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Metacognitive Intervention Contributes to More-skilled Listeners: Using Fuzzy Logic Analysis Approach

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ABSTRACT
Metacognitive intervention is known as one of the effective approaches to increase listening skills and comprehension. Recent research on less-/more-skilled L2 listeners indicated that metacognitive intervention is more rewarding for less-skilled L2 listeners than more-skilled counterparts. However, since more-skilled L2 listeners achieved a repertoire of knowledge and skills, it is more difficult for them to achieve more improvement. Therefore, the scales of improvements are different between less- and more-skilled L2 listeners, and mere comparison between pre- and post-tests does not suffice. In this study, however, Fuzzy logic analysis was employed as a remedial approach in order to equalize these scales. Next, the comparison was made between less- and more-skilled L2 listeners to find out which group would logically benefit more from metacognitive intervention. A quantitative approach and quasi-experimental design were used to address the research questions. 65 Iranian students were selected including 31 more-skilled (15 advanced and 16 upper-intermediate) and 34 less-skilled (18 intermediate and 16 lower-intermediate). The instruction was based on metacognitive intervention in eight sessions. The result, which was based on a Fuzzy logic analysis approach, indicated that more-skilled L2 listeners benefited more than less-skilled L2 listeners from metacognitive intervention, and is quite contrary to the previous studies. This study is beneficial to the field of assessment. Assessment based solely on differences in pre-/post-test results may not be adequate in some cases. Researchers and teachers should consider other factors in their judgments.

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1. Introduction

Listening has received rudimentary attention amongst the four macro-skills in L2 language learning classrooms though this skill plays a considerable role in efficient communication and has a close correlation with L2 overall language proficiency (see Bozorgian (2012b)). Teaching and learning are complementary, and increasing students' awareness is the result of this interaction (Rahbar et al., 2020). Unfortunately, this skill is underrated in the classroom and is an invisible process, and many teachers are not trained to teach the process of this skill to learners; instead, they prefer to put their efforts into teaching speaking and writing (Nunan, 1997). The reason is that learning this skill is accompanied by taxing and demanding effort since it is the least explicit skill (Nunan, 1997). For having successful listening comprehension, listeners go through physiological processes, cognitive and metacognitive processes, and attention to context (Rost, 2002; Swaffar & Bacon, 1993).

The extent to which a listener is able to have a successful listening comprehension is highly related to his/her level of proficiency about this skill (Vandergrift, 2004). Native speakers do many comprehension processes autonomously, but foreign language learners are suffering from these overwhelming processes most of the time (Graham, 2006). This is owing to the reason that their restricted and finite language knowledge impedes autonomous processing; therefore, this necessitates paying attention to the very pieces of information that they listen to (Vandergrift, 2004). According to Rost (2013), listening engages neurological, linguistic, semantic, and pragmatic processing. These processes are also integrated with linguistic, world, and communicative-context knowledge (Buck, 2001; Rost, 2013; Vandergrift, 2007). Thereby, learners should be equipped with some compensatory strategies to overcome their language defects and deficiencies or comprehension break-down happens frequently (Vandergrift, 2004). Consequently, taking into account the capability of orchestrating multitudes on-line information, and utilizing a variety of knowledge sources are integral parts of an effective listening comprehension (Rost, 2005).

For nearly two decades there has been a growth in utilizing metacognitive intervention to expedite the processes of listening comprehension (Bozorgian, 2015). This is due to its apparent capacity to improve learners' comprehension and to boost their listening performance (Bozorgian & Alamdari, 2018; Bozorgian & Muhammadpour, 2020).The term 'metacognition' is often simplified as thinking about thinking or cognition about cognition. Flavell (1976) first coined the term metacognition and defined it as 'knowledge concerning one's own cognitive processes and products or anything related to them' (Flavell, 1976, p. 232). According to Pressley (2002), long duration of direct explanation, modeling strategies and strategies with guided practice is necessary to accommodate learners' needs. Bozorgian (2015) avers that metacognitive intervention is helpful in both enhancing successful language learning through acquiring metacognitive strategies and illustrating the strategies, which successful learners select for the sake of processing learning.

Some research in a realm of metacognitive intervention that focuses on less-skilled and more-skilled L2 listeners in order to reveal which group benefits from the instruction the most (Bozorgian, 2012, 2015; Cross, 2011; Goh & Taib, 2006; Vandergrift & Tafaghodtari, 2010). Most of them came to the conclusion that the instruction is more rewarding for less-skilled L2 listeners than their more-skilled counterparts (Bozorgian, 2012, 2015; Cross, 2011; Goh & Taib, 2006; Vandergrift & Tafaghodtari, 2010).

In addition, there has been a widespread agreement on that less-skilled L2 listeners are suffering from lack of ample knowledge and strategies to overcome their shortage and deficiencies to improve listening comprehension (Goh & Taib, 2006; O'malley et al., 1990; Rost, 2002; Vandergrift, 2003). More-skilled L2 listeners have the advantage of both occupying repositories of strategies to regulate listening processes and organizing these strategies in a continuous metacognitive cycle (Vandergrift, 2003).

