Multiple Input Phoneme Therapy: An Approach to Severe Apraxia and Expressive Aphasia

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INTRODUCTION

Stroke patients exhibiting profound expressive aphasia or severe verbal dyspraxia often go untreated by speech and language clinicians. Initially, traditional formal testing proves too difficult for these patients. Using task-oriented informal testing, many still do not present expressive base skills on which to build a therapy program. Therapy approaches tapping left hemisphere strengths are ineffective, as are those involving right hemisphere skills, such as Melodic Intonation Therapy. In many instances the patient is left in a nursing home without a means of communication and without plans for language rehabilitation.

The present approach, Multiple Input Phoneme Therapy, addresses the needs of such individuals. It has significantly improved the verbal output of all patients involved in the program (14), many of whom had been discontinued from therapy because there was "no hope" for rehabilitation. MIPT has been successful with patients presenting no verbal output as well as those many months post onset. Thus, this approach offers hope of rehabilitation for those patients typically excluded from speech and language therapy.

METHOD

The MIPT approach begins with an analysis of the patient's spontaneous output, a record kept by family and the clinician of all verbalizations. If the patient demonstrates repetition or other expressive skills, he is not considered a candidate for this approach.

The program proceeds through a hierarchy of steps stressing phoneme generalization through multiple input of stimuli (Table 1). During the initial phase the patient's utterances are controlled by the clinician, such that output becomes completely nonvolitional. Subsequent steps allow the patient gradually to regain volitional control and with it competency to spontaneously express words and phrases. Later stages of MIPT incorporate traditional therapy techniques into the schema. Final steps stress independent control over verbal expression. Refer to Table 2 for a flow chart of therapy procedures.

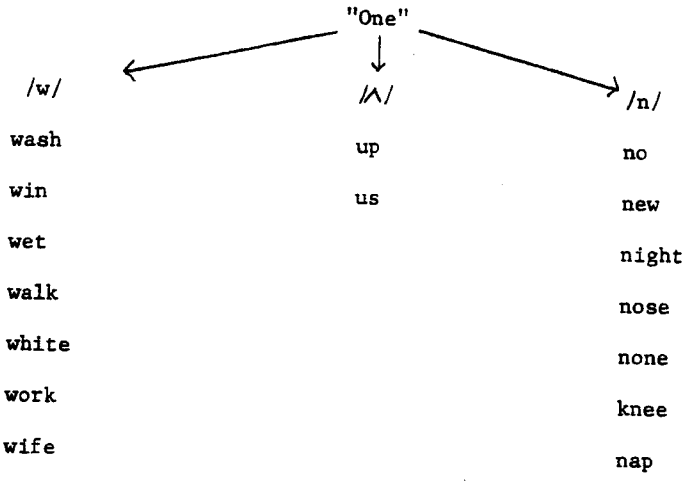

Table 1. Phoneme generalization for Multiple Input Phoneme Therapy.

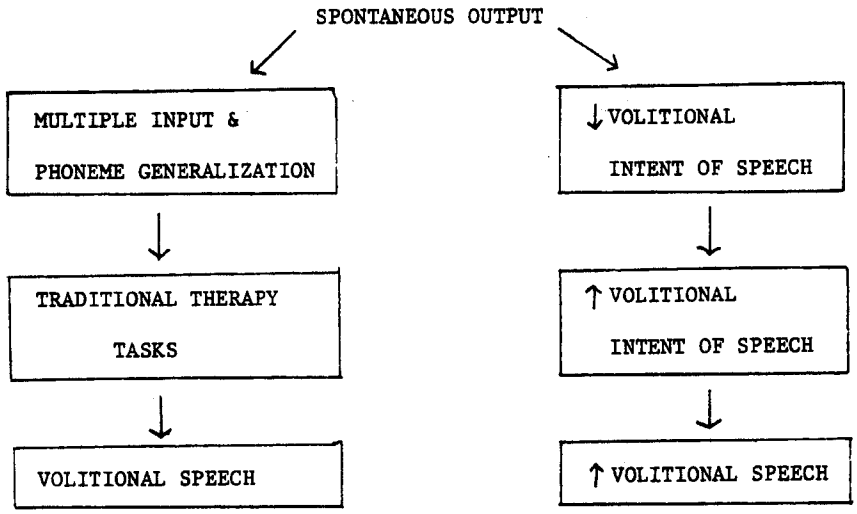

Table 2. Flow chart for Multiple Input Phoneme Therapy.

