 consecutive sessions during morning or afternoon probes, for trained or untrained items. Beginning with the 11th treatment session, verbal labels were provided during imagery training. The examiner labeled each object prior to reading the script for that object. During this portion of intervention, acquisition of training items was evident during posttreatment and afternoon probes, with performance ranging from 20% to 60% accuracy. However, no change in production of untrained items was noted. These data indicated that hypnosis and imagery training was not effective for Subject 3 until the verbal label was provided during treatment. In addition, vividness of imagery ratings indicated that he was unable to formulate clear images of the objects during training, with average daily ratings ranging from 5.6 to 6.2 for each session, with an overall mean of 5.7.

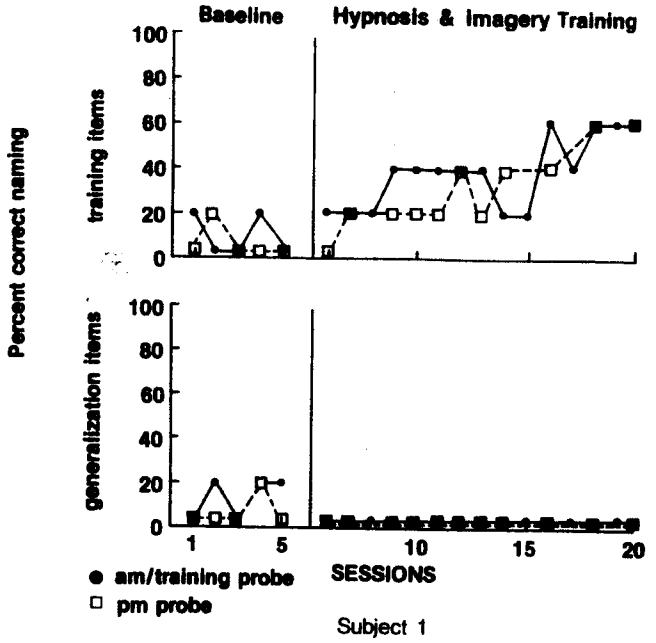

Figure 1. Percent correct production of verbal labels for training and generalization items during morning and afternoon probe sessions for Subject 1.

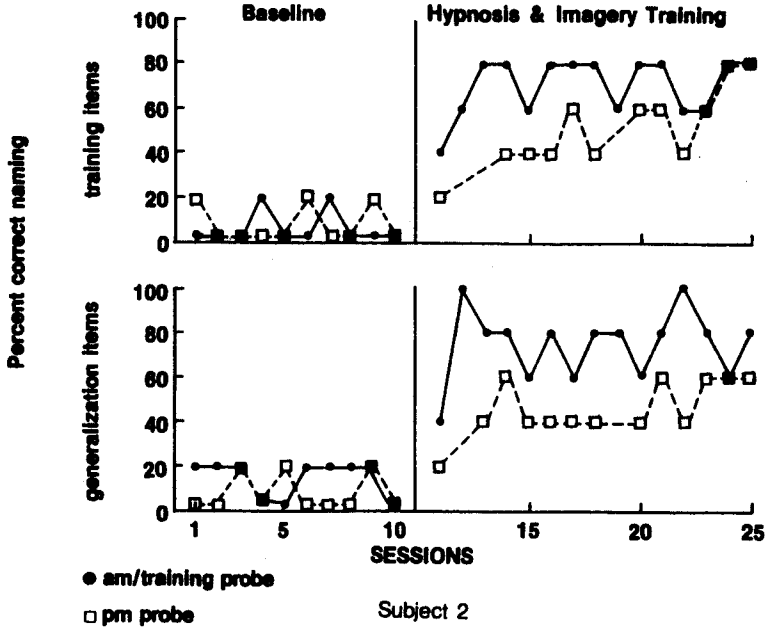

Figure 2. Percent correct production of verbal labels for training and generalization items during morning and afternoon probe sessions for Subject 2.

