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# *Developing a Listening Comprehension Problem Scale for University Students' Metacognitive Awareness*

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This article reports on the development and validation of a measurement survey tool, the Listening Comprehension Problem Scale (LCPS). LCPS is intended to help identify and evaluate second language (L2) learners' listening comprehension problems while they are listening to oral texts in order to enhance their metacognitive awareness of L2 listening processes. An exploratory factor analysis was performed with a primary sample ($N$ = 360), followed by a subsequent confirmatory factor analysis with a secondary sample ($N$ = 326), resulting in a 15-item survey instrument with robust psychometric properties. The reliability and factorial validity of the instrument are presented along with evidence for a statistically significant correlation between students' responses to the items on the instrument and their L2 listening performance. Future uses for the instrument are also discussed in relation to its potentials in verifying the effectiveness of pedagogies designed to develop L2 learners' listening comprehension skills.

**Key words: cognitive processing, L2, listening comprehension problems, EFL, metacognitive awareness**

# INTRODUCTION

Much attention in listening comprehension research has been paid to L2 learners' self-reports of their awareness of the difficulties encountered in listening. Oftentimes, reflections of these difficulties constitute a part of learners' metacognitive knowledge about their listening processes (e.g., Goh, 1997, 2000; Vandergrift et al., 2006; Wenden, 1991). It has been argued that metacognitive knowledge could have positive influences on L2 development (Wenden, 1998; Zhang, 2010), and it is particularly so as regards L2 listening (e.g., Bolitho et al., 2003; Goh, 2000; Vandergrift et al., 2006; Victori & Lockhart, 1995; Wilson, 2003). Such introspective reports can also be useful for both researchers and teachers to understand part of the cognitive constraints in L2 learners' listening comprehension (Cross, 2009; Goh, 1997, 2000; Sun & Li, 2008; Wang, 2008).

Recent evidence has prompted the development of this measurement tool intended to explore learners' difficulties in L2 listening (see also Vandergrift et al., 2006; Zhang & Goh, 2006). Given that the available research lacked both factor specificity and psychometric evaluations of the instruments that were used for these purposes, we make an attempt to fill up this paucity by outlining the processes of scale item generation, data collection and analyses, whereby a reliable and well-validated Listening Comprehension Problem Scale (LCPS) is generated. This measure could serve not only as a self-assessment instrument for learners to appraise their difficulties in L2 listening but also a survey instrument for researchers and instructors to assess L2 learners' comprehension problems in listening to enhance their metacognitive awareness of L2 listening comprehension processes.

# REVIEW OF THE LITERATURE

## Metacognitive Knowledge about L2 Listening

Research on the process of L2 listening started with examinations of L2

learners' use of learner strategies in listening comprehension (e.g., Bacon, 1992; Graham & Macaro, 2008; O'Malley & Chamot, 1990; Vandergrift, 1997). Such research has recently expanded to emphasize learners' cognitive appraisal or metacognitive knowledge (Vandergrift et al., 2006; Zhang, 2010).

Metacognition is a concept that has been used to refer to a variety of epistemological processes, meaning essentially cognition about cognition. Flavell (1978) referred to metacognition as "knowledge that takes as its object or regulates any aspect of any cognitive endeavor" (p. 8). Paris and Winograd (1990) argue that "metacognition captures two essential features … self-appraisal and self-management of cognition" (p. 17). Even though the literature offers many definitions of the term, there is a general consensus among theorists that the most effective learners are those who self-regulate their learning in many aspects (Butler & Winne, 1995, p. 245). Key to effective self-regulation is accurate self-assessment of what is known or not known (Schoenfeld, 1987), during which process metacognition plays a crucial role. There is extensive evidence that learners' metacoginition can directly affect the process and the outcome of their learning (Boekaerts et al., 2000; Bolitho et al., 2003; Eilam & Aharon, 2003; Gong et al., 2011; Palmer & Goetz, 1988; Schoonen, Hulstijn, & Bossers, 1998; Victori & Lockhart, 1995; Winne, 1995; Zhang, & Wu, 2009; Zimmerman & Schunk, 2001), including test performance (Purpura, 1997).