SUBJECTS

The five subjects differed greatly with regard to site of lesion, months post onset, and range of communicative skills. Refer to Tables 3-4 for relevant descriptive data. Prior to treatment, all subjects except one nonverbal woman demonstrated perseverative stereotypic utterances.

Table 3: Descriptive data for five aphasic subjects.

Name	Age	Months Post Onset	Etiology Site-Lesion	Visual	Rt. Hem. Damage	Rt. Hemiparesis	Language Spoken	Previous Therapy
JP	49	22	cerebral thrombosis of L ventricular striabranch, middle cerebral artery	rt. hemianopsia rt. retinal vein thrombosis	no	yes (right flaccid) ambulatory	French/ English	no
ER	61	9	CVA/left hemisphere	right hemianopsia	no	yes ambulatory	English	2 months
BP	73	2	CVA/L hemisphere post L carotid endarterectomy	right hemianopsia	no	yes non-ambulatory	English	2 months
VG	65	36	CVA/L hemisphere	right hemianopsia	no	yes ambulatory with assist.	French/ English	2 months
AW	69	9	CVA/left occipital putamen	rt. homonymous hemianopsia	? chronic alcoholism	yes non-ambulatory	English	no

Table 4: Initial communication skills for five aphasic subjects.

Subject	Auditory	Visual Reading	Gestural	Writing	Oral-Verbal	Verbal Output	Stim. MIPT
JP	basic environmental comp. points to noun pictures to command (4), 90% follows 2 level commands	matches words-pictures	non-functional; limb apraxia	simple copying	severe oral & verbal apraxia	stereotype utter. F--- Y-- son of a wh--- E chris E cadvaille mon dieux one,one,one there	NO
ER	environmental comp. w/gestures; point to noun pictures (4), 80% can not follow commands	absent-unable to match words-pictures	non-functional; limb apraxia	no; would not attempt copying	severe oral & verbal apraxia	stereotype utter. sh-- ok Chicago	NO
BP	good environmental conversational comp. 7/12 complex BDAE	simple sentence comprehension	functional; no limb apraxia	some spon. numbers, letters, simple single syllable words	slight oral apraxia severe verb. apraxia	stereotype utter. ah, oh	NO
VG	good environmental conversational comp. 7/12 BDAE complex 2 level commands	simple sentence level	some learned gestures mod-marked apraxia	spontaneous name, some numbers	severe oral & verbal apraxia	stereotype utter. wata,wata,wata some highly, distorted counting in rhythm	NO
AW	? basic environmental comprehension no consistent response for simple task	no response	non-functional; could not imitate gestures	could not copy or write spontaneously	severe oral & verbal apraxia	none	NO

#1 JP: Initial verbal output consisted of 6 stereotyped utterances. Following MIPT JP repeated 2-3 word phrases, spontaneously names 50+ noun pictures, and demonstrated intelligible single word and phrase verbal output (to communicate).

#2 ER: Verbal output initially was limited to 3 stereotyped utterances. Following 3 months of therapy, he repeated words and phrases, had begun spontaneous naming, and made basic needs known through single word and phrase output.

#3 BP: Initial output consisted of "oh" and "ah" (verbalizations programmed through earlier traditional therapy) and several intelligible words. After 3 months of MIPT, BP repeated multisyllabic words and spontaneously named single syllable written words and pictures. Oral output was at sentence level.

