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**Reinvestment and spoken language proficiency: Evidence from Cantonese learners of  
Mandarin and Mandarin learners of Cantonese**

Chan Chun Ha, Florence

A dissertation submitted in partial fulfillment of the requirements for the Bachelor of Science

(Speech and Hearing Sciences), The University of Hong Kong, June 30, 2013

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### Abstract

The Speech Reinvestment Scale (SRS) (Wong, in preparation) was a newly developed questionnaire to investigate one's predisposition to exert conscious control over speech movements. The present study was designed to determine (1) if any differences exist between SRS scores in first and second language production; (2) if any correlation exists between one's oral proficiency and one's SRS score in a second language. Two groups of participants (Group 1: 63 Cantonese-speaking learners of Mandarin; Group 2: 41 Mandarin-speaking learners of Cantonese) were recruited and each participant was asked to fill in a questionnaire on demographic information, complete two SRS forms, in regard to first and second language, respectively and to record a speech sample using their second language. The speech samples were rated by 3 listeners in each group to obtain an average proficiency score for each participant. The results revealed a significant difference between SRS score in first and second language. No significant correlation was found between L2 SRS and proficiency score. This may indicate that the relationship between reinvestment and speech proficiency is more complicated than we expected. Since research on the SRS is still very new and the relationship between reinvestment and speech proficiency is still unclear, further investigations are recommended.

*Keywords:* reinvestment, second language, speaking proficiency, Mandarin, Cantonese

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**Attention, automaticity and proficiency of speech production in L2**

Speech production is an intentional activity which requires central control including attention (Levitt, 1989). However, attentional resources are limited (Kormos, 2006; 2011; Postma, 2000; Robinson, 1995; see also Tomlin & Villa, 1994, for a review). As described in Kormos (2006), language production has four major components: (1) conceptualization (planning for message), (2) formulation (includes grammatical, lexical and phonological encoding of message), (3) articulation (production of speech sounds) and (4) self-monitoring (checking for the correctness and appropriateness of produced output). In production of the first language (L1), attention is required mainly for conceptualization and self-monitoring since the formulation and articulation processes are relatively automatic so people can generate speech fluently in L1 (Kormos, 2006; 2011). However, since the formulation stage and articulation stage are less automatic in second language (L2), L2 speakers will have less attention available for monitoring and hence, the speech becomes less proficient and more error prone (Declerck & Kormos, 2012; Kormos, 2000a; 2000b; 2006; 2011; Norman, 2003; see also Tomlin & Villa, 1994 for a review).

## **Reinvestment and Development of Reinvestment Scale**

Reinvestment refers to the switch from an automatic form of movement control to a conscious form of control (Masters, Polman, & Hammond, 1993). Masters et al. (1993) developed the “Reinvestment Scale” to investigate the association between one’s predisposition to exert conscious control over movement and performance under pressure. Four studies were included in this paper and it was found that people who scored high in the Reinvestment Scale had higher tendency to fail to perform a complex task under pressure. As reviewed by Masters and Maxwell (2008), many other studies within these two decades have examined the association between conscious motor processing and performance under psychological pressure. The majority of those studies showed disruption of performance when participants were asked to attend to their movements consciously under stressful or self-focused conditions.

## **Development of Movement Specific Reinvestment Scale**

The Reinvestment Scale validated by Masters et al. (1993) was not specifically focusing on conscious control of movement but on general self-consciousness for a person. Hence, Masters, Eves and Maxwell (2005) developed a movement specific version of the original scale which was known as the Movement Specific Reinvestment Scale (MSRS) (see Appendix A) to address this limitation. The scale contains 10 items in total and involves two subscales, namely conscious motor processing (CMP) and movement self-consciousness

(MSC). The CMP subscale reflects how people are aware of the process of movement whereas the MSC subscale reflects how people are concerned about the “style” of their movement (Masters & Maxwell, 2008). Several studies using the MSRS were published after the validation of the scale. The study by Masters, Pall, MacMahon and Eves (2007) showed that the duration of Parkinson Disease (PD) was significantly correlated with the score on MSRS indicating that the propensity of patients with PD to monitor their movements consciously increased over time. Orrell, Masters, & Eves (2009) showed that there was a significant association between propensity for reinvestment and functional impairment. The study also showed association between propensity for reinvestment and time spent in rehabilitation for patients with stroke. Wong, Masters, Maxwell and Abernethy (2008) showed that there was a significant difference in scores on MSRS between elderly fallers and elderly non-fallers indicating that MSRS could be a potential clinical tool to predict elderly fallers. The findings reviewed above suggested that a higher score on MSRS is related to more conscious control over a person’s movement. However, none of the above studies focused specifically on movements during speech production.