Flavell's (1979) model of metacognitive knowledge has been successfully applied to the research work in the field of L2 learning by Wenden (1991, 1998), Goh (1997), Victori & Lockhart (1995), Cross (2009) and Zhang (2010), among others. Three categories of knowledge are included in the model: Person variables, task variables, and strategy variables. Based on Goh (1997, 2000), Zhang (2001), and Zhang & Goh (2006), Vandergrift and associates defined person knowledge about listening as knowledge about how factors such as age, aptitude, gender, learning style, beliefs about oneself as a learner (e.g., self-concepts and self-efficacy about listening and specific listening problems, their causes and possible solutions) can be useful information that learners can make use of when learning to listen in a second

language (Vandergrift et al., 2006). Hence, reflections of the problems encountered by learners in listening constitute a part of learners' metacognitive knowledge about their listening processes (Cross, 2009; Goh, 2000; Wenden, 1991; Zhang & Goh, 2006).

To investigate learners' metacognitive knowledge about listening comprehension problems, various procedures have been used, including listening diaries and interviews (Goh, 1997; Zhang, 2001), think-aloud protocols (Goh, 2000; Sun & Li, 2008), and questionnaires (Wang, 2008; Zhang & Goh, 2006). Results of these studies have indicated that language learners possess knowledge about their difficulties in listening processes and such knowledge is linked to how listening abilities are orchestrated, and that learners with higher listening abilities demonstrate a higher degree of awareness of their listening comprehension problems. Moreover, there has been preliminary evidence that learners' performance, confidence and motivation can be enhanced through classroom metacognitive instruction (Goh & Taib, 2006; Vandergrift, 2003; Zhang, 2008a; Zhang & Goh, 2006). Based on his study of relationships among metacognition, motivation, and listening proficiency, Vandergrift (2005) provided some evidence for links among self-determination theory, self-regulated learning, learning autonomy, and metacognition. Similarly, Zhang (2008b) advocates a metacognitive knowledge-based skills/strategies approach to L2 listening development based on his successful experience in metacognitive reading instruction (2008a).

## Listening as Cognitive Endeavors

Listening comprehension problems can be identified through exploring the degree to which L2 learners posses metacognitive knowledge about, or awareness of, L2 listening comprehension processes. It follows that a valid instrument for tapping language learners' listening comprehension problems would be built on an understanding of the construct of metacognition. One of the prerequisites for this is the understanding that listening involves primarily

cognitive processing, and metacognition is one important aspect. In relation to this understanding, a number of studies are reported in the literature that draw on such theoretical understanding (Goh, 2000; Zhang & Goh, 2006).

In her research on L2 listening comprehension problems, Goh (2000) resorted to Anderson's (1995) cognitive processing model of language comprehension in categorizing the listening comprehension problems she identified through examining learners' self-reported data. In Anderson's (1995) framework language comprehension comprises three stages: Perceptual processing, parsing, and utilization. Perceptual processing is the first stage, which is mainly concerned with encoding the audio, visual, or written language, as soon as the listener receives the stimuli. This means that the listener has to encounter phonemes that need to be segmented and retained in echoic memory for the next stage of processing, i.e., parsing (Anderson, 1995, p. 37). Parsing involves the listener's effort to transform whatever is heard or seen into a mental representation of the combined meaning of these audio or visual stimuli.

Parsing occurs when an utterance is segmented according to syntactic structures or cues to meaning. These segments are recombined to generate a meaningful representation of the original sequence. This mental representation is related to the existing knowledge stored in long-term memory commonly known as propositions, scripts, or schemata, and is made use of by the listener during utilization, the third stage of cognitive processing.