#4 VG: Initial output consisted of /watawata/. Following 6 months of MIPT, he repeated words and developed cue-naming skills. It is noteworthy that subsequent to MIPT he developed an associated reaction in the right hand.

#5 AW: Verbal expression was not initially demonstrated. Following 9 months of MIPT, she repeated multisyllabic words and phrases and cue named pictures, objects, and written words. Spontaneous output included single familiar words.

RESULTS

All subjects participating in Multiple Input Phoneme Therapy showed significant gains in verbal expression and reduction of stereotype perseverative utterances. Following several months of therapy, most patients demonstrated spontaneous meaningful output at the single word level. To date, all subjects have developed single word and, in many cases, phrase and sentence length spontaneous communication (Table 5).

Table 5: Communication skills post-MIPT for five aphasic subjects.

Name	Auditory Comprehension	Visual/ Reading	Gestural	Writing	Oral/ Verbal	Verbal Output	Length Time
JP	same-slight improvement	same	copy limb gestures some spontaneous	same	mild oral & verbal apraxia	communicate with single word & short phrase output spont. naming of 100 words repeat 2-3 word phrases	1st patient on which approach started; 2 years
ER	same	improved wd-picture & word recognition	same occasional spont. attempts	same	oral-same to slight improvement verbal-improved	spont. phrases & wds. used appropriately 10-20 wds. spont. naming, 3-4 phrase repetition	3 months; patient subsequently expired
BP	same	same	same	improved spont. single word generation	oral-same mild-mod. verbal apraxia	connected speech w/ sentence level apraxia phoneme errors & word finding diff. 70-80% intelligibility, word repetition & cue naming 80%	6 months
VG	same	same	improved	same	improved	single & 2 wd. spont. speech, used 50% of time. 3 wd. phrase repetition. spont. naming 65%	6 months 1 year
AW	environmental comp. requiring yes/no response (head nod)	? word recognition	same	same	oral-same; improved verbal apraxia	wd. & phrase rep. cue naming of obj. pict., written words. spont. output single familiar wds.	9 months

DISCUSSION

The success of MIPT suggests that patients diagnosed by means of traditiona methods as globally aphasic may only lack the means to an appropriate response modality. The subjects discussed in this study presented a wide range of communicative abilities with regard to expression and comprehension of language. However, each emerged from the MIPT program able to spontaneously verbalize meaningful speech.

It is hypothesized that the patient, locked into an automatic expressive loop such as /watawata/, produces this utterance in response to any stimulus requiring a verbal answer. It is necessary to break this pattern and alter it such that the patient is released from the loop and gains volitional control over speech. During MIPT, the clinician initially gains complete control over utterances, such that the loop is allowed to "run" only when specified. The response is generalized to other words and the patient is gradually allowed to assume control.

It is possible that Melodic Intonation Therapy is unsuccessful because the patient is so locked into the left hemisphere loop that he is unable to cross over and utilize otherwise intact right hemisphere skills. In response to MIT stimulation, patients in this study devised their own intonation and used the automatic response rather than the MIT phrase.

Traditional therapy tasks such as picture naming and word reading also are initially unsuccessful because they require left hemisphere analysis, a procedur which triggers the automatic perseverative response. Once the automatic loop is broken through MIPT, these tasks are viable methods of improving verbal expressi It is noteworthy that written words were frequently easier stimuli than pictures for MIPT subjects. This is a similar finding to patient response during use of Voluntary Control of Involuntary Utterances (Helm, Barresi; 1980).

Traditional standardized aphasia diagnostic tests do not predict success with MIPT nor do they differentiate between severe apraxia and severe aphasia. It is necessary to analyze such behaviors as visual attentional skills, oral/facial response to multiple input stimuli, and spontaneous environmental automatic reception in order to select possible candidates for MIPT. Those showing positive response, despite failure in both standardized tests and previous traditional therapy attempts, have potential to develop functional verbal communication via MIPT. Thus, MIPT shows initial promise as a therapy technique for severely, expressively impaired individuals who typically fail or are excluded from traditional therapy approaches.