However, far too little attention has been paid to the fact that more-skilled L2 listeners have gained a reservoir of knowledge, skills, and strategies; thus, it necessitates more strenuous and arduous efforts for them to acquire new knowledge or strategies. In other words, the insignificant improvements of more-skilled L2 listeners are not insignificant at all.

Fuzzy logic was first developed by Zadeh (1965, 1988) to make two goals with two different scales comparable. In this regard, Alavidoost et al. (2021); Babazadeh et al. (2018); Nemati and Alavidoost (2019) have used this concept in multi-objective mathematical modeling to compare several contradictory and non-scale goals. In these studies, instead of one axis (X) in calculations, two axes (X and Y), is used. Assessments with different scales on the X-axis would have the same scales on the Y-axis using fuzzy logic.

The main purpose of this study is to measure whether less-skilled listeners benefit more than more-skilled counterparts through Fuzzy logic analysis approach. In this regard, the following research question is stated:

Do less-skilled L2 listeners benefit more from metacognitive interventions than more-skilled L2 listeners based on fuzzy logic analysis?

2. Literature review

Vandergrift and Tafaghodtari (2010) focused on teaching L2 listening during a semester based on the process-based approach. Both the experimental group which included 59 and the control group which contained 49 participants were under the instruction by the same teacher and the same instrument. The experimental group, however, was led to apply metacognitive intervention. Utilizing pre- and post-test, they were able to trace the participants' metacognitive awareness development. Needless to say, the control group performance was trivial and insignificant in contrast to the experimental group. Furthermore, the less-skilled participants were benefited more than their more-skilled counterparts.

Cross (2011) conducted a small-scale study in a Japanese EFL context using metacognitive intervention to explore its impact on listeners' comprehension. Five lessons were prepared for twenty adult advanced level EFL learners based on the 'pedagogical cycle' of predicting, monitoring, problem identification, and evaluating in order to enhance their comprehension level of news items on television. Given learners pre- and post-test different results, he realized that three less-skilled listeners out of four made considerable improvement; however, one out of four more-skilled listeners improved during the treatment. Both groups benefited from the intervention but less-skilled listeners gained more. Reaching the threshold point by the more-skilled listeners, it makes the improvement harder for them.

Bozorgian (2012) carried out a small-scale study aimed at investigating the effect of the metacognitive on listeners' comprehension. 28 adult, Iranian, high-intermediate level EFL listeners participated. The intervention focused on directed attention, selective attention, and self-

JOURNAL OF FOREIGN LANGUAGE RESEARCH, Volume 11, Number 1, Spring 2021, Page 139 to 152

management based on pedagogical cycle in each of four listening lessons. A comparison of pretest and posttest scores showed that metacognitive intervention assisted less-skilled L2 learners more than more-skilled L2 learners in IELTS listening tests. Furthermore, the study confirmed that metacognitive intervention was helpful for both groups to improve their listening comprehension ability.

Bozorgian (2015) obtained similar results in thirty-two female adult Iranian intermediate level English as a Foreign Language (EFL) learners. He, as well, minded to investigate the influence of metacognitive intervention on less-skilled and more-skilled L2 listeners. The participants were under a 'strategy-based' instruction, planning, monitoring and evaluation on which focused the amelioration of learners' comprehension of International English Language Testing System (IELTS) listening texts. Once again, less-skilled learners benefited more from metacognitive intervention than more-skilled learners in IELTS listening tests.

The reviewed studies above conducted pre-tests and post-tests to trace less-skilled and more-skilled L2 listeners' level of development. The results were based on the difference between pre-test and post-test, utilizing interval scales, in order to measure the extent to which an L2 listener improved. Figure 1 is an example for more elaboration:

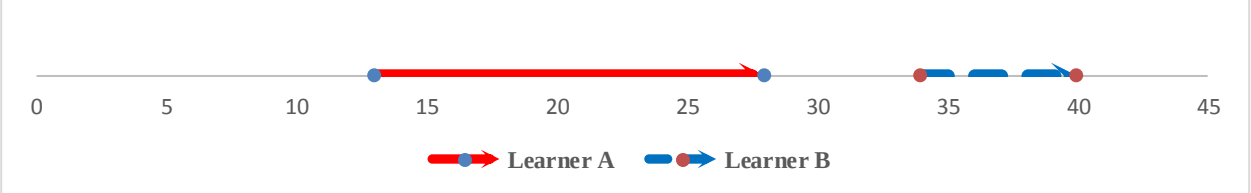

Figure 1. Making a comparison between less- and more-skilled L2 listeners' improvement based on previous studies

In Figure 1, the learner A is considered as a less-skilled L2 listener and the learner B is considered as a more-skilled L2 listener and their pre-test results are 13 and 34, respectively. Accordingly, learner A receives 28 in his/her post-test result and learner B receives 40 in his/her post-test result. Based on these analyses, learner A illustrated more significant improvement (28-13=15) than learner B (40-34=6). Therefore, learner A (Less-skilled listener) has 15 gain scores and learner B (more-skilled listener) has 6 gain scores.

