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Examining the impact of teaching Cantonese speakers to enhance the use of their abdominal region in pronouncing English consonant clusters

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In teaching L2 English learners to pronounce segmental sounds, anatomically the emphasis has been almost exclusively on improving their articulatory functions, while neglecting another area integral to producing many sounds, that of the abdominal region. In the absence of research investigating the efficacy of teaching learners to enhance the use of their abdomen, this study employed a quasi-experimental design to do so, examining L1 Cantonese learners of English as its participants. The experimental and control groups were taught sounds which are reliant on abdominal effort, and which commonly cause difficulties for L1 Cantonese learners. These sounds were selected long vowels, voiced fricative consonants, and consonant clusters. The study targeted consonant clusters, but it was reasoned that teaching the technique for a range of problematic sounds would help to enhance pronunciation of the consonant clusters, especially when they occurred in words also containing long vowels and voiced fricatives. The experimental group was taught the relevant articulatory functions and abdominal enhancement techniques, while the control group was taught the same way but minus the abdominal techniques. A pre-test and post-test reading aloud task indicated that the experimental group benefitted from the instruction to a slightly greater degree than the control group in developing their pronunciation of the consonant clusters.

Key words: English pronunciation; Cantonese learners of English; pronunciation instruction; abdominal enhancement techniques

Introduction

In teaching L2 English learners to pronounce segmental (e.g., vowel/diphthong and consonant) sounds, there is invariably a focus by instructors, and the teaching materials they use, on improving the learners' articulatory functions, particularly those involving the mouth, tongue and lips (Celce-Murcia, Brinton, & Goodwin, 1996, 2010; Kelly, 2000; Nation & Newton, 2009; Richards, 2015). However, only very occasionally is there mention of the role also played by the abdomen (Messum, 2009), and the need to enhance use of this region of the body to intelligibly produce many of the sounds (Yeldham, 2000). For example, to produce some of the longer vowel/diphthong sounds (e.g., /i:/, /u:/, /eɪ/), requires a measured contraction of the upper abdomen region. This moves the diaphragm upwards in promoting a steady flow of air to maintain the length of the sound. Many voiced consonants, especially voiced fricatives such as /z/, /ð/, /v/ and /ʒ/, also require a sharp burst of muscular effort from the abdomen. This effort pushes the diaphragm upwards, which is needed to drive vibration of the larynx and to expel air from the mouth, with both these processes required to produce the voiced sound (Underhill, 2005).

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Producing many of these sounds is often problematic for L1 Cantonese learners of English, whose more syllable-timed L1 creates a challenge for them to pronounce the longer vowel sounds of English (Chan & Li, 2000; Eastman, 1993). Cantonese also lacks voiced fricatives (Chan & Li, 2000), so these sounds, too, are often a problem. Also challenging are consonant clusters (Chan & Li, 2000; Chen, 2015; Hansen Edwards, 2016; Setter, 2008), especially when they are situated in words that include these vowel and consonant sounds.

Cantonese only allows single consonants, while English allows up to three before a vowel and up to four following a vowel (see, for example, *strengths*; Chen & Li, 2000), and research shows that Cantonese speakers often tend to simplify English consonant clusters by dropping one or more of the consonants (Chen, 2015; Deterding, Wong, & Kirkpatrick, 2008; Hansen Edwards, 2016; Setter, 2008), a simplification which can affect intelligibility (Jenkins, 2000). Consequently, one part of the challenge for L1 Cantonese speakers in pronouncing English consonant clusters lies in improving their articulatory functions. However, many such learners also often require a lengthy air flow from the expiratory organs to help pronounce these clusters. This is especially so for words with multiple clusters, like *prevent*, or words containing a cluster after a lengthy vowel/diphthong sound (such as *Knowles*, the name of a building at the university where this present study was conducted); both word-types require abdominal support by the learner to say them in their entirety. Also presenting a challenge are clusters that incorporate voiced consonants, especially if those include voiced fricatives (e.g., the aforementioned words, plus others such as *clothes* and *thousands*).