REFERENCES

Albert, M., Sparks, R.W., Helm, N.A. Melodic Intonation Therapy for Aphasia. Archives of Neurology, 29, 130-131, 1973.

Helm, N.A. and Barresi, B. Voluntary Control of Involuntary Utterances: A Treatment Approach for Severe Aphasia. Clinical Aphasiology: Conference Proceedings, 1980. Minneapolis, MN: BRK Publishers, 1980.

DISCUSSION

Q: What exactly is Multiple Input Phoneme Therapy? What do you do?

A: Essentially, we start with the patient's stereotyped utterance or utterances and input that from 6-10 times, allowing a response only when we request it. Sometimes we have to keep our hand over their mouth, to prevent their

stereotyped loop from "running loose." Once we've gained control over their utterances, we use phoneme generalization and input other words utilizing phonemes from their stereotype utterances.

Q: How do you go from "one, one, one" which was what he automatically said to his "wife" or some of the other words?

A: We just go to another word starting with /w/ and use multiple input in the same manner. It seems that these patients are like a computer that has gone wild. No matter what the stimuli, their perseverative utterance is played like a loop tape and they can't control it. So we take their utterance and control it for them. We push the buttons. With the initial patient, by the time we had gained control over her 6-7 stereotype utterances she was "locked in" to the response mode that I had set up for her and was also programmed for success, which may relate to a paper presented yesterday.

When we multiple input any one of these perseverative utterances, we get them back just the way we demand it. Once JP gained control over f--- y--, I could take another word beginning with /f/ and via multiple input she correctly produced this word, others, and so on until we had generalized to all phonemes in her initial repetoire of stereotype utterance. Subsequently, this generalized to all phonemes.

The patient AW, who was nonverbal, presented a problem similar to a number of nursing home patients we see in that they just don't respond. They sit there and don't say or do anything. No matter what you do the only thing you see may be a slight change in their facial expression or something that flickers in their eyes. You can't give them traditional tests such as the Boston because they would bottom right out on it and that wouldn't provide you with practical information. So we would do things like walk in there on a snowing day and say something like "Gosh I'm really hot, I'm going swimming today" and see if something registers. It is difficult to determine whether they are really severely aphasic or severely apraxic. And what emerged as we went through the steps of our approach was that patients who initially gave us very apraxic responses to the stimuli we were putting in, would become less and less apraxic as we went on. So we're thinking that perhaps we were initially dealing with a person who was just so darn apraxic that he couldn't make any response to stimuli. Also, after we have run these patients through this approach for a few months, we may start to see some real aphasic qualities that we couldn't see before.

Q: First of all, did you mention whether of the five patients you reported on, whether they had any prior treatment?

A: A couple of them did have prior treatment. For instance BP, the one who said "ah, o" had received therapy focusing on imitation of vowels. Apparently, the "ah, o" had been programmed in to her and initially I had a real hard time getting her out of this. As soon as she would look at me, knowing I was a "speech person," she'd open her mouth and was ready to go with "ah, o, ah, o." Several others had had therapy with traditional approaches, especially focusing on auditory activities.

Q: When was treatment initiated relative to the onset of aphasia with these patients?

A: That varied also. One was 2 months, the others 9 months to 3 years. Just recently, a doctor referred a gentleman who was 18 years post onset who's

only utterance is "da bird, da bird, da bird." And we're having success with him on this approach.

Q: For the patient who is 2 months post onset, do you think you might be attributing the results of the end product of your treatment to some spontaneous recovery notions?

A: That's real possible. We could say that, but we could also say that this approach has worked with some other patients who are so far post-onset that this patient fits along with them.

Q: Where do those other words come after "one" that were on that slide? Were they out of the patient's repertoire or out of yours?

A: The only thing in the patient's repertoire was "one," "one, one, one."