### **Research Questions and Hypotheses**

As shown, previous studies did not investigate specifically reinvestment in movements of speech production. In addition, no research has investigated the relationship between conscious control (reinvestment) of movements in speech production and one’s proficiency

level in L2 production. A person's proficiency in L2 is mostly related to the automaticity of the formulation and articulation processes among the four major components in speech production proposed by Kormos (2006). Hence, people who are less proficient in L2 may have less efficient articulation process and more attention will then be required for monitoring the speech movements (reinvestment). Therefore, the present study was aimed to determine the relationship between reinvestment and proficiency in L2 speech production using the Speech Reinvestment Scale (SRS) (Wong, in preparation; see Appendix B). The SRS was modified from the MSRS (Masters, et al., 2005) in which all 10 items from MSRS were modified and included in SRS with addition of two new items to focus only on speech production. The research questions were:

1. Is there any significant difference between one's SRS score in L1 and L2 speech production?
2. Is L2 proficiency score significantly correlated with L2 SRS score?
3. Is L2 proficiency score significantly correlated with number of years learning L2 and/or frequency of using L2 in daily life?
4. Is L2 SRS score significantly correlated with number of years learning L2 and/or frequency of using L2 in daily life?

L2 production requires more conscious attention even for advanced speakers (Kormos, 2006) than L1. Hence, for the first research question, it was hypothesized that the SRS



scores in L2 would be significantly higher than L1 which means participants are more aware of their movements during speech production in L2 than in L1.

In addition, higher proficiency indicates higher automaticity in one's speech production and hence, less attention required for the speech movements monitoring processes (Kormos, 2006). Therefore, for the second research question, it was hypothesized that L2 SRS scores would correlate negatively with L2 proficiency scores. That is, higher proficiency scores in L2 will be associated with lower SRS scores in L2.

Moreover, we normally expect one's L2 proficiency improves with longer duration of learning and more frequent usage of L2 in daily life. Hence, for the third research question, it was hypothesized that the L2 proficiency score would correlate positively with both number of years learning L2 and frequency of using L2 in daily life.

Lastly, automaticity of the speech-encoding mechanisms of advanced L2 learners is higher than beginning learners (Kormos, 2006). According to Norman (2003), we pay less effort and attention for more automatic tasks. Therefore, for the last research question, it was hypothesized that the L2 SRS scores would correlate negatively with both number of years learning L2 and frequency of using L2 in daily life.

Two groups of participants: (1) Cantonese-speaking learners of Mandarin and (2) Mandarin-speaking learners of Cantonese were selected in this study. The first language and the second language of the two groups were reversed to see if the patterns found in the 4

research questions were universal across languages or specific to certain languages. If the results in the two groups differed, the nature of L1 or L2 might be correlated with one's propensity for conscious motor control over their speech production.

## Method

### Participants

Two groups of participants were recruited: Cantonese-speaking learners of Mandarin (group 1) and Mandarin-speaking learners of Cantonese (group 2). A total of 63 participants (45 females and 18 males with a mean age of 20.24 years [ $SD = 1.85$ , range = 18-24 years]) were recruited in group 1 whereas 41 participants (25 females and 16 males with a mean age of 20.78 years [ $SD = 2.38$ , range = 18-24 years]) were recruited in group 2. All participants reported to have normal hearing and no history of speech or language disorders. They were all undergraduate students in the University of Hong Kong. The average number of years learning L2 (i.e., Mandarin) speech production was 13.38 years ( $SD = 2.41$ , range = 6-20 years) in group 1 whereas the average number of years learning L2 (i.e., Cantonese) speech production was 4.39 years ( $SD = 6.06$ , range = 1-21 years) in group 2. An independent  $t$ -test demonstrated that the difference in number of years learning L2 between the two groups was significant,  $t(48.3) = 9.04$ ,  $p < .001$ . The frequency of using L2 in daily life for group 1 and group 2 are shown in Figures 1 and 2, respectively.