Currently, hardly anything is known of the advantages, or otherwise, of teaching L2 learners to enhance the use of their abdomens to help their pronunciation. This study, therefore, set out to examine the effect of teaching Cantonese learners of English to do this, with the goal of helping them to improve their production of consonant clusters. The main question guiding the research was:

1. Does teaching abdominal enhancement improve Cantonese L1 speakers' pronunciation of English consonant clusters?

Also, because it seems apparent that clusters containing voiced consonants tend to require more abdominal effort to produce than unvoiced clusters, the following additional question was also investigated:

2. Does teaching abdominal enhancement have greater impact on the speakers' pronunciation of clusters containing voiced consonants than clusters only containing unvoiced consonants?

Method

A quasi experimental design was adopted for the research. The study involved learners from four classes, two of which comprised the experimental group, with the other two comprising the control group. The researcher taught all four classes to ensure the instruction adhered to the aims of the research. The research took place during the first two-and-a-half-hour session with each class during a voluntary one-week summer pronunciation course for learners at a top-ranked university in Hong Kong. Near the beginning of this session, the learners took a pre-test which was repeated as a post-test at the end of the session. In this test, the learners read two passages that included a number

of words containing various consonant clusters (Appendix), which was audio-recorded by each speaker on a computer.

After the pre-test, the classes were taught segmental pronunciation sounds. The experimental group and the control group received the same content, used the same learning tasks and were given the same articulatory advice on how to pronounce the sounds. The only difference was that instruction for the experimental group included how to enhance the use of their abdominal regions when producing the sounds. The instruction between pre- and post-tests only lasted for about 90 minutes. This is a relatively short time, but past experience in teaching the abdominal enhancement techniques suggests that the pronunciation of the experimental group might improve quite rapidly once they were taught these techniques.

The participants

Each of the four classes was composed almost entirely of L1 Cantonese and Mandarin speakers. The study concentrated on the Cantonese speakers because observation during teaching indicates they tend to have slightly greater difficulties pronouncing English consonant clusters than Mandarin speakers. Of the 24 learners in the two experimental classes, 11 were L1 Cantonese speakers, and of the 20 learners in the two control group classes, 10 were L1 Cantonese speakers. Most of the participants in the study were postgraduate students with a small number of third- and fourth-year undergraduates. As the university is English medium, the participants were generally quite proficient in their spoken English. However, pronunciation was a problem for many which was why they attended this voluntary pronunciation summer course.

Instruction of the sounds

The learners were taught various sounds in the course, including the long vowel/diphthongs /i:/, /eɪ/ and /u:/ and voiced fricative consonants /ð/, /z/, /v/ and /ʒ/.[1] During this grounding in these sounds that require abdominal support, the learners were also required to recite sentences featuring words that contained these, along with various consonant clusters. Some of these clusters (shown here with examples of some of the words in which they were embedded) were unvoiced: in syllable-initial position (*spoon, Spain*), medial position (*festival*), and final position (*that's, thanks*). Others were voiced or partly voiced: in initial position (*Brazil, pleasure*), and final position (*New Zealand, things*). Other words, such as *Switzerland*, contained clusters in different positions.

After this more general introduction to some of the main sounds that require abdominal support, teaching was focused more specifically on the pronunciation of consonant clusters, especially those known to sometimes cause difficulties for Cantonese learners, such as syllable-initial /pl/ and /pr/ and syllable-final clusters ending with /t/ and /d/ (Chan & Li, 2000; Hansen Edwards, 2016). Particular attention was paid to words containing multiple clusters, highlighting items like *protect* and *problem*, and also words such as *clothes* which had clusters situated after long vowel sounds. Speaking such words in their entirety can be challenging and commonly requires strong abdominal effort.