During utilization the listener may make inferences of any type that would benefit his/her attempt at interpreting the stimuli and make them more personally meaningful for completing the round of comprehension. Perception, parsing, and utilization are different but interrelated levels of processing. According to Anderson (1995), these three processes are "partially ordered in time; however, they also partly overlap. Listeners can be making inferences from the first part of a sentence while they are already perceiving a later part" (p. 379). It is obvious that Anderson's model offers us a lens through which researchers can access L2 learners' listening difficulties.

This is because by locating where the problems are researchers can make use of this knowledge in understanding the difficulties listeners encounter. They can also help these learners meet the challenges with useful tactics and strategies (see Zhang, 2008b)

Goh (1997) investigated Chinese ESL learners' person knowledge (i.e., their metacognitive knowledge about themselves as L2 learners) and found that the Chinese-speaking ESL students could assess the problems that they encountered in L2 listening. Goh (2000) further reported 10 listening problems identified from three self-reported sources: listening diaries (the main one), oral reports from small group interviews and recall protocols. Based on the cognitive framework of language comprehension proposed by Anderson (1995), she assigned half of the problems to perceptual processing problems, three others to parsing, and two others to utilization. These problems are real-time processing problems, resulting from a number of factors like failure in word recognition, ineffective attention, failure to use appropriate comprehension tactics, lack of schematic knowledge, limited processing capacity, and so on. She found that the more skilled listeners demonstrated a higher degree of awareness of their listening problems. Furthermore, the high ability listeners might have more high-level utilization problems, while the low ability listeners appeared to have more low-level perception problems, although all of them shared some similar problems. Following this line of research, researchers have shown great interest in EFL learners' listening comprehension problems (e.g., Hu, 2009; Sun & Li, 2008).

While it is laudable that researchers focused on identifying L2 listening comprehension problems, given the size of the country, the immense number of EFL learners at universities in China (Gao, 2010), and the social influences on language learning and teaching (Barkhuizen, 2004), we need to point out a strong drawback in these studies; i.e., most of the researchers categorized the listening comprehension problems into the three phases as in Anderson' (1995) cognitive framework without following any consistent taxonomy. Furthermore, except for a few studies (Vandergrift et al., 2006; Wang, 2008), the few existing questionnaires for investigating listening

comprehension problems have provided no rigorous validation procedures (e.g., Hu, 2009; Mokhtair & Reichard, 2002; Sun & Li, 2008; Zhang & Wu, 2009). Given the importance of understanding learners' awareness of listening comprehension problems, a valid instrument is needed imperatively.

The following section describes the development and validation of a new self-report measure, the LCPS, for assessing L2 learners' metacognitive awareness about listening comprehension problems based on Anderson's cognitive framework of language comprehension. We are interested in locating the underlying factorial structure of this self-report measure of listening comprehension problems. By so doing, we hope that the inconsistency in categorizing listening comprehension problems into Anderson's three phases might be reduced, and a valid rating scale could be generated. This measure could serve both as a self-assessment instrument for learners to appraise their difficulties in L2 listening and as a survey instrument for researchers and instructors to efficiently assess learners' listening comprehension problems and enhance their metacognitive awareness of L2 listening processes. This instrument might also be useful for classroom teachers to check the effectiveness of their pedagogies designed for developing L2 learners' listening comprehension strategies which would help students increase their self-regulation in L2 listening.

## METHOD

Our developing and validating the LCPS started with a thorough review of the recent literature relevant to metacognition on L2 listening comprehension and student difficulties in listening comprehension. Thirty-five listening comprehension problems were collected from the prior studies and evaluated through expert judgment and pilot test with 14 items deleted. The list of retained items was then submitted to an exploratory factor analysis (EFA) to determine the potential factors, followed by a subsequent confirmatory factor analysis (CFA), and thus a four-factor model was obtained. Finally, the

reliability and validity of the rating scale, LCPS, were verified and a relationship between student responses on the rating scale and students' actual listening performance was established.