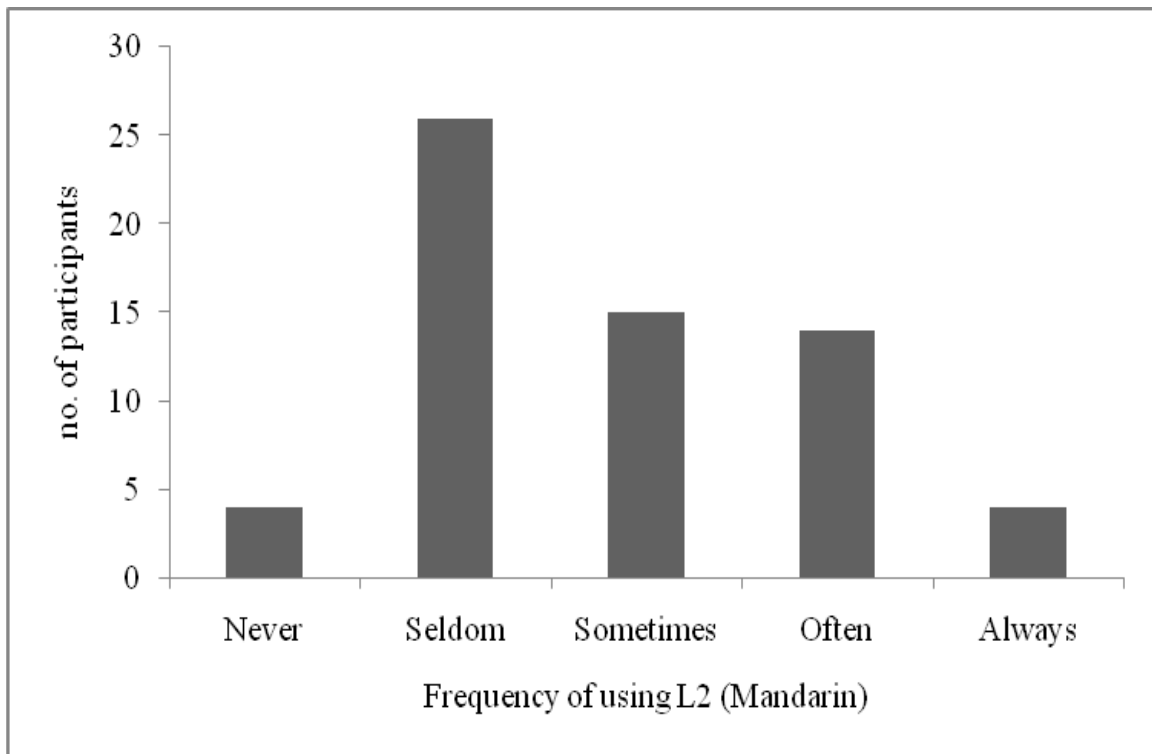


Figure 1. Frequency of using L2 (i.e., Mandarin) in daily life in group 1

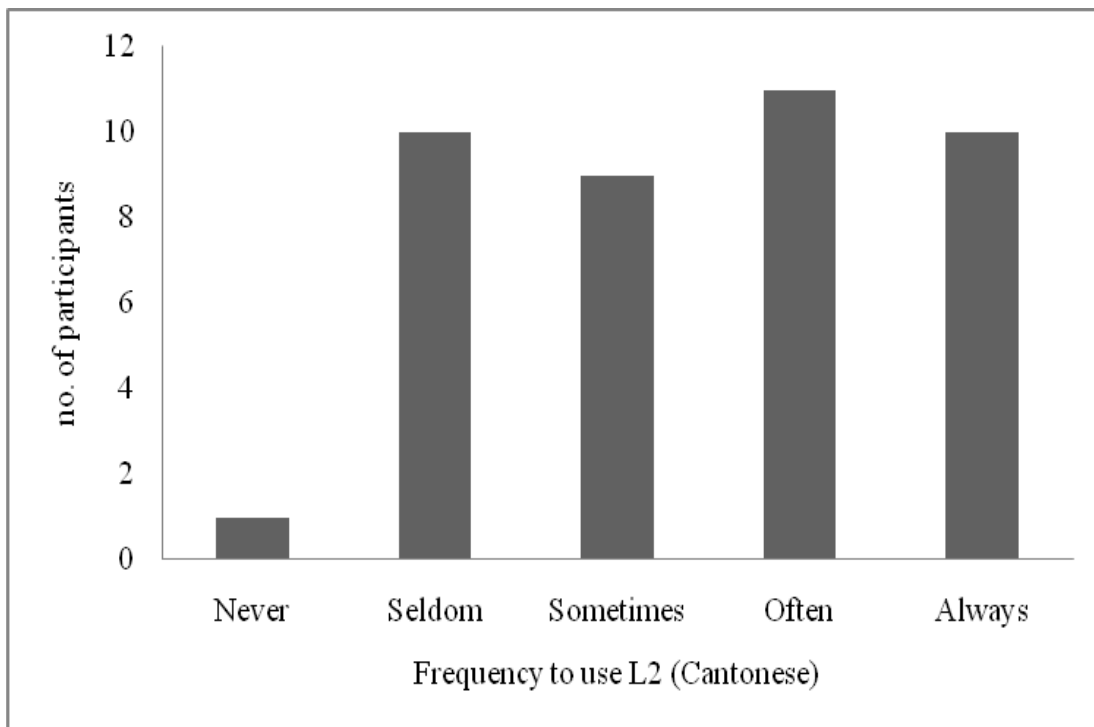


Figure 2. Frequency of using L2 (i.e., Cantonese) in daily life in group 2

Three listeners who were native speakers of the second language (i.e., Mandarin for group 1 and Cantonese for group 2) were invited to judge the overall proficiency of the speech samples from all participants in that group. The three listeners (2 females and 1 male) for group 1 were all postgraduate students in the University of Hong Kong whereas the three listeners (3 females) for group 2 were all undergraduate students in the University of Hong Kong. All listeners from both groups reported to have normal hearing and no history of speech or language disorders. The listeners for both groups had limited prior experience listening to speech samples from people whose second language was their first language. For group 1, the three listeners had studied Cantonese as a L2 (i.e., L1 of participants) for 1-2 years and had 1-3 years of experience in listening to Mandarin speech from native Cantonese speakers. For group 2, the three listeners had studied Mandarin as a L2 (i.e., L1 of participants) for 7-10 years and had 3-4 years of experience in listening to Cantonese speech from native Mandarin speakers.

### **Procedures**

Before the experiment, all participants completed a questionnaire on their demographic information (see Appendix C) (age, gender, number of years learning L2, frequency of using L2 in daily life, etc.). After that, the participants completed the following three tasks, in randomized order:

1. Complete Speech Reinvestment Scale (SRS) (see Appendix B) on L1

2. Complete Speech Reinvestment Scale (SRS) (see Appendix B) on L2
3. Record speech samples of L2 production

The SRS (Wong, in preparation) was originally developed to measure trait reinvestment, that is, to measure the overall level of predisposition for a person to exert conscious control during speech production in all speaking contexts. For the purpose of this study, the SRS was modified to measure state reinvestment, i.e., reinvestment when speaking in L1 and L2, respectively to find out if the reinvestment scores in L1 and L2 speech production differ.

All the questionnaire items were based on a 6-point equal-appearing interval (EAI) scale with “1” representing strongly disagree and “6” representing strongly agree. The 12 items in the SRS were randomized into 4 sets in order to eliminate the possible effect of question order on participants’ answers. The order of items in SRS of L1 and in SRS of L2 was also different for each participant. The sum of scores of all 12 items in SRS was calculated as the total reinvestment score in L1 and L2, respectively for each participant for further data analysis.

