An application of TPR to solve the classic problem of "difficult-to-pronounce" phonemes

(This article is dedicated to graduate students worldwide.)

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From a series of interesting articles about the brain in Discover Magazine, I want to take a close look at a specific research project by James L. McClelland at the Center for Mind, Brain and Computation at Stanford University. He was part of a research team that attempted to correct a classic problem that adult Japanese immigrants experience with English. It is the difficulty hearing the distinction between the phoneme [r] and the phoneme [l].

The McClelland and associates study

The article in Discover magazine promised a solution with this: McClelland, working with Japanese adults newly arrived in the United States, used a computer to exaggerate the phonetic distinction that often confuses Japanese speakers when they hear English. He accentuated certain frequencies to interrupt the assimilation of these words into sounds familiar to the Japanese speakers. Virtually overnight, the adult learners turned into prodigies. After just an hour of training, they were able to make tricky phonetic distinctions that would normally require years of living in an English-speaking environment. (p.14)

Here is what actually happened

When I retrieved the original research article that appeared in the 2002 issue of *Cognitive, Affective & Behavioral Neuroscience*, the writers were McCandliss, Fiea, Protopapas, Conway and McClelland. They wanted to explore a model by Hebb who speculated that children's brains have "plasticity" that tends to fade with age. For example, the belief is that all infants can hear the distinction between the phoneme [r] and the phoneme [l], but as Japanese mature, they only "hear [r] because [l] is not a phoneme in Japanese. Hence, rice and lice

sound like rice and rice, rock and lock sound like rock and rock and road and load sound like road and road. Linguists describe this as being "functionally deaf" for phonemes that are absent from our native language. The linguists, in my opinion, are quite correct, at least for the left hemisphere of the brain.

The problem with the research

The problem with this research project is that the researchers were "functionally blind" to a critical filter that determines the outcome of any psychological or linguistic research study. That filter is whether the study is playing to the right or the left hemisphere of the brain. In this case, it was playing to the left side of the brain because subjects sat in front of a computer screen, listened to a minimal pair such as rock and lock and pressed a key for "same" or "different." That was one test. Another test was to listen to each word and press a key for [r] if the word started with an [r] or [l] if the word started with an [l].

The results

Subjects experienced more than 100 trials with a single minimal pair of "rock lock" under various conditions. To explore transfer-of-learning they used a different pair, which was "road load". The total learning time was about one hour. The results showed some gain when a correct identification was rewarded with green check marks.

My interpretation

A hundred trials is an enormous amount of work for a small return of discriminating a single minimal pair. In my opinion, the reason for this is: The study was playing to half of the brain and in this case the wrong half. The left side is the talking side of the brain and because it is hypercritical, it tends to resist change. Anything different from the familiar is perceived as change. For example, the incumbent for any political office in the USA has a 95 percent change of being re-elected. We prefer the familiar to the unfamiliar, unless the familiar has been marred, for instance with a scandal.

The left brain evaluates everything coming in to be sure it is safe. The best way to be safe and secure is to continue doing what we have always done. Novelty is a problem for the left brain. Anything different could be dangerous. Why take a chance? Stick with the "tried and the true." A classic example of the left brain is a sign above the light switch in the turn-of-the century wing of the old Coronado Hotel in San Diego. The sign reads: "This switch turns on the electric lights. They will not harm you." It took many years before people trusted that electric lights were harmless.

An alternate way to solve the problem

Next, I want to suggest an alternate approach that I believe is more powerful than the passive sit-in-front-of-a-computer screen, listening to minimal pairs such as "rake" and "lake" or "rocket" and "locket" and typing in a response on the keyboard. This is a brainswitch from the critical talking left brain to the mute, but non-evaluative right brain.

I want to urge candidates for a master's or doctoral degree to seriously consider this project for their thesis, and I guarantee that if the project is completed with meticulous attention to detail, it will be welcomed and published by *The Modern Language Journal*, *The International Review of Applied Linguistics*, *Foreign Language Annals*, *Philologia*, or the *Journal of Applied Psychology*.

Apply a brainswitch with James Asher's Total Physical Response, known worldwide as TPR

Plan A is to replicate the study by McClelland and associates except instead of sitting in front of a computer screen, gather the subjects in a classroom and invite two volunteer Japanese speakers to sit on either side of you at the front of the room. Here is the pattern:

You say: "Stand" (and gesture to the people on either side of you to stand. Note: if they try to repeat your direction, signal silence by placing your finger on your lips.)

Next: "Sit" (you sit and gesture your subjects to sit).

Again: "Stand."

Then: "Sit."

Continue with: "Stand" (you remain seated and gesture the individuals to stand).

Then you say: "Sit" (and gesture for them to sit).

Next you say: "Stand" (and stand up with them).

Then: "Walk" (and you walk with them).

Now: "Stop" (and you stop with them).

Next: "Walk" (but you remain where you are and let them walk by themselves).

You say: "Stop."

Now you join them and say, "Turn" while you turn with them and "Turn" again and once more "Turn."

While you remain where you are, say, "Walk. Stop. Walk. Stop. Turn. Sit."

Now join them at their seats and invite one of the individuals to perform alone. For example, here is what you say to Emi:

To Emi: "Stand. Walk. Stop. Walk. Stop. Turn. Turn. Turn. Walk. Stop. Sit."

To Shirou: (Vary the sequence slightly with:) "Stand. Sit. Stand. Walk. Stop. Turn. Walk. Stop. Turn. Sit." (Continually encourage the onlookers to applaud.)