However, as mentioned earlier, there is a consensus among researchers that more-skilled L2 listeners have acquired not only a sufficient repertoire of knowledge and strategies, but also the capability of orchestrating such strategies (Goh, 2000; O'malley et al., 1990; Rost, 2002; Vandergrift, 2003). They reached a threshold point, and passing this point entails more diligent and assiduous efforts (Cross, 2011); thus, the amount of improvement on post-test might not be significant. On the other hand, less-skilled L2 listeners put their effort on reaching their threshold point of proficiency, due to their insufficient Knowledge; thus, it would be less complicated for them to illustrate more improvement on their post-test.

The second problem that should be mentioned here: *the maximum score*.

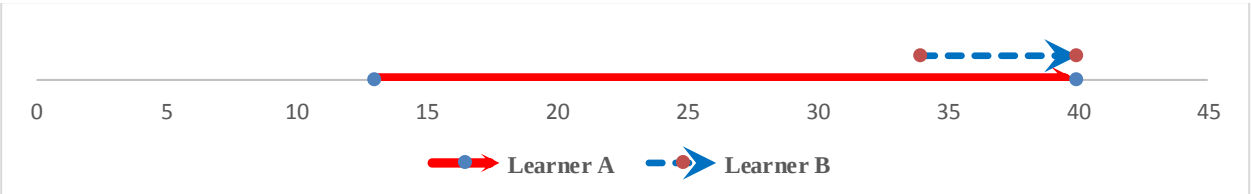

Figure 2. The ceiling effect

In Figure 2, again the learner A's result in pre-test is 13 (considered as a less-skilled L2 listener) and the learner B's result is 34 (considered as a more-skilled L2 listener), yet both learners' post-test results are the same (40) this time. According to previous analyses, learner A's improvement is more appreciable (40-13=27) than learner B's improvement (40-34=6). However, since the maximum score is 40, none of them is able to go further than the maximum score; in other words, the door for demonstrating more improvement than the maximum score is closed to them. Thus, it is logical to assume that if the maximum score was 100, learner B might receive 90 in his/her post-test and demonstrate more significant improvement (90-34=56 > 40-13=27). It is axiomatic to say that there should always be a maximum score, but the assumed result is not rational that learner A's improvement is more significant than learner B's improvement. The only sound judgment could be that we assume, at least, their improvement is equal; in other words, no one improved more than the other one.

As a result, according to the explanations given, the assessment based on previous studies poses two problems:

1. The scale of progress of less-/more skilled L2 listeners is different and this difference is not taken into account.
2. Achieving the same maximum score by these two groups does not indicate the superiority of either group.

Due to these unjustified analyses and takes on the previous research findings, Fuzzy logic analysis approach was applied as a remedial procedure for data analysis in this study.

2-1. Fuzzy logic

Fuzzy logic was first coined by Zadeh (1965, 1988) in order to equalize two same objectives which possess two different scales. In our study, for instance, the extent of improvement for less- and more-skilled L2 listeners has the same objectives: obtaining the full score; however, they have different scales according to what is noted above. First, these two different scales should be equalized, and then compared with each other. For solving such issues, Alavidoost et al. (2016); Bellman and Zadeh (1970) applied two axes (X and Y axes) instead of one (see Figure 3). The results (pre-tests and post-tests) are mentioned on the horizontal or X axis (ranging from 0 to 40 in IELTS listening band score), and the vertical or Y axis demonstrates the significance of improvement rather than the horizontal axis (ranging from 0 to 1 see Alavidoost et al. (2016)). The Y axis is used for acquiring new and equalized scale; in other words, the different scales which are on X axis changes to equal scale on Y axis. In this study, this logic is employed to obtain a better comparison of less- and more-skilled L2 listeners' improvements.

Two axes were utilized instead of one (see Figure 3); thus, the significance of improvement of a learner who receives 0 in pre-test and 40 in post-test is 1 (the maximum score, called Positive Ideal Solution (PIS) point in this study). The reason for choosing 40 is that the maximum score in the IELTS listening sections is 40. The students' pre-test results are their Negative Ideal Solution (NIS) in this study.

JOURNAL OF FOREIGN LANGUAGE RESEARCH, Volume 11, Number 1, Spring 2021, Page 139 to 152