The learners were taught each of the sounds (vowels, consonants and clusters) by showing them, and getting them to practice, the articulatory positioning needed to say the sound, both in different words and word positions and, where possible, in comparison to its minimal pair counterpart. The experimental group were, additionally, introduced to the mechanics involved in enhancing the use of their abdomen to help in saying the sound (as described earlier in this article). The teacher/researcher specifically explained to this

experimental group the required abdominal movements, while simultaneously demonstrating these with a hand placed on his abdomen to highlight the various movements which the learners then practiced themselves. The learners from both instruction groups also practiced saying each sound in a number of sentences containing various words with the embedded sound. A sample of these words is already listed above, and an example of a sentence used to specifically practice consonant clusters is: "The walls provide good protection in the Knowles building".

The reading test, and how it was marked

The reading test had been piloted with other learners, and contained an array of words/sounds likely to challenge L1 Cantonese speakers, including the consonant clusters and the words in which they were embedded. There were 43 consonant clusters in the test; 12 of these were unvoiced, 17 were voiced, and 14 included a combination of voiced and unvoiced consonants. Many of the clusters targeted in the test had been highlighted in the classroom instruction: in particular, syllable-initial /pl/ and /pr/, in words included in the test such as *protect, prevents, plan* and *pleasure*; and the /t/ and /d/ sounds in syllable-final clusters, in words in the test such as *find, ground, thousands* and *protect.* Various other cluster sounds in the test had also been in words which had been recited in the classroom (/br/ – *Brazil* in the classroom, *brother* in the test; /lz/ – *walls* in the classroom, *animals* in the test; and so on). However, some of the clusters in the test had not been specifically practiced in the classroom, although already having learned the various other vowels, consonants and clusters in the course using abdominal support, would probably facilitate the learners' ability to pronounce many of these untaught clusters.

To guide marking of the tests, these consonant clusters were highlighted on a transcript of the passages, with each of the three different cluster categories of unvoiced, voiced and mixed, shown in a different colour. Points were assigned during the marking in the following way: (1) standard pronunciation (1 point), (2) slight deviation (i.e., from standard pronunciation; half a point), and (3) substantial deviation (0 points). Because of the relatively small sample sizes of each cluster category, they were not broken down further based on other criteria that are sometimes used by researchers, such as the position of the sound in a syllable or word. It should be noted, though, that during marking, there were no obvious trends in learner response when taking such criteria into account.

To maintain reliability throughout the marking process, marking of the specific aspects of each test paper was regularly checked against those corresponding aspects of previously marked tests. Later, after all of the learners' tests had been marked, four were remarked two months later and this produced an intra-rater reliability coefficient of 88%.

Data analysis

The pre-test data was normally distributed (based on Shapiro-Wilk test scores) and also demonstrated homogeneity of variance (based on Levene's test scores) for three of the four independent variables in the study: those of all clusters combined, unvoiced clusters and voiced clusters. Thus, parametric inferential tests were used to examine these sets of data.

For the remaining independent variable, mixed clusters, the pre-test data was normally distributed for the control group but not for the experimental group. Consequently, the experimental group's pre-test scores were fractionally ranked to normalize that set of data (Templeton, 2011). After this step, the pre-test data for the

mixed clusters also demonstrated homogeneity of variance which enabled the use of parametric inferential tests with this set of data.

In terms of the inferential test used for Research Question 1, which examined the impact of abdominal enhancement on all clusters combined, an ANCOVA was employed to compare the post-test score for the experimental group against that of the control group, with any difference in pre-test scores adjusted as a covariate. Within-subject effect sizes[2], shown through Cohen's *d*, were also calculated for these two independent groups using an effect size calculator at https://www.ai-therapy.com/psychology-statistics/effect-size-calculator. When Cohen's $d = 1.0$, this indicates one standard deviation difference between the two means being compared, and a rule of thumb for the effect size is that $d = 0.2$ or lower is considered a small effect, $d = 0.5$ a medium effect, and $d = 0.8$ or greater a large effect (Cohen, 1988).