To observe how simple and graceful this can be, please see my personal demonstration in the DVD from the Northeastern Conference of FL/ESL Instructors at www.tpr-world.com.

Now act with them to: "Stand. Point to the chair. Point to the table. Point to the door."

Now individuals act alone.

To Shirou: "Point to the chair. Walk to the chair."

To Emi: "Point to the table. Walk to the table."

To Shirou: "Point to the door. Walk to the door. Touch the door." (You act with him because he has never heard "touch" before.)

To Emi: "Walk to the table. Touch the table."

To Shirou: "Walk to the chair. Touch the chair. Sit on the chair."

To Emi: "Walk to the table. Touch the table. Sit on the table."

Next, you demonstrate with the subjects. "Stand. Point to the rocket. Point to the locket."

Now the individuals act alone. For example, here is what you say to Emi:

To Emi: "Walk to the rocket. Pick up the rocket. Point to the locket. Pick up the locket. Put the rocket on the table. Put the locket on the chair."

Next: "Point to the 'rake.' Point to the 'lake'." (You point with them.)

Now the subjects act alone when given a direction. For example, here is what you say to Shirou and to Emi:

To Shirou: "Point to the rake. Point to the lake."

To Emi: "Point to the lake. Point to the rake."

To Emi: "Point to the lake. Walk to the lake. Pick up the lake."

Tp Shirou: "Point to the rake. Walk to the rake. Do not pick up the rake."

To Emi: "Pick up the rake and give the lake to Shirou."

To Shirou: "Put the lake on the chair."

To Emi: "Put the rake on the table."

As you continue with minimal pairs, I believe the tasks will become easier and easier for the subjects. By "easy," I mean they will respond more rapidly to the [r] and [l] phonemic distinctions. The reason is this: The right hemisphere, which is the essence of TPR, is non-critical. Anything is possible. For example, it does not know the difference between English and Japanese, Spanish or Russian, Chinese or German. (See my DVD video demonstration showing that subjects on the right side of their brain do not know the difference between Arabic and Spanish.)

Testing to determine whether my hypothesis is true would be the purpose of your thesis. Here is the test I recommend:

The ideal location for the study

Perhaps you have access to Japanese immigrants you can recruit for the study. An ideal location would be students in Japan who are trying to acquire English.

How to test the subjects before training

I recommend you start with a Pretest A like this:

From the list below, subjects listen to each pair and make a simple decision of "Same" or "Different." For example, are Rock and Lock the same word spoken twice or two different words. Of course, the list should include in random order rock lock, rock rock, lock lock, road load, road road, load load, etc.

The Pretest B works like this:

From the list below, subjects hear each word individually and mark [r] if it begins with an "r" or [l] if the word begins with an "l."

Now subjects get the TPR training experience I illustrated

From the list below, select half of the list for the training and the remaining items on the list to measure transfer-of-learning.

How to test subjects after training

Administer Pretest A and Pretest B again at the climax of their TPR training.

Analysis of the data

Apply a simple t-test for correlated groups for

1. Pretest A compared with post-test A for

    a. Items used in training

    b. Items not used in training to measure transfer-of-learning. (This answers the important question: Does the training generalize to other minimal pairs?)

2. Pretest B compared with post-test B for

    a. Items used in training

    b. Items not used in training to measure transfer-of-learning. (This answers the important question: Does the training generalize to other minimal pairs?)

3. For t-tests that are "significant", follow-up with effect size.

Minimal pairs you can use			
Rain, Lane	Rap, Lap	Raw, Law	Ray, Lay
Read, Lead	Red, Lead	Rent, Lent	Rhyme, Lime
Rice, Lice	Right, Light	Rid, Lid	Rip, Lip
River, Liver	Road, Load	Rock, Lock	Rust, Lust

If my hypothesis is correct with Japanese learning English, then follow-up with "difficult-to-pronounce" phonemes for Chinese learning English and Hispanics learning English. TPR could be an exciting solution to a vexing pronunciation problem that is stressful for adult immigrants trying to make a successful transition to a new country.

REFERENCES

McCandliss, Bruce D., Fiez, J. A., Protopapas, A., Conway, M., and McClelland, J. L. (2002) Success and failure in teaching the [r]-[l] contrast to Japanese adults: Tests of a Hebbian model of plasticity and stabilization in spoken language perception. *Cognitive, Affective & Behavioral Neuroscience, 2:2* 89-108. A PDF version of this article at of this article is can be viewed at http://www.lrdc.pitt.edu/fiez/publications/McCandlissEtAl2002.pdf.

To learn more about TPR, order the following Asher books online, at www.tpr-world.com.

Asher, James J., *Learning Another Language Through Actions* (6th edition). Los Gatos, CA., Sky Oaks Productions, Inc.

Asher, James J., *Brainswitching: Learning on the right side of the brain*. Los Gatos, CA., Sky Oaks Productions, Inc.

Asher, James J., *The Super School: Teaching on the right side of the brain.* Los Gatos, CA., Sky Oaks Productions, Inc.

Asher, James J., *The Weird and Wonderful World of Mathematical Mysteries: Conversations with famous scientists and mathematicians.* Los Gatos, CA., Sky Oaks Productions, Inc.

Asher, James J*., A Simplified Guide to Statistics for Non-Mathematicians.* Los Gatos, CA., Sky Oaks Productions, Inc.

Asher, James J., *Prize-winning TPR Research*. Los Gatos, CA., Sky Oaks Productions, Inc.

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