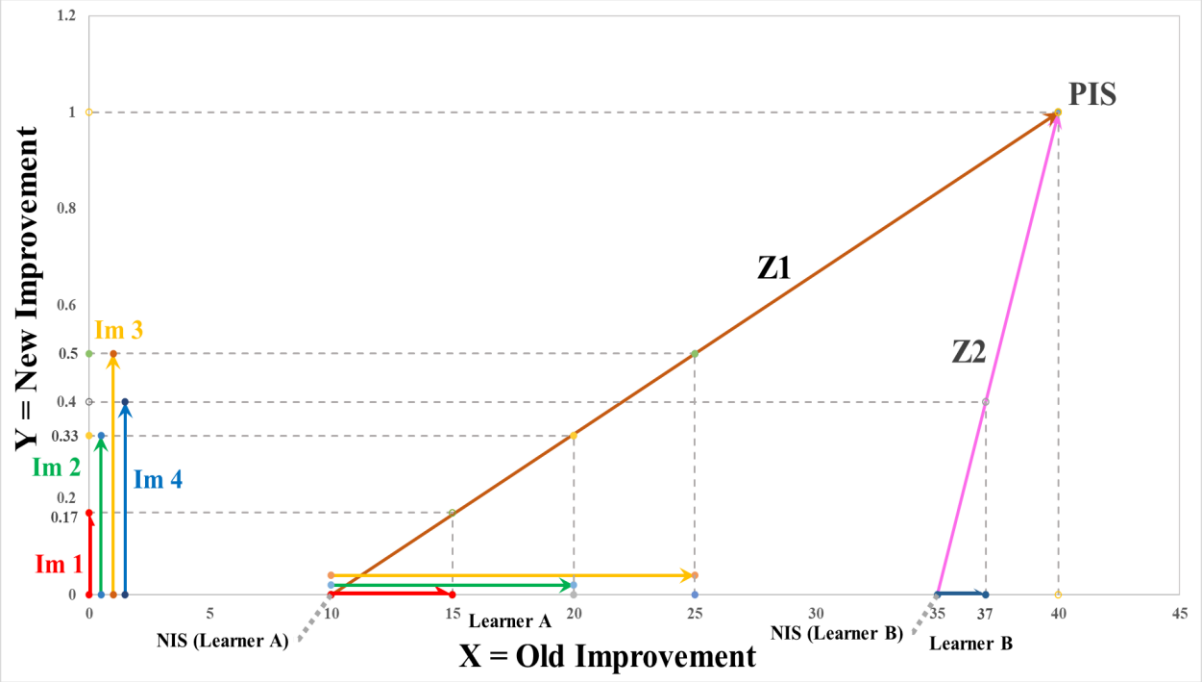

Figure 3. Making a comparison between less- and more-skilled L2 listeners' improvement based on fuzzy logic

For the sake of realizing the significance of the improvement, a line, which is called Z in this study (see Figure 3 above), was drawn from the NIS to the PIS point. Thereafter, another line was drawn from post-test results to the Z line which is parallel to the vertical axis (called Im which stands for improvement in this study) and connected to the vertical axis.

In Figure 3, as mentioned above, there are two (vertical and horizontal) axes; learner A's pre-test result is 10 (considered as a less-skilled L2 listener) and learner B's pre-test result is 35 (considered as a More-skilled L2 listener). The Z_1 and Z_2 lines were drawn from their NISs to PIS point, respectively; needless to say, the slope of learner B's line (Z_2) is more than learner A's line (Z_1).

The way to calculate the improvements based on vertical axis is according to the angle of inclination formula in mathematics (see the equations below)

Table 1

Eq. 1 $Y - \boldsymbol{Y_1} = M(X - \boldsymbol{X_1})$

Eq. 2 $M = \frac{Y_2 - Y_1}{X_2 - X_1}$

Eq. 3 $Y = (\frac{Y_2 - Y_1}{X_2 - X_1}) \times (X - X_1)) + Y_1$

Eq. 4 $\text{Improvement based on vertical axis} = (\frac{1}{40 - \text{Pretest Result}}) \times (\text{Posttest Result} - \text{Pretest Result}))$

Eq. 5 $\text{Imp} = \frac{\text{Post} - \text{Pre}}{40 - \text{Pre}}$

In Eq. 1, M represents the slope of the line or the angle of inclination, and it is calculated according to Eq. 2. In Eq. 1, Y is the new improvement (which is based on vertical axis), and X is post-test result. Two locations are needed so that M can be computed; (Y_1, X_1) and (Y_2, X_2) are these two locations. In Figure 3, and in this study, (Y_1, X_1) is NISs, and (Y_2, X_2) is PIS. Therefore, it is logical to say: $Y_1 = 0$, X_1 = Pre-test Results, $Y_2 = 1$, and $X_2 = 40$. Accordingly, Eq. 4 and, finally in brief, Eq. 5 are achieved.

Providing more account for Figure 3, let's assume that learner A's pre-test result is 10, and learner B's pre- and post-test result is 35 and 37, respectively:

1. **If learner A's post-test result is 15:**
   The Im_1 line shows the significance of improvement on vertical axis, which is 0.17; however, Im_4 illustrates the significance of improvement of learner B, which is 0.4 and more than learner A.
2. **If learner A's post-test result is 20:**
   The Im_2 line shows the significance of improvement on the vertical axis, which is 0.33; however, for learner B, Im_4 is 0.4, which is still more than learner A.
3. **If learner A's post-test result is 25:**
   The Im_3 line shows the significance of improvement on the vertical axis, which is 0.5. Now, learner A's improvement becomes more than that of B.