## Developing Instruments

By reviewing the relevant literature of metacognition, listening comprehension and Anderson's (1995) language comprehension model (e.g., Goh, 2000; Hu, 2009; Sun & Li, 2008; Wang, 2008; Zhang, 2001; Zhang & Goh, 2006), we intended to provide a theoretical validation for the construction of items (relevant items and format) to measure learners' listening comprehension problems. Concretely, a comprehensive list of 35 items in Chinese (L1) for measuring listening comprehension problems was formulated based on L2 listening comprehension problems identified by Goh (2000), Hu (2009), Sun & Li (2008), and Wang (2008). This initial list of items was evaluated by two English language teachers for redundancy, content validity, clarity, and readability (Dörnyei, 2003; Vandergrift et al., 2006; Weber et al., 2004). After discussing with these two persons and re-examining the list, we found that 14 items either had multiple forms or containing a double question, so we eliminated them and kept only 21 items.

Following the guidelines outlined by Dörnyei (2003), the 21 items were designed in a 5-point Likert scale with gradations ranging from "Never True for Me" to "Always True for Me", forming the listening comprehension problem scale (LCPS; see Appendix). The items were grouped in sequences logically organized by content (perception, parsing, and utilization). This scale concluded with demographic questions pertaining to gender, age, class rank, academic major, and the last five digits of Student ID No. A cover letter explaining the project's purpose was provided to the instructors and students together with a consent form. Finally, the scale was piloted with a few students for additional feedback on clarity of the items, followed by a further fine-tuning of the items.

## Validating Instruments

*Participants*

The LCPS was field tested with a sample of 360 respondents at a university in a northern city of about 8 million people in mainland China. The participants included first-year medical graduates (12%), third year English undergraduates (18.9%), second year Health Management undergraduates (16.1%), second year Clinical Medicine undergraduates (22.8%), second year Clinical Laboratory Science undergraduates (11.1%), second year Labor and Social Security undergraduates (11.1%), and second year Pharmacy Marketing undergraduates (8%). Of the total number of respondents, 33.3% were male and 66.6% were female. The mean age of these participants was 23.5 years (range = 20 – 29). All of them were Chinese and the LCPS was written in Chinese.

*Procedures*

All participants were briefed on the procedures and were informed that they were requested to fill in the LCPS and they could withdraw from this research at any time if they wished to. The LCPS was distributed and collected by the regular course instructors and the administration procedures were similar in all classes. The instructors were asked to administrate the LCPS after the class had completed Part III in the listening section of Band 4 Test for English Majors (TEM-4), which included listening to three texts of about 150 words each and answering 25 questions. TEM-4 is a large-scale nation-wide examination in China which has been well-established with a high reliability ($\alpha = 0.901$). In this case, students would have a specific task on which to base their responses. The instructors were required to review and clarify the instructions for students to complete the scale, emphasizing that there were no right or wrong answers and that honest responses to the items were encouraged and appreciated. Students were asked to indicate their

responses directly onto the LCPS according to their experiences and feelings while doing the test. The student responses on this scale were submitted to an EFA to determine the underlying factors.

After the EFA (see Results section), a shorter version of the LCPS revised based on the EFA was submitted to a CFA. The second administration of the LCPS took place with another sample of respondents ($n$ = 326). All respondents were university students studying English as a foreign language at two universities in the city where the first sample was drawn. Their proficiency levels ranged from beginner-intermediate (25%), intermediate (55%), to intermediate-advanced (20%). All participants were Chinese, and the LCPS was written in Chinese. The procedures for this second administration of the LCPS were similar to those in the first except that the listening task this time was the listening comprehension section of a TOEFL test (Oct. 2003, $\alpha = 0.924$). In this case, the participants were encouraged to ensure that the code number for their identity on the scale was the same as that on the listening comprehension test.