Q: So she got that under control then you hook up some more words with it.

A: Yes. And we used words that we thought were very common words.

Q: And vowel words and final consonant words?

A: Yes. We stuck more with the initial phoneme. We found /s/ was a hard phoneme for many of our patients to get and we had to use the phoneme generalization with that at the end. So, for instance, we used a lot of "mess, miss, toss" and then we could put the 's' at the beginning. Once we get rolling, the final consonants will kick in.

Q: One final question on that one who had no output, what was your input?

A: We figured we would have the most success if we started with something that was more automatic. She was the woman who had very little education and was a "backwoods" type. We figured that if we started her with a counting sequence such as "one, two, three, one-two-three" we might get somewhere. So we did that "one, two, one-two-one-two, one, one, one, one, number ---" and she kicked right in on that and then we could go right through the /w/ words.

Q: First of all, when you said if a patient can repeat they're not considered for the approach. I want to know what your criteria is for a patient being able to repeat.

A: Okay, pretty much if we gave them a word from a list of easy monosyllabic words and we ask them to repeat it and they did, we would figure that they wouldn't really benefit from this, because they can already repeat and repetition is the first step in our hierarchy. It's interesting now that we sort of have a feel for the kind of patient who it really works for. We're trying to pull in other patients who are a little bit higher level and we try and plug them into the system farther down and it's working on them too. But we only have a couple of them we've tried it on.

Q: So you're talking about a patient who generally repeats accurately most of the time? A patient who can sometimes repeat but most of the time can't repeat would still be a subject that could be used or a patient who could be used for this technique?

A: Probably. We don't have any patients like that, we have a real problem getting patients up in Maine.

Q: They can repeat sometimes and other times their repetition is impaired?
A: I would say yes, that that person would be a very likely candidate for this, at this point.

Q: When you repeated the multiple phoneme input, how many times did you do it? Did you find an optimal level, ten times for this patient and then have them start it? Did you find that there's a pattern in all these patients?
A: Yes. We could start pretty much with five to ten inputs and if they were real good at that and they picked it up real quickly, we moved down to fewer and fewer. Ultimately what you're looking for is the point where you can move into some other things. But you need to get the control over the repetition before you can do other things.

Q: Did you find a change? Did you have to give 20, sometimes, to a patient?
A: No that many. Probably 10 would be the most. Some people only take 2 or 3 and they break out of their loop real qucikly. It also seems that once we've gained control of the 2nd or 3rd loops, they move more quickly with the words we start inputting and phoneme generalization comes faster after that.

Q: My question evolves around some of your patients who you said were severely impaired in auditory comprehension, particularly patient #5 who you could not even get any test data on, how did you teach them the strategy, I mean, how did you get them to know what you wanted them to do? Particularly, I think one of your strategies is cue naming.
A: Yes, that comes real late. That was the judgment call when we first saw her. With most of our other patients, when we said something very off-the-wall it would register in their eyes as something was wrong there. With her, I plopped myself right down in front of her so that she couldn't move her eyes too much and she would look at me and I would have my face right in front of her and I would multiple input. That's how we got the first word out of her.

Q: But she did not seem to understand?
A: If you would just go and talk to her, she didn't really appear to respond too much.

Q: Well, what I wanted to know is then so you keep repeating. How long did you have to do that before she repeated?
A: Second session she repeated and then she generalized very quickly onto "w" words.

Q: The other thing is did you think her speech or that your patients' speech was functional, I mean you said that they repeat 3 word phrases and I'm wondering could they express spontaneously?
A: I definitely think their speech was functional.

Q: Could you give me some examples of functional?
A: Ok, for instance, the one woman who we were talking about (AW) when her shoe was too tight would point down and say "My foot hurts," but she had to be in pain to do that. One of Elaine's patients can converse with you on almost anything now, full sentences.

Q: Were they gesturing a lot while they were trying to talk?
A: No. All of these patients had very poor gestural skills.