It is noteworthy to say that all these three assumptions had the same conclusion and judgment based on previous studies; learner A's improvement was more significant:

- **Assumption 1:**
  Learner A's significance of improvement: 15-10=5
  Learner B's significance of improvement: 37-35=2
- **Assumption 2:**
  Learner A's significance of improvement: 20-10=10
  Learner B's significance of improvement: 37-35=2
- **Assumption 3:**
  Learner A's significance of improvement: 25-10=15
  Learner B's significance of improvement: 37-35=2

Furthermore, for solving the maximum score problem, assume that both learner A and B received full score (40) in their post-tests. Obviously, for both, significances of improvement are maximum 1; thus, we cannot claim that one of them improved either less or more, but we can claim their improvements are equal.

The aim of this study is twofold. The first aim is to replicate and extend the previous research by adopting metacognitive strategies and investigating its role on listening performances. The other aim is to find out which group (less-skilled or more-skilled) benefits more from metacognitive intervention.

3. Methodology

A quantitative approach was used to address the research questions. In doing so, quasi-experimental design (Cook & Campbell, 1979) was utilized since assignment of participants were not randomized.

3-1. Participants

65 Iranian students participated including 31 more-skilled (15 advanced and 16 upper-intermediate) L2 listeners and 34 less-skilled (18 intermediate and 16 lower-intermediate) L2 listeners. The participants were between 20 and 30 years old. 14 were male, and 51 were female.

3-2. Instruments

Two research instruments were used in the present research study to answer the research questions:

- An Oxford Placement Test (OPT) (Allan, 2004)
- IELTS listening tests (Scovell et al., 2004)

An Oxford Placement Test (OPT) was used for the sake of homogenizing L2 learners' level of English proficiency (Allan, 2004). The OPT included 200 multiple choice items on two sections, namely listening, and use of English (i.e. vocabulary, grammar, and reading). In addition, the grammar section contains 100 questions focused on typical verb tense and

JOURNAL OF FOREIGN LANGUAGE RESEARCH, Volume 11, Number 1, Spring 2021, Page 139 to 152

sentence structure. Participants normally have a maximum of 90 minutes for the test. This test has a high measure of reliability calculated as 0.9 (Geranpayeh, 2003).

The materials used in listening activities should feature authentic and natural everyday speech. Field (2000) suggests that listening activities should be authentic Therefore, in order to consider the authenticity, IELTS listening test was used to examine the learners' listening comprehension in the pre-/post-test. IELTS listening tests, developed by Scovell et al. (2004) consisted of four components and each with ten questions focusing on daily conversation, public speech, academic discussion, and academic lecture.

3-3. Procedure

First, the OPT was used to homogenize the participants based on their level of English proficiency. In addition, less- and more-skill l2 listeners groups were separated based on their OPT results. The participants were divided into four groups based on their OPT test. The first two groups were considered as more-skilled L2 listeners and the second two groups were considered as less-skilled L2 listeners

Group 1 represents the *advanced* group (170 ≤ OPT result ≤ 189),

Group 2 represents the *upper-intermediate* group (150 ≤ OPT result ≤ 169),

Group 3 represents the *intermediate* group (135 ≤ OPT result ≤ 149),

Group 4 represents the *lower-intermediate* group (120 ≤ OPT result ≤ 134)

The teacher guided the learners through metacognitive strategy-based instruction (Vandergrift & Tafaghodtari, 2010), and the learners were encouraged to apply metacognitive strategies during the listening process, specifically planning, monitoring, and evaluation. Since the metacognitive intervention was sequential, it helped learners to develop their listening skills and benefit from the intervention. The process of these interventions is as follows.

1. Before the intervention, the learners were given a topic and were asked to have some prediction related to the topic.
2. Then, they were asked to listen to a recorded listening text, related to the topic, for the first time and verify their prediction; in addition, they shared their notes with their peers.
3. They were, then, asked to repeat the process for second verification, but this time, they shared their notes with the whole class.
4. They also were asked to listen to the recorded listening text one last time for final verification; furthermore, they could add any additional information or write about the strategies they used during the process in reflective stage.

After OPT (session one), the students took IELTS Listening test as a pre-test (session 2). The interventions were from sessions three to ten (eight sessions). Consequently, a post-test was conducted in the last session (session 11) in order to indicate the learners' final significance of improvement. Eight weeks interval between pre- and post-test were considered.

After obtaining the results, the assessments were based on fuzzy logic. Thus, the progress of less-/more-skilled L2 listeners with different scales were first equalized and then comparisons were made. During the assessment, on the horizontal axis or X, the results of pre-tests and post-tests were mentioned. The Y axis is used to equalize the two scales. In other words, the different scales on the X-axis became equal scales on the Y-axis, indicating progress.

4. Results and discussion

Figure 4 shows the learners' improvement based on previous studies while Figure 5 is based on this paper. As mentioned above, the participants were divided into four groups based on their OPT test:

Group 1 represents the *advanced* group (170 ≤ OPT result ≤ 189),

Group 2 represents the *upper-intermediate* group (150 ≤ OPT result ≤ 169),

Group 3 represents the *intermediate* group (135 ≤ OPT result ≤ 149),

Group 4 represents the *lower-intermediate* group (120 ≤ OPT result ≤ 134).