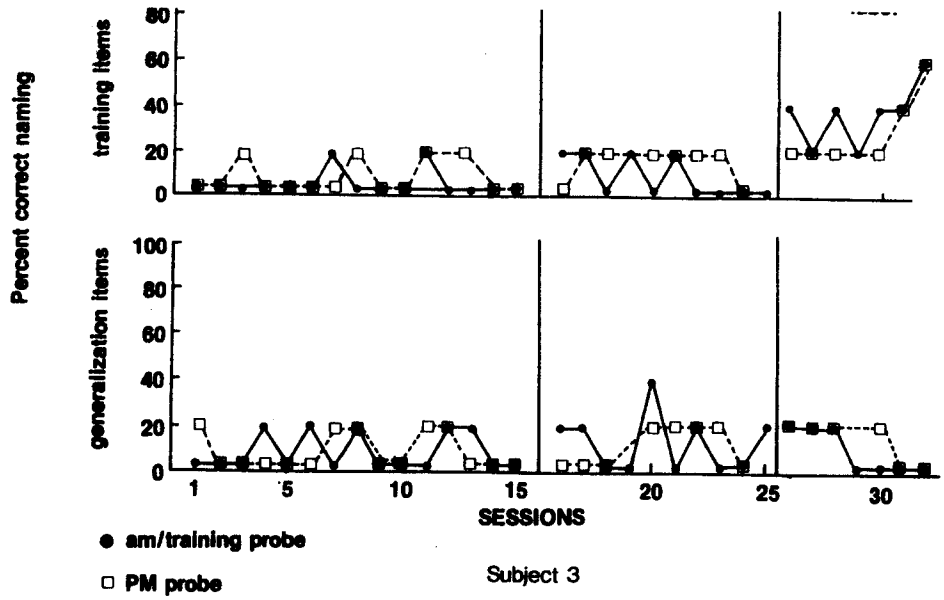

Figure 3. Percent correct production of verbal labels for training and generalization items during morning and afternoon probe sessions for Subject 3.

In summary, results of the study indicated that there was variability in subjects' responsiveness to treatment. Interestingly, subject differences corresponded to vividness of imagery. Subject 2 reported ability to formulate visual images clearly, Subject 1 indicated ability to image objects less well than Subject 2 but better than Subject 3, and Subject 3 reported great difficulty in formulating images of the training items. These data also corresponded to subjects' ability to image as measured by a modified version of the Betts Questionnaire Upon Mental Imagery. Susceptibility to hypnosis as measured by a modified version of the Stanford Scale for Hypnotic Induction did not correspond to treatment effects.

The results of this study suggest that hypnosis and imagery training may be effective for facilitating improved naming performance for some patients with aphasia. These results are not in complete agreement with data reported by Hoit-Dalgaard et al. (1982). Imagery training may be most useful for those patients who report high imageability. Since imageability is reported to be normally distributed within the population (Sheehan, Ashton and White, 1983), all aphasic patients cannot be expected to image well. Thus, aphasic patients who are good imagers may perform better on imagery tasks than poor imagers, as do normals (Katz, 1983; Marks, 1983; Sheehan et al., 1983).

One problem inherent in this form of treatment is related to the nature of imagery as an internal, mentalistic process which can only be assessed by subjects' self-report. In the present study, aside from the subjects' affirmations that they were imaging the objects and following the examiner's guided imagery, it was not possible to determine whether the subjects were, in fact, formulating images or using imagery to facilitate naming during probes. It is possible that the verbal cues used in the guided scripts served to facilitate improved naming.

The present study represents an initial study in this area. Further research is necessary at several levels. Replication of the present results with aphasic patients who are high and low imagers is necessary to clarify the relationship between imageability and responsiveness to treatment. A component analysis of the relative effects of hypnosis and imagery is necessary. Finally,

the effects of hypnosis and imagery training compared with traditional approaches for retraining language in aphasic patients is in need of study.

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DISCUSSION

Q: Did you have some way of asseasing whether these people were truly hypnotized?

A: No, not during each session. However, prior to beginning the study we used a formal assessment procedure, the Stanford Scale for Hypnotic Susceptibility, which, of course, is not standardized on aphasic patients, to determine the extent to which each subject was hypnotizable. A close look at data derived from that test showed that the patients did not perform well. That is, had they been normals, they would have fallen in a range of low hypnotizables. On a daily basis, there was no way of knowing whether the subjects were hypnotized or not. We used a standard procedure which Howard Hall, one of the coauthors, has used successfully in his research, focused mainly on affecting change in cancer patients. The procedure that we used was the same across all treatment sessions, entailing basically progressive muscular relaxation, verbal suggestions for deepening their hypnotic state, and counting from 1-10. The entire procedure usually took about ten minutes to administer. But there was no way to determine whether or not this procedure truly induced hypnosis.

Q: What's your personal feeling as to whether relaxation training might have produced the same result, or just imagery training?

A: My personal feeling, which is not substantiated directly by the data, is that the imagery training alone would have produced the same effects. We're in the process of studying the effects of hypnosis alone and the effects of imagery alone, because in the present data the contribution of each of these variables to the changes that we saw cannot be deduced.

Q: I once took a course in clinical hypnosis. The problem with determining whether or not someone is hypnotized is really a crucial one. The literature uses words like deep trance and could you levitate an arm. A long

time ago we did a biofeedback study related to whether or not we could enhance the abilities of aphasic patients with relaxation. Our results showed that we could change behavior, but that it was not maintained. Did you feel that your patients maintained? Did the patients that improved maintain it over time?