Speech samples were collected from the participants using a topic narrative task. According to Riazantseva (2001), the topic narrative task is less structured so it allows speakers to choose a linguistic means of expression, the cognitive complexity as well as the content of their speech. Hence, speech samples from a topic narrative task would be more natural and representative of the participants’ daily performance in L2 speech production than

a more structured task. Speech samples on self-introduction using L2 were recorded using a Sony PX312M digital voice recorder and an external stereo microphone maintained at a mouth-to-microphone distance of 10 cm. Recordings were made in a quiet room. The length of the recordings was one to two minutes long (Chalhoub-Deville, 1995).

### **Listening Task**

All speech samples were cut into around one minute long for the listening task. The greetings and introduction of the participants' name at the beginning of the recording were cut to ensure the confidentiality of each participant's personal information. The hesitation for thinking of more new points towards the end of the recording was also cut because the pauses stem from hesitation may be treated as fluency in production and affects the judgment of proficiency by the listeners. Before the listening task, an orientation was given to all listeners in which written instruction of the listening task, definition of scale terms (see Appendix D) and sample anchor stimuli were given. The study by Flege, Mackay and Pike (2002) showed "foreign" accent ratings (i.e., nativeness) are good predictors of overall oral proficiency and they correlated well with other indirect proficiency parameters such as sentence duration. Several studies (Piske, Mackay & Flege, 2001; Simonet, 2010; Yeni-Komshian, Flege & Liu, 2000) also used "foreign" accent rating to assess a person's linguistic proficiency in L2. Hence, listeners in each group were asked to judge the overall oral proficiency of second language speech production in terms of "nativeness" for each

participant in the group using a 10 cm visual analog (VA) scale with the leftmost end representing heavily accented speech and the rightmost end representing completely native-like speech. A VA scale was used since proficiency is an attribute that ranges across a continuum. Each listener listened to all speech samples in random order. The listeners were asked to give the proficiency rating after they finished listening to the entire edited speech sample for each participant. Ten to twenty percent of the speech samples in each group were randomly selected and were rated again by each listener without notice to obtain the intra-rater reliability. The average proficiency score by the three raters in each group was calculated for further data analysis.