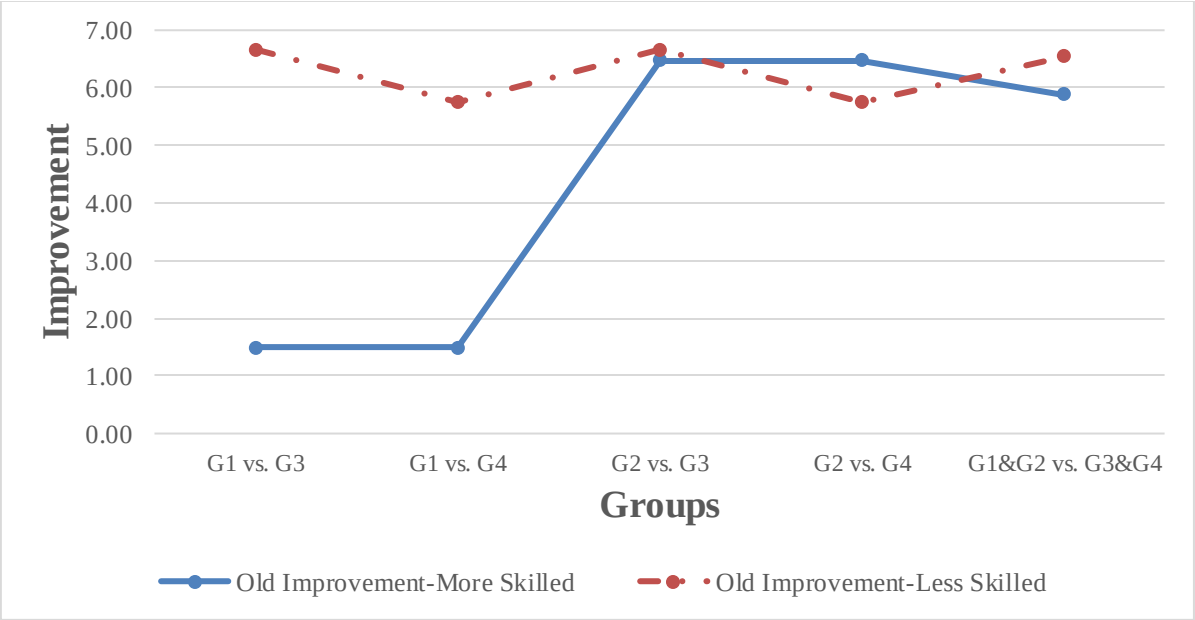

Figure 4. Improvement based on old-assessment

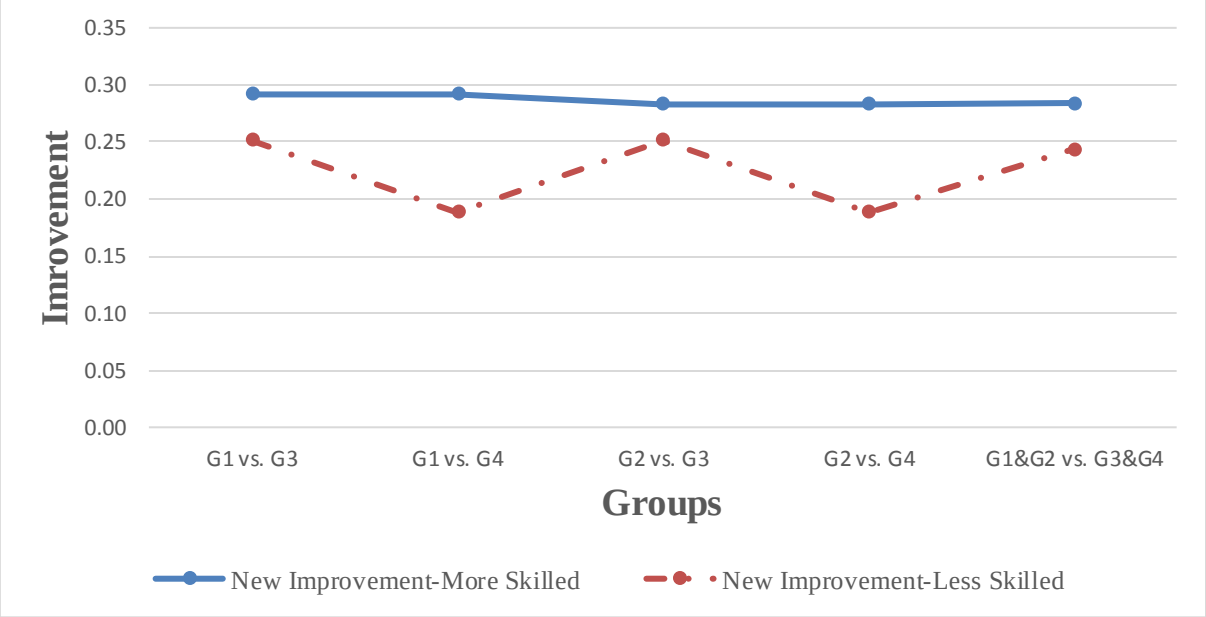

Figure 5. Improvement based on new-assessment

In both Figures, the vertical axis shows the extent of improvement, and the horizontal axis indicates the names of less-skilled and more-skilled groups which were compared. For example, G1 vs. G4 on the horizontal axis means that group 1 is compared with group 4. The blue line shows the improvement of more-skilled L2 listeners and the red line illustrates the improvement of less-skilled ones. As you can see the "Improvement" in Figure 4 and Figure 5 are different; this is due to the fact that the result of improvement based on old-assessment ranges