## RESULTS

### Exploratory Factor Analysis

An investigation of the LCPS factor structure was conducted through SPSS (SPSS, Inc., 2002) with the first sample ($n$=360). Principal axis factor analysis with oblique rotation was used to obtain a small number of factors by maximizing variances among factors. Kaiser's criterion and scree plot were considered to determine the number of factors to extract. With an attempt to improve the solutions' clarity and meaningfulness, items whose factor loadings to the target factor were over .40 (i.e., at least 15% overlapping variance between the item and the factor) were retained and they loaded only on that factor (Tabachnick & Fidell, 1997). As a result, items 1, 2, 6, 10, 12, and 18 were excluded from the analysis and thus 15 items were retained (see Table 1). The number of factors was determined by the size of

eigenvalues (Kaiser, 1960) and the scree test (Cattell, 1966). The resulting eigenvalues greater than 1 were 7.553, 1.615, 1.303, and 1.155 with a total 70.17% of the variance, indicating either one or four factors could be extracted. The scree plot suggested a four-factor solution, with each factor meeting the needs for at least three indicators (Kishton & Widaman, 1994). In an attempt to further fine-tune the scale, both the one- and four-factor models would be assessed using CFAs.

**TABLE 1**
**Factor Loading Estimates for the Exploratory Factor Analysis (*n* = 360)**

| No. | Items | One-factor model | Four-factor model | | | |
|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 |
| V21 | Do not understand the intended message of an entire text. | .512 | **.791** | | | |
| V19 | Do not understand the intended message of some part(s). | .561 | **.680** | | | |
| V20 | Confused about the key ideas in the message. | .636 | **.619** | | | |
| V17 | Do not understand next parts of input because of earlier problems. | .538 | **.588** | | | |
| V13 | Do not understand the long sentences. | .622 | **.456** | | | |
| V16 | Do not understand a word with more than one meaning. | .599 | **.439** | | | |
| V15 | Quickly forget what is heard. | .652 | | **.796** | | |
| V11 | Neglect the next part when thinking about meaning. | .517 | | **.614** | | |
| V14 | Do not chunk streams of speech. | 572 | | **.487** | | |
| V5 | Difficult in recognizing words due to own incorrect pronunciations. | .547 | | | **.804** | |
| V4 | Do not respond to words quickly enough. | .613 | | | **.636** | |

| | | | | |
|---|---|---|---|---|
| V3 | Do not recognize the learned words. | .550 | **.615** | |
| V8 | Difficult in recognizing sounds due to linking, assimilation, omission in speaking. | .523 | | **.726** |
| V7 | Difficult in recognizing sounds due to fast speaking. | .509 | | **.654** |
| V9 | Difficult in recognizing sounds due to speaker's accent and intonation. | .496 | | **.581** |

**TABLE 2**
**LCPS Factor Correlations for the Exploratory Factor Analysis**

| Factor | EFA | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 1 Meaning | .803 | | | |
| 2 Attention and Memory | .503*** | .739 | | |
| 3 Words | .626*** | .496*** | .715 | |
| 4 Sounds | .475*** | .455*** | .550*** | .701 |

*Note*. Crohbach's alphas for EFA are presented on diagonal. *** $p < 0.001$

*One-factor Model ($M_1$)*

The items and loadings on the one factor are displayed in Table 1. All items loaded substantially (> .40) on this factor, ranging from .496 to .652.

*Four-factor Model ($M_4$)*

The four-factor model accounted for 70.17% of the variance. The oblique rotation resulted in the most interpretable structure. Based on the item contents, the four factors were termed: Meaning (Items 13, 16, 17, 19, 20, 21), Attention and Memory (Items 11, 14, 15), Words (Items 3, 4, 5), and Sounds (Items 7, 8, 9). The loadings and item contents are depicted in Table 1, with loadings varying from 0.439 to 0.804 being all greater than 0.4. The correlations among the four factors are presented in Table 2, ranging from

0.455 to 0.626.