### **Statistical Analysis**

Since the SRS scores were categorical in nature, non-parametric tests were selected. To examine whether any difference existed between the SRS scores in L1 and L2 (first research question), a Wilcoxon signed-rank test was used. To examine whether any correlation exists between the proficiency scores and reinvestment scores in L2 (second research question), Spearman's rho correlations were calculated. Similarly, to examine if L2 proficiency score is correlated with number of years learning L2 and/or frequency of using L2 in daily life and to examine if L2 SRS score is correlated with number of years learning L2 and/or frequency of using L2 in daily life, Spearman's rho correlations were calculated.

## **Reliability and agreement of proficiency ratings**

**Intrarater reliability and agreement.** Intrarater agreement for VA scaling, calculated using percentage of agreement (Kreiman, Gerratt, Kempster, Erman & Berke, 1993), showed that 100% of listener ratings had agreement within +/- 1 cm on the VA scale for both groups 1 and 2. Intrarater reliability for the three listeners in each group was calculated using Spearman's rho correlation. Intrarater reliability ranged from 0.93-0.99 ( $p < .01$ ) for all listeners (both groups).

**Interrater reliability and agreement.** Interrater reliability was calculated using intraclass correlation coefficient (ICC) type (2,k) (Kreiman et al., 1993). The interrater reliability for the three listeners in groups 1 and 2 were 0.79 and 0.92, respectively. Since between-listener variance was excluded in the calculation of ICC (2,k), percentage of agreement (Kreiman et al., 1993) of the three listeners in each group was also calculated. Results showed that 17.5% and 46.3% of listener ratings had agreement within +/- 1 cm on the VA scale in group 1 and group 2, respectively.

## **Results**

### **Speech Reinvestment Scale (SRS) Score in L1 and L2**

For Group 1 (Cantonese-speaking learners of Mandarin), the mean of L2 SRS scores (55.1, SD = 6.9) was significantly higher than the mean of L1 SRS scores (49.7, SD = 8.3), Wilcoxon signed-rank test  $Z = -5.54, p < .001$ . For Group 2 (Mandarin-speaking learners of



Cantonese), the mean of L2 SRS scores (55.1,  $SD = 7.1$ ) was significantly higher than the mean of L1 SRS scores (46.7,  $SD = 10.5$ ), Wilcoxon signed-rank test  $Z = -4.94, p < .001$ .

Spearman's rho test revealed a statistically significant relationship between the L1 SRS scores and L2 SRS scores in both group 1 ( $rs[63] = .65, p < .001$ ) and group 2 ( $rs[41] = .54, p < .001$ ).

### **Proficiency scores and SRS scores in L2**

The mean L2 proficiency scores of the three listeners was 4.76 ( $SD = 1.87$ ) for group 1 whereas the mean L2 proficiency scores of the three listeners was 4.67 ( $SD = 2.46$ ) for group

2. There was no significant relationship between the L2 SRS scores and L2 proficiency scores for either group 1 ( $rs[63] = .158, p = .216$ ) or group 2 ( $rs[41] = .17, p = .288$ ).

### **L2 proficiency scores, number of years learning L2 and frequency of use of L2**

Spearman's rho test revealed no significant relationship between L2 proficiency scores and the number of years learning L2 in group 1 ( $rs[63] = -.011, p = .931$ ). However, a significant moderate positive relationship between L2 proficiency scores and the number of years learning L2 was found using Spearman's rho in group 2 ( $rs[41] = .599, p < .001$ ).

There was a significant relationship between L2 proficiency scores and frequency of using L2 in daily life for both group 1 ( $rs[63] = .42, p < .01$ ) and group 2 ( $rs[41] = .74, p < .001$ ). A moderate positive relationship was found in group 1 whereas a strong positive relationship was found in group 2.

### **L2 SRS scores, number of years learning L2 and frequency of using L2**

There was no significant relationship between L2 SRS scores and the number of years learning L2 for either group 1 ( $r_s[63] = -.011, p = .931$ ) or group 2 ( $r_s[41] = .042, p = .794$ ).

Spearman rho's test revealed a significant but weak positive relationship between L2 SRS scores and frequency of using L2 in daily life in group 1 ( $r_s[63] = .269, p < .05$ ).

However, no significant relationship was found between L2 SRS scores and frequency of using L2 in daily life in group 2 ( $r_s[41] = .055, p = .734$ ).