A: Maintain over time which way? We didn't look at maintenance of trained behavior longitudinally following termination of treatment or follow-up, but we did look at maintenance in terms of the afternoon probes. The reason that we administered those probes was to determine the patient's ability to name after the hypnotic state had subsided. We wanted to know if behavior was the same when the patients weren't hypnotized as it was when they were. The data showed no difference. That is, they performed as well or as poorly in the afternoon as they did in the morning when they were hypnotized.

The one thing that we didn't clarify in the paper is how hypnotism was measured. Relaxation is induced and then a series of items are administered such as one where the patient is instructed to "hold your arm out and imagine holding a brick or something heavy." If the subject's arm falls down, then it is assumed that they are hypnotized. The aphasic patients did not respond well on that measure.

Q: I was interested in Subject number 2. You indicated that you had one guess as to why there might have been some generalization in that patient. Any feel for this variability across subjects in terms of generalization?

A: I have thought about that a lot in terms of the differences across these subjects. Of course, we tried to match them very closely. One of the patients (Subject 2) was not as severely involved as the others. This patient is also the one who reported the ability to formulate images, both during pre-experimental testing and during each treatment session. He also reported that he was imaging during probe sessions. While it cannot be certain that he was actually imaging, his report that he was and his responsiveness to treatment make me interested in pursuing this line of research. Generalization is a problem and we didn't expect to see this. Perhaps these results are an example of the use of mediational strategies for facilitation of generalization, as discussed by Stokes and Baer (1977). Although they discussed mediation in terms of using language as a mediational strategy to facilitate generalization of nonlanguage behaviors, imagery (perhaps a nonlanguage behavior) may serve to mediate language responses for patients who reportedly image well. That's why I'm excited about these data. Other studies that I have done have shown that aphasic patients are resistant to response generalization within linguistic classes (for example trained nouns, prepositions, and questions don't generalize to untrained nouns, prepositions or question types).

Q: It sometimes depresses me when I don't see generalization in some patients. Were you elated when you got this effect? Or confused?

A: I was both. In fact, I did not think that this treatment would be effective at all. Howard Hall, who is interested in hypnosis and imagery, became interested in aphasic behavior so we decided to try this and see what would happen. I didn't expect to see any positive effects at all. I expected everybody to respond exactly like Subject 3 did. But it was interesting that both Subjects 1 and 2 changed, and that Subject 2 generalized. I'm uncertain as to why that happened.

A: What you just said is that we usually don't see within-class generalization. I think that we'd probably agree that we've seen within-class but not across-class generalization or stimulus generalization.

A: I think it depends on how you define your classes. Linguistic classes aren't necessarily response classes, at least not according to data that we've both collected.

Q: Would you comment on the magnitude of treatment effects? One of the concerns for clinical significance is obviously the magnitude and stability of treatment effects. You had five items. What about the magnitude of treatment effects?

A: With a limited number of experimental items ,it's difficult to show a large treatment effect. I think that in research of this nature, you're in a catch-22 situation. That is, if you train a large number of responses it's difficult to control for possible differences among those responses. If, for example, there are unknown differences, a subject may learn some items and not others and the treatment may look ineffective when in reality it was, but it may not be equally effective for training all responses. It's easier to see clear treatment effects with a smaller pool of training items ,with each item very closely matched, but then the magnitude of the effect cannot be great. What we're planning on doing is to increase the number and type of training items (e.g., nouns, verbs) to see if these treatment effects hold for other items. In this study we wanted to know what would happen with a small specific set of items so we purposefully set it up this way.

Q: What is your feeling about the role of imagery vs. the role of verbal association? Is it an actual picture or just an effect of the hypnotist providing enriched verbal associations?

A: That's a valid concern, one I also share. We can't know if persons are imaging or doing something inside their head. For that reason I am also uncomfortable with this whole area. I think the important thing is to focus on what we did, on our intervention.

Q: Barlow Hayes, and Nelson (1984) and some other people have suggested combining measures, physiological measures and subjective measures. I think that particularly in something like this, it's probably the way to go.

A: That's an excellent suggestion. I agree that instrumentation would definitely provide another dimension to the data and perhaps provide validity to the self-reports. However, physiological measures are not without problems. For one thing self-report and physiological data don't always agree ,and with measures such as EEG it's not always clear what's being measured. We've thought about measuring alpha waves during baseline tasks, and then during treatment when the subjects are supposedly imaging, and again during afternoon probes during the treatment phase to see if alpha waves noted during treatment match those noted during later probes. That way we would have some idea whether or not the subjects were actually imaging. We've also thought about looking at conjugate eye movements to address hemispheric processing during imaging. There are several exciting possibilities.