Research Question 2 compared the two learner groups' performance for unvoiced clusters versus clusters which included voiced consonants (encompassing both voiced clusters and mixed clusters). To examine this two-way interaction between learner group and cluster type, the two-way ANCOVA test was used, which adjusted for any pre-test difference in mean scores. Specifically, three two-way ANCOVAs were used to examine learner performance for the following three cluster type comparisons: (1) unvoiced clusters and voiced clusters; (2) unvoiced clusters and mixed clusters; and (3) unvoiced clusters and a combination of the voiced and mixed clusters.

Results

Table 1 shows the descriptive statistics for the two instruction groups for each of the cluster types. It can be seen from the mean scores that the experimental group slightly outscored the control group in each of the consonant cluster categories. Most importantly here, the experimental group (pre-test $M = 69.60$, $SD = 20.47$; post-test $M = 71.43$, $SD = 22.50$) outscored the control group (pre-test $M = 75.63$, $SD = 12.15$; post-test $M = 74.55$, $SD = 14.09$) for all clusters combined. The results of the inferential tests are reported for each of the two research questions below.

Table 1. Descriptive statistics for the two instruction groups

Cluster category	*N*	Experimental Group		Control Group	
		Pre-test M (SD)	Post-test M (SD)	Pre-test M (SD)	Post-test M (SD)
All clusters	43	69.60 (20.47)	71.43 (22.50)	75.63 (12.15)	74.55 (14.09)
Unvoiced	12	60.80 (26.73)	64.20 (22.73)	71.88 (15.13)	71.67 (19.65)
Voiced	17	76.47 (17.35)	77.27 (19.65)	80.59 (11.72)	79.41 (11.46)
Mixed	14	69.16 (23.54)	70.78 (25.34)	73.29 (16.68)	71.86 (21.33)

Research question 1: Does teaching abdominal enhancement improve Cantonese L1 speakers' pronunciation of English consonant clusters?

The ANCOVA results for all clusters combined show there was no significant difference in the post-test mean scores [$F(1, 18) = 3.54$; $p = .76$] between the experimental and control groups, while adjusting for the pre-test mean scores. However, based on the within-subject effect sizes calculated through Cohen's *d*, there is a difference in favour

of the experimental group (d = 0.09) over the control group (d = -0.09). This effect size differential of d = 0.18 indicates a small difference in effect size between the two groups.[3]

This result showing that the effect size differential between the two groups favours the experimental group, suggests that the instruction in abdominal enhancement gave the learners a minor advantage in improving their pronunciation of consonant clusters compared with when such instruction was absent from the pronunciation course.

Research question 2: Does teaching abdominal enhancement have greater impact on the speakers' pronunciation of clusters containing voiced consonants than clusters only containing unvoiced consonants?

The various applications of the two-way ANCOVA tests also failed to find an interaction effect between the instruction groups and cluster types, in examining the comparisons between: (1) the unvoiced clusters and the voiced clusters [F (1, 17) = 1.12, p = .31]; (2) the unvoiced clusters and the mixed clusters [F (1, 16) = 1.02, p = .33]; and (3) the unvoiced clusters and a combined value for voiced and mixed clusters [F (1, 16) = 0.90, p = .36].[4]

Consequently, these results from the two-way ANCOVAs indicate that the instruction in abdominal enhancement, compared with the absence of such instruction, did not lead to greater learner improvement in pronouncing clusters containing voiced consonants over clusters containing only unvoiced consonants.