### **Discussion**

The first aim of this study was to find out if there is any difference between reinvestment in L1 and L2 speech production. The results indicated a significantly higher L1 SRS score than L2 SRS score in both group 1 (Cantonese-speaking learners of Mandarin) and group 2 (Mandarin-speaking learners of Cantonese) which is the same as what we expected. This implies that people will reinvest more (i.e., become more conscious on their speech movements) when speaking in L2 than in L1. This result supports the findings by Kormos (2006) that L2 speech production required more conscious attentional control even for advanced speakers than L1 speech production. It is possible that the less automatic articulation stage in L2 speech production had contributed to the greater need for the speakers to exert more conscious control over their speech movements for more precise articulation. In addition, a significant moderate positive relationship was found between L1 SRS scores

and L2 SRS scores. This indicates that people who score higher in L1 SRS will also score higher in L2 SRS. This can be explained by the reason that reinvestment is a dimension of personality (Masters, et al., 1993), i.e., some people have greater tendency to reinvest speech movements than others.

The second aim of this study was to explore the relationship between L2 proficiency and L2 SRS scores. No significant relationship was found between L2 proficiency and L2 SRS scores in either group 1 or group 2. This result was different from the hypothesis that L2 SRS scores would correlate negatively with L2 proficiency scores. The discrepancy between the hypothesis and the result might indicate that the relationship between reinvestment and speech proficiency is more complicated than we expected. It is possible that other factors (e.g., personality, methods to learn L2, frequency of using L2 in daily life, number of years learning L2, etc.) might have complicated the relationship between reinvestment and speech proficiency in L2. Several other possible reasons may explain the result. Firstly, the topic of “self introduction” may have been too easy for participants. Secondly, many previous experiments using reinvestment scales investigated the performance disruption under stress-induced conditions (Masters et al., 1993; Maxwell, Masters & Poolton, 2006) but the speech production task used in this study was not a stress-induced task. Hence, the reason of having no significant correlation between L2 proficiency and L2 SRS scores can be due to the absence of stress-induced condition during the speech production

task in this study. Thirdly, the use of “nativeness” as a global measure to evaluate a person’s speech proficiency may not have been the most appropriate term to use in this study. As shown in the results, the interrater agreement was low for both groups 1 and 2. This may indicate that the listeners in both group did not have a consensus on how to rate a person’s global proficiency using the VA scale in terms of “nativeness” even though an orientation was given before they started the listening task. It is possible that different listeners might have been attending to different speech dimensions (e.g., speech rate, variety of vocabulary used, pronunciation, etc.) when judging a person’s overall level of “nativeness”. In addition, reinvestment might affect certain dimensions of speech production only (e.g., speech rate, duration of pause, number of errors made, etc.) but not affect the overall proficiency perceived by others.

The third aim of this study was to find out if one’s L2 proficiency is correlated with number of years learning L2 and/or frequency of using L2 in daily life. Significant correlations were found between L2 proficiency and frequency of using of L2 in daily life in both groups 1 and 2. A significant correlation was also found between L2 proficiency and number of years learning L2 in group 2. These results support the hypothesis that one’s proficiency improves with increasing number of learning years and frequency of using L2 in daily life. However, unlike in group 2, no significant correlation was found between L2 proficiency and the number of years learning L2 in group 1. The difference of results in the

two groups might be due to significant higher number of years learning L2 for group 1 than group 2 as well as a less diverse distribution of number of years learning L2 in group 1 than group 2. Since participants in group 1 have similar number of years learning L2 (i.e., 97% of participants in group 1 have learnt Mandarin as a L2 for more than 10 years whereas 75% of participants in group 2 have learnt Cantonese as a L2 for less than 3 years only) and similar mode for learning L2 (i.e., about 50% of participants reported that they learnt Mandarin as L2 intensively in primary/secondary schools), the similar proficiency in L2 may have contributed to an insignificant correlation.

The last aim of this study was to find out if L2 SRS score is correlated with number of years learning L2 and/or frequency of using L2 in daily life. As shown in the result section, no significant correlation between L2 SRS scores and number of years learning L2 was found for either group 1 or group 2. This indicates that number of years learning L2 may not be a factor affecting one's predisposition to exert conscious control over speech movements.

There was also no significant correlation between L2 SRS score and frequency of using L2 in daily life in group 2. However, a weak positive significant correlation was found between L2 SRS scores and frequency of using L2 in group 1. This indicates that participants in this group reinvest more when they use L2 more frequently in daily lives. The direction of this result contradicts to what we expected. As explained before, the relationship between reinvestment and speech production mechanism may be far more complicated than what we