JOURNAL OF FOREIGN LANGUAGE RESEARCH, Volume 11, Number 1, Spring 2021, Page 139 to 152

from zero to forty while the result of improvement based on new-assessment ranges from zero to one. Due to increasing the accuracy of evaluation, L2 listeners were divided into four groups instead of two.

1. First, group 1 was defined as more-skilled L2 listeners, and group 3 is defined as less-skilled ones (advanced vs. intermediate groups) and then compared.
2. Second, group 1 was chosen as more-skilled L2 listeners, and group 4 as less-skilled counterparts and then compared (advanced vs. lower-intermediate groups).
3. Third, group 2 was introduced as more-skilled L2 listeners, and group 3 as less-skilled ones and then compared (upper-intermediate vs. intermediate groups).
4. Fourth, group 2 was defined as more-skilled L2 listeners, and group 4 is defined as less-skilled ones (upper-intermediate vs. lower-intermediate groups) and then compared.
5. Now, no groups were left; thus, two groups were merged into one group so that the new groups can represent less- or more-skilled listeners as a whole. Accordingly, groups 1 and 2 is defined as more-skilled L2 listeners, and group 3 and 4 as less-skilled ones (the first and second half) and then compared.

All calculations were performed based on both previous studies (Figure 4) and fuzzy logic (Figure 5).

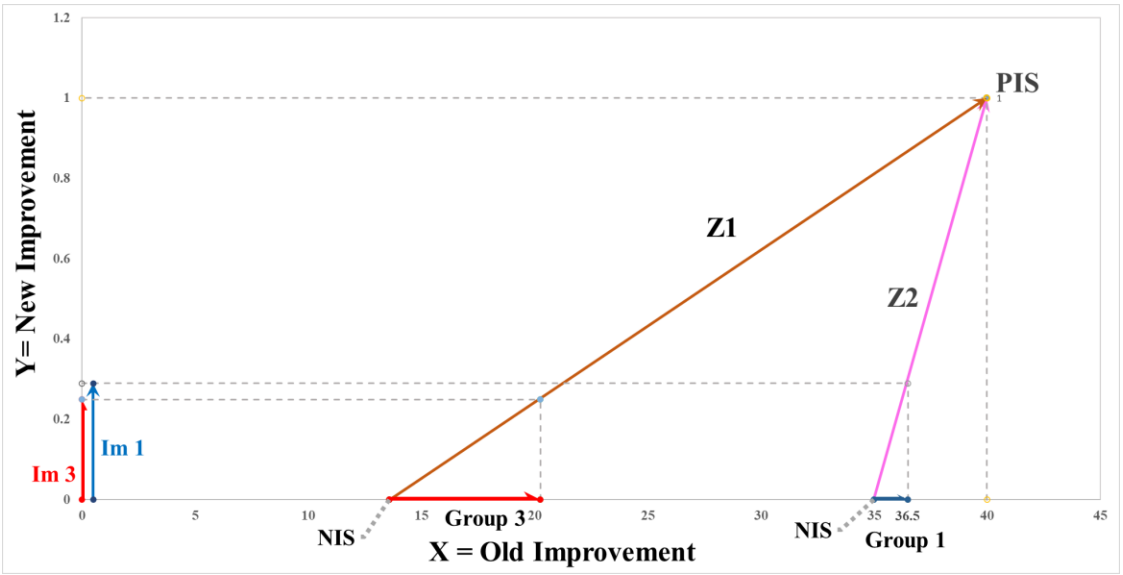

Figure 6. Comparison of group 1 and group 3 based on fuzzy logic

For example, in Figure 6, group 1 (advanced) is compared with group 3 (intermediate), based on fuzzy logic. As can be seen, the mean of pre-test groups 1 and 3 are 35 and 13.6, respectively, and the mean of their post-tests are 36.5 and 20.26, respectively. Lines Z1 and Z2 from the pre-tests (representing NIS) are attached to the final score with coordination (1 and 40) (representing PIS). From the post-test results, parallel lines of the Y axis are drawn to the lines Z1 and Z2. The size of these lines are equal to the two lines Im1 and Im3, which represent the progress of groups 1 and 3, respectively, based on fuzzy logic. It is noteworthy that in order to assess the progress of groups 1 and 3 based on the previous studies, the difference between the post-test and the pre-test, which are 36.5-35=1.5 and 20.26-13.6=6.66 for group 1 (blue line on the X axis) and group 3 (red line on the X axis), respectively.