Discussion and conclusion

The main finding of the study is that the implementation of abdominal enhancement techniques benefitted the learners to a small degree in helping to improve their pronunciation of consonant clusters. The study was very small-scale, and very much a preliminary investigation into the effectiveness of teaching these abdominal enhancement techniques. The learner sample sizes were small. Also, the instruction was not conducted for a lengthy time although this was not considered a major drawback as past experience in similar classroom contexts suggests that teaching the abdominal enhancement techniques can lead to rapid pronunciation improvement in a relatively short time. That said, it seems worthwhile in the future to examine the usefulness of teaching these techniques with a larger sample of participants and with a longer instruction period. These adjustments would add rigor to the study, and enhance the generalizability of its findings.

Further research examining the impact of the techniques on learners' pronunciation of consonant clusters seems a worthy goal given that Cantonese learners tend to have problems with them (Hansen Edwards, 2016; Setter, 2008). This difficulty was further attested to in the current study by the learners' relatively low pre-test scores for the clusters (around 70%). Further research investigating the effect of abdominal enhancement techniques on consonant clusters also seems warranted as Jenkins (2000) has highlighted consonant clusters among her core sounds that L2 users would need for mutual intelligibility in using English as a lingua franca. Jenkins highlights word-initial clusters in particular but also cautions about the impediments to communication of the deletion of individual consonants from clusters in general.

One aspect of the current study which might be seen as a limitation is that it did not systematically target particular consonant clusters (for example, those involving syllable final /t/ and /d/) to the exclusion of others, in both the instruction and in the assessment. However, it was reasoned that teaching a number of sounds specifically requiring strong use of the abdomen (long vowel/diphthongs, voiced fricative consonants, and consonant

clusters in words containing such sounds) might have an impact on consonant clusters, in general. It was for this reason that the adopted approach was used for the instruction and assessment undertaken in the study. That said, perhaps future studies could research the effect of teaching abdominal enhancement in a more systematic way.

In future research, it would also be useful to see whether any gains obtained from the techniques endure beyond the instruction period, through use of a delayed post-test. For adult learners, in particular, maintaining a new set of muscular mechanics might be a major challenge. Another interesting question might be whether instruction in abdominal enhancement can bring about pronunciation improvements as demonstrated through more authentic speaking tasks than those used in the current study. This study used a reading task as its assessment tool, which allowed precise diagnosis across the different learners and between their pre- to post-test scores. A less-structured speaking task, though, would have examined their pronunciation in a more natural language use situation. Perhaps a story-telling task guided by cartoon pictures would be suitable here for future research, although there would probably be some trade-off in terms of being less able to precisely target the desired words and sounds.

In summary, this study has signalled, in very modest terms, the likely importance of pronunciation instruction incorporating abdominal enhancement techniques into segmental pronunciation instruction. These techniques may provide L2 speakers with the power to better produce words containing various sounds, including consonant clusters, and the techniques may have the potential to improve English pronunciation instruction in future.

Notes

1. A report on the development of the experimental group on these vowel/diphthong sounds and voiced fricatives relative to the control group is currently in preparation. The current paper focuses solely on the consonant clusters.
2. These with-in subject effect sizes for each group were calculated when examining the pre-test to post-test mean score differential for each of the groups.
3. Note that the factorial effect size indicated on SPSS through partial eta squared, showed a similar effect to *d* at $\eta_p^2 = .16$. This partial eta squared value was considered less important to report than the Cohen's *d*, for which the magnitude of the effect (small, medium, large) is more clearly defined in the literature.
4. Here, the factorial effect size was quite minimal for each of these three calculations at, respectively: $\eta_p^2 = .06$, $\eta_p^2 = .06$, and $\eta_p^2 = .05$.

About the author

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References

Celce-Murcia, M., Brinton, D. M., & Goodwin, J. M. (1996). *Teaching pronunciation : a reference for teachers of English to speakers of other languages*. Cambridge: Cambridge University Press.

Celce-Murcia, M., Brinton, D. M., & Goodwin, J. M. (2010). *Teaching pronunciation: A course book and reference guide* (2nd ed.): Cambridge University Press.