expect. It is possible that increasing frequency of using L2 may not necessarily lower the automaticity in formulation and articulation processes during speech production but it may lead to an opposite effect. It is because people who use L2 more frequently in their daily life may be more concerned about their speaking style and pronunciation than people who seldom use L2 in their daily life. The difference of results in the 2 groups might be explained by the difference in learning mode of L2 in the 2 groups. About 50% of participants in group 1 reported that they learnt Mandarin as L2 intensively in primary/secondary schools for years whereas about 60% of participants in group 2 reported that they learnt Cantonese as L2 in a university course for only one semester. It is possible that more explicit rules in L2 speech production were learnt and accumulated for participants in group 1 during intensive lessons in primary/secondary schools for years than for participants in group 2 who only learnt Cantonese for a comparatively short period of time. Hence, when participants in group 1 used L2 more frequently in daily life, they applied more explicit rules that they had learnt before in L2 speech production. The study by Maxwell, Masters and Eves (2000) showed a significant positive correlation between Reinvestment Scale Score and the number of explicit rules used by participants in a complex motor skill (i.e., golf putting). Similar relationship might also be applied to speech movements and Speech Reinvestment Scale scores in which people who score higher in SRS might have applied more explicit rules in their speech production. This point support the finding in this

study but it has to be verified in future research.

Research on the Speech Reinvestment Scale (SRS) (Wong, in preparation) is still a very new area and much more work can be done to establish the relationship of SRS score with other variables related to speech production and to find out more applications of the SRS.

Two questions remained unanswered in this study: (1) the relationship between L2 SRS score and individual dimensions of proficiency (e.g., speech rate, number and types of errors occur, different acoustic properties, etc.); (2) the effect of different instruction styles in learning a language (implicit vs explicit instruction) on one's SRS score. Further investigations on these are needed. Apart from these points, future research may also focus on extrapolating this study to different kinds of populations (e.g., students from other Universities, people who are not attending university, etc.) or to other first and second languages to see if the results found in this study are generalizable. Furthermore, the effect of different stages of learning in L2 (i.e., beginning vs advanced learners) on L2 SRS scores may be investigated in the future. Last but not least, future research may also focus on application of the SRS to people with speech or expressive language impairments because they have impaired language production systems which might lead to higher reinvestment of speech movements.

Investigating whether any differences exist between SRS score of patients with impaired speech production systems and non-impaired people, and whether patients with different SRS scores perform differently in different tasks under stress-induced conditions, may give some

new insights to specialists on rehabilitation services to be provided to these patients.

As reviewed by Maxwell et al. (2006), reinvestment can be induced by circumstances other than anxiety or one's self-consciousness (e.g., boredom, novel task constraints, etc.). In this study, even though the speech task used was not anxiety-induced and perhaps too easy for participants, a significant difference was still evidenced between L1 and L2 SRS scores. Apart from this, a significant but weak correlation was also found between L2 SRS score and the frequency of using L2 in daily life in group 1 (i.e., Cantonese-speaking learners of Mandarin). Therefore, this might indicate that the reinvestment in speech movements may also be induced by circumstances other than anxiety. For examples, speech reinvestment may be induced by one's motivation to speak in one particular language than other languages, a specific speaking context (e.g., formal versus informal) and/or specific types of listeners (e.g., teachers, friends, family members or naïve listeners). These are very new findings contributing to the research area of using the SRS. Future studies investigating the relationship between reinvestment and speech production mechanism should incorporate factors other than anxiety like this study to see if reinvestment can be induced by other circumstances.

### **Conclusion**

In conclusion, a significant difference between Speech Reinvestment Scale (SRS) score in first and second language production was evidenced from this study regardless of the



nature of the first and second languages. No significant correlation was found between one's proficiency and SRS scores in L2. This may indicate that the relationship between reinvestment and speech proficiency is far more complicated than what we expected. Since research on the SRS is still very new and the relationship between reinvestment and speech proficiency is still unclear, further investigations are recommended.

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## Appendix A

### Movement Specific Reinvestment Scale Items (Masters, Eves, & Maxwell, 2005)

#### **Conscious Motor Processing**

---

I am always trying to think about my movements when I carry them out.

我做動作時，經常試著思考自己的動作。

I reflect about my movement a lot.

我時常思考自己已做的動作。

I am always trying to figure out why my actions failed.

我經常試著尋找動作出錯的原因。

I am aware of the way my body works when I am carrying out a movement.

當我做動作時，我會留意到自己腦部和身體的活動方式。

I rarely forget the times when my movements have failed me.

我極少會忘記自己動作上的錯誤，即使這些錯誤只是很輕微。

---

#### **Movement Self-Consciousness**

---

I am concerned about my style of moving.

我會留意自己動作的姿勢。

I am self conscious about the way I look when I am moving.

我很在意自己做動作時的形態。

If I see my reflection in a shop window, I will examine my movements.

如果我在店舖櫥窗看到自己的倒影，我會仔細觀察自己的動作。

I sometimes have the feeling that I am watching myself move.

我有時覺得我在看著自己做動作。

I am concerned about what people think about me when I am moving.