In the same way, the other groups were compared in Figure 4 and Figure 5.

4-1. Considering two Figures for comparison

- **Group 1 vs. Group 3:**

  Figure 4 (based on previous studies): group 1's improvement is significant compared with group 1's.

  Figure 5 (based on this study): group 1's improvement is rather significant compared with group 3's.

- **Group 1 vs. Group 4:**

  Figure 4: group 4's improvement is significant compared with group 1's.

  Figure 5: group 1's improvement is significant compared with group 4's.

- **Group 2 vs. Group 3:**

  Figure 4: group 2 and 3's improvements are almost the same.

  Figure 5: group 2's improvement is rather significant compared with group 3's.

- **Group 2 vs. Group 4:**

  Figure 4: group 2's improvement is slightly more than group 4's.

  Figure 5: group 2's improvement is significant compared with group 4's.

- **Groups 1 and 2 vs. Groups 3 and 4:**

  Figure 4: group 3 and 4s' improvement is slightly more than group 1 and 2s'

  Figure 5: group 2 and 3s' improvement is rather significant compared with group 3 and 4s'.

Generally, based on previous studies, less-skilled L2 listeners' extent of improvement is more than that of more-skilled L2 listeners' while based on this study, the result is vice versa.

In Figure 5, comparing groups 1 and 2 with group 4, illustrate more difference than comparing groups 2 with 3, and also, group 12 with 34. The results seem logical since the more gap between L2 listeners' levels appears, the more difference appears in their results. For example, the comparison of group 2 with group 4 (upper-intermediate with lower-intermediate) showed more difference, due to the more gap between them, than the comparison of group 3 with group 4. However, the comparison of group 1 with 3 did not illustrate much difference although there was a gap between group 1 and 3.

The data provided in this study indicated that both less-skilled and more-skilled groups made significant progress according to two different assessments. If the differences between pre-test and post-test results were only considered (Bozorgian, 2012, 2015; Cross, 2011; Goh & Taib, 2006; Vandergrift & Tafaghodtari, 2010), the progress of more-skilled group would be trivial (Figure 4). However as Cross (2011); Vandergrift and Tafaghodtari (2010) mentioned, there may be a threshold point for the more-skilled group based on their level of knowledge and skills. Nevertheless, mere consideration of the difference between pre-test and post-test results makes the value of performance, for both groups quite equal. This study made an attempt on considering the difference in performances between these groups.

Referring to the research question and considering Figure 5, which is based on fuzzy logic, it should be stated that the answer to this question is no. After comparing the two different scales (the rate of progress of less-/more-skilled L2 listeners) through the fuzzy logic shown in Figure 5, it can be generally stated that less-skilled L2 listeners benefit less from metacognitive intervention.

It is worth noting that this study also confirms the results of previous studies. As shown in Figure 4, if the assessment approach is based on previous studies (pre-/post-test differences) (Bozorgian, 2012, 2015; Cross,

2011; Goh & Taib, 2006; Vandergrift & Tafaghodtari, 2010), this study is in line with previous studies, and less-skilled L2 listeners benefit more from the metacognitive intervention. However, if the assessment approach is based on fuzzy logic in Figure 5, the results are quite the opposite of previous studies.

There are some similarities and differences between the present study and previous ones that should be taken into account. First, the learners in this study were Persian adult TEFL students, whereas the learners in Bozorgian (2015); Cross (2011); Goh and Taib (2006); Vandergrift and Tafaghodtari (2010) students were intermediate Persian adult, advanced Japanese, Chinese ESL, and high-beginner/ low-intermediate French students, respectively. Second, like Bozorgian (2015), in this study, IELTS listening component contents (daily conversation, public speech, academic discussion, and academic lecture) were utilized as listening materials. Goh and Taib (2006); Vandergrift and Tafaghodtari (2010) employed a variety of listening texts for the learners in the classroom; Cross (2011) used BBC television news items. Finally, similar to Bozorgian (2015), in the present study, IELTS listening tests were applied as an instrument to assess the learners' pre-test and post-test performance. In contrast, the studies above used standardized teacher-made tests.

5. Conclusion

This was a quantitative study based on metacognitive intervention about more- and less-skilled listeners and their significance of improvements. Based on this study, more-skilled listeners benefit more from the intervention. This study provides an opportunity to advance the understanding of difference between the level of improvement of less- and more-skilled L2 listeners based on pre- and post-test results. This might be beneficial for researchers and teachers to consider other factors when they try to come to a conclusion about less- and more-skilled L2 listeners. In addition, this study makes a contribution to the field of assessment. Assessments based on just the difference of pre- and post-test results may be neither sufficient nor suitable in some cases.

However, there were some limitations before and during the study: i) This study did not consider the gender factor between participants, and there were unequal numbers of male/female participants in both control and experimental groups. ii) This study did not consider the age factor of the participants either. iii) The allocated time for metacognitive interventions was limited.

Because this is a quantitative study with results based on numbers, future studies can apply a qualitative approach and conduct interviews after the intervention period.

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