Chan, A. Y. W., & Li, D. C. S. (2000). English and Cantonese phonology in contrast: Explaining Cantonese ESL learners' English pronunciation problems. *Language, Culture and Curriculum, 13*(1), 67-85. https://doi.org/10.1080/07908310008666590

Chen, H. C. (2015). A corpus-based pronunciation learning website. Retrieved from http://ec-concord.ied.edu.hk/phonetics_and_phonology/wordpress/?page_id=328

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, N.J.: Lawrence Erlbaum Associates.

Deterding, D., Wong, J., & Kirkpatrick, A. (2008). The pronunciation of Hong Kong English. *English World-Wide, 29*(2), 148-175. https://doi-org/10.1075/eww.29.2.03det

Eastman, J. K. (1993). C-words and F-words: The importance of distinguishing content and function in teaching second language listening comprehension. *System, 21*(4), 495-502. https://doi.org/10.1016/0346-251X(93)90060-T.

Hansen Edwards, J. G. (2016). Postcolonial Englishes and lexical diffusion: /t, d/deletion in Hong Kong English. *World Englishes, 35*(1), 60-77. https://doi.org/10.1111/weng.12166

Jenkins, J. (2000). *The phonology of English as an international language*. Oxford: Oxford University Press.

Kelly, G. (2000). *How to teach pronunciation*. Harlow: Longman.

Messum, P. R. (2009). Grounding stress in expiratory activity. *IATEFL Pronunciation Special Interest Group Newsletter, 41*, 12-16.

Nation, I. S. P., & Newton, J. (2009). *Teaching ESL/EFL listening and speaking*. New York: Routledge.

Richards, J. C. (2015). *Key issues in language teaching*. Cambridge: Cambridge University Press.

Setter, J. (2008). Consonant clusters in Hong Kong English. *World Englishes, 27*(3-4), 502-515. https://doi.org/10.1111/j.1467-971X.2008.00581.x

Templeton, G. F. (2011). A two-step approach for transforming continuous variables to normal: Implications and recommendations for IS research. *Communications of the Association for Information Systems, 28*(1), 41-58. Retrieved from: https://aisel.aisnet.org/cais/vol28/iss1/4

Underhill, A. (2005). *Sound foundations: Learning and teaching pronunciation*. Oxford, U.K.: Macmillan Education.

Yeldham, M. (2000). *English conversation in Taiwan: Intermediate level*. Taipei: Crane Publishing Company.

Appendix: The reading test

1. Zac, Jack and Jake have all been disappo***int***ed lately. Zac is very keen to get a job as a zookeeper. He likes zoos because they he***lp*** to ***pr***otect anima**ls**. However, he's fi**nd**ing it impossible to get a job in one. That's because he wa***nts*** to work in Hong Kong, but the only jo**bs** for zookeepers are overseas. Jack can't fi**nd** a job, either. He's a baker, and bakers have to get up at 3 in the morning to bake their cakes. But Jack's too lazy to wake up that early. Jake's ***pr***o**bl**em is worse. He's always very late for work, and he's been fired ***fr***om a lot of jo**bs** recently because of it. That almost ***pr***eve***nts*** him ***fr***om fi**nd**ing the job he really wa***nts***. If he fi**nds** it, he'll really be over the moon.

2. My **br**other, Ja**mes**, and I usually put on our boots at night and go outside into our yard. We put some cheap sheets on the **gr**ou**nd**, and lie down and look up at the moon. Someti**mes** a third person, my mother Jane, co**mes** along with us, and looking up into the night sky gi**ves** us a lot of ***pl***easure. We ***pl***an to do it thousa**nds** of ti**mes** in the future. It very much he***lps*** to ***pr***otect our family values.

- Unvoiced clusters (N = 12) are shown underlined only.
- Voiced clusters (N = 17) are shown underlined and bold.
- Mixed clusters (containing voiced and unvoiced consonants) (N = 14) are shown underlined, italicized and bold.