我做動作時會在意別人怎樣想我。

## Appendix B

## Speech Reinvestment Scale Items (Wong, in preparation)

1) 我時常回想自己說話的過程。

**I reflect about my speech production a lot.**

2) 在說話時，我會留意與說話相關的身體部份(如嘴巴、舌頭、下巴、喉嚨等)的活動。

**I try to think about my speech movements (e.g., movements of my lips, tongue, jaw, larynx, etc.) when I speak.**

3) 在說話時我會留意自己口部的運作。

**I am aware of my way my mouth works when I am speaking.**

4) 我會嘗試找出有時口齒不清/發音不準的原因。

**I try to figure out why my speech sometimes fails me.**

5) 我會記得自己口齒不清/發音不準的時候。

**I remember the times when my speech has failed me.**

6) 我注重自己說話的方式。

**I am concerned about my style of speaking.**

7) 我會留意自己說話的外表。

**I am self-conscious about the way I look when I am speaking.**

8) 當我說話時，我會留意自己的聲音。

**I am self-conscious about how I sound when I am speaking (not in MSRS)**

9) 如果我聽到一段自己的錄音，我會檢討自己說話的方式。

**If I listen to an audio recording of myself, I will evaluate the way I speak.**

10) 我有時覺得我在聽著自己說話。

**I sometimes have the feeling that I am listening to myself speak.**

11) 當我說話時我會注意別人對我的看法。

**I am concerned about what people think about me when I am speaking.**

12) 我注重自己發音和咬字的準確度。

**I am concerned about the accuracy of my pronunciation (not in MSRS).**

Rating scale

1	2	3	4	5	6
非常不同意	不同意	少許不同意	少許同意	同意	非常同意

## Appendix C


## Questionnaire on demographic information of participants

Name	_____
Gender	F / M
Age	_____
Undergraduate programme	_____
Is your first language Cantonese/Mandarin?	Y / N
When did you start learning Mandarin/Cantonese?	_____
How frequent do you use Mandarin/Cantonese?	Never      Seldom      Sometimes      Often Always <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
How do you learn Mandarin/Cantonese?	<input type="checkbox"/> University course (Please specify course name) <input type="checkbox"/> Non-university course (Please specify organization) <input type="checkbox"/> Listen to pop-music <input type="checkbox"/> Watch TV programmes <input type="checkbox"/> Others (Please specify: _____ )
Have you ever received professional training on public speaking using Mandarin/Cantonese?	Y / N
Do you have any living experiences in HKSAR/ Other Places which Mandarin/Cantonese is the main language?	Y / N If yes, please specify _____
Do you want report of your oral score?	Y / N If yes, please give your e-mail: _____



## Appendix D

## Indicators of Nativeness

Band	Fluency	Vocabulary	Grammar	Intelligibility
<b>Completely native-like</b> 	Speak fluently; Appropriate speech rate; Rare repetition, self-correction and hesitation such as making sounds (e.g., err, um)	Uses vocabulary with full flexibility and precision	Uses a full range of structures such as articles, prepositions, countable/uncountable flexibly and accurately	Precise pronunciation such as words with this sound (e.g., <b>'this'</b> , <b>'father'</b> ), ends of words (e.g., <b>'worries'</b> , <b>worried'</b> ); Flexible use of features like intonation and word stress (e.g., <b>'temporary'</b> not <b>'temporary'</b> ); Effortless to understand
	Speaks fluently Appropriate speech rate Occasional repetition, self-correction and hesitation	Uses vocabulary flexibly with occasional inaccuracies	Uses a wide range of structures flexibly; Occasional grammatical mistakes	Precise pronunciation; Flexible use of features with occasional lapses; Minimal effect of L1 accent
	Mostly fluent speech; Too fast or too slow speech rate; Frequent repetition, self-correction, hesitation	A wide enough vocabulary but with limited flexibility and inappropriateness	Limited flexibility of structures; Frequent mistakes with complex structures but not with simple sentences	Occasional mispronunciation; Mostly effective use of features; Some effect of L1 accent ; Generally understandable
	Speak slowly with long pauses; Frequent repetition, self-correction and hesitation	Frequent errors in word choice; Insufficient vocabulary	Errors are frequent in both simple and complex sentences; May lead to misunderstanding	Frequent mispronunciations; Occasional use of pronunciation features; Obvious effect of L1 accent
	Pauses lengthy before most words; Overuse of sounds (err, um)	Conveys basic meanings only; Repetitive use of simple vocabularies	Few correct simple sentences Often lead to misunderstanding	Few correct pronunciation; Significant effect of L1 accent; Difficult to understand
<b>Highly accented</b>				

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