*Confirmatory Factor Analysis*

The CFA was performed using Amos 6.0 (Arbuckle, 2005; SPSS, Inc., 2002). CFA is useful in assessing the accuracy of the underlying latent structure of the measure by determining if the data fit the specified model. The indices of goodness of fit include $\chi^2$, the relative discrepancy index ($\chi^2/df$), goodness-of-fit index (GFI) (Jöreskog & Sörbom, 1986), the adjusted-goodness-of-fit index (AGFI) (Jöreskog & Sörbom, 1986), the Bentler-Bonnett index (NFI) (Bentler & Bonnett, 1980), the Tucker and Lewis (1973) index (TLI) (McDonald & Marsh, 1990), the comparative fit index (CFI) (Bentler, 1990), the root-mean square error of approximation (RMSEA) (Raykov, 1998), Akaike's Information Criteria (AIC) (Akaike, 1987) and Browne-Cudeck Criterion (BCC) (Browne & Cudeck, 1993). These indices were chosen based on their frequent use in the CFA literature, and for their suitability in model comparison (Bieling et al., 2001; Mulaik et al., 1989).

In CFA, a non-significant $\chi^2$ ($p \geq .05$) is desired because it indicates that the hypothesized model fits the data, whereas a significant $\chi^2$ suggests that the model does not fit the data. An $\chi^2/df$ ratio $\leq 2$ represents a good fit (Byrne, 1989, 1994) and some others claim values $< 3$ (Carmines & McIver, 1981) indicate a good fit. Doll et al. (1994) claim that GFI and AGFI values between 0.80 and 0.89 indicate an acceptable fit while values greater than 0.90 are generally regarded as a good fit. NFI, TLI and CFI values closer to 1 are indicative of a good fit (Byrne, 2001) and values greater than .90 are commonly recommended (Hu & Bentler, 1999). The RMSEA is an evaluation statistic that is relatively unaffected by sample size, and is suitable for assessing models of differing complexity (Browne & Cudeck, 1993). Hu and Bentler (1999) note that RMSEA values $\leq .06$ indicate a good fit. Tabachnick and Fidell (1997) claim the RMSEA value $\leq .07$ indicates a close fit. Others have proposed that values between .06 and .10 reflect a mediocre fit while values above .10 indicate a poor fit (MacCallum, Browne, &

Sugawara, 1996). Measures of parsimony that assess both model fit and the number of constraints required (efficiency of the model) included the Akaike's Information Criteria (AIC) and Browne-Cudeck Criterion (BCC). For these indices, the lowest, the better.

To examine further the best structure for LCPS, two separate factor solutions ($M_1$ and $M_4$) were compared using confirmatory techniques with maximum likelihood estimation in the second sample ($N = 341$). To show the real picture of the factor structures, model modification indices were not utilized in each model. A number of goodness of fit indices and measures of parsimony for each solution were compared to ensure that the most appropriate model was chosen (Mulaik et al., 1989).

Following Vandergrift et al. (2006), the assumptions of multivariate normality and linearity were evaluated through SPSS before proceeding with the analysis of the two models. Mahalanobis $D^2$ showed that 15 participants were multivariate outliers, $p < 0.001$, and their responses were deleted from the analysis (326 remained).

**TABLE 3**
**Measures of Goodness of Fit and Parsimony for the Two Models**

| | $\chi^2$ | $\chi^2$/df | *p* | GFI | AGFI | NFI | TLI | CFI | RMSEA | AIC | BCC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $M_1$ | 275.709 | 3.063 | 0 | .798 | .731 | .667 | .701 | .744 | .112 | 335.709 | 342.196 |
| $M_4$ | 129.621 | 1.543 | 0 | .909 | .870 | .854 | .921 | .937 | .058 | 201.621 | 209.404 |

*Note.* M1 = the one-factor model; M4 = the four-factor model.

The values of indices for the two models are shown in Table 3. An examination of the goodness-of-fit indices for $M_1$ shows a poor overall fit, $\chi^2 > 3$ (Carmines & McIver, 1981), with distributed values of GFI and AGFI being < 0.8 (Doll et al., 1994), and of REMSEA being > 0.1. The $\chi^2$ (129.621) of the four-factor model is smaller than that of the one-factor solution (275.709) and the $\chi^2/df$ ratio is 1.543 (< 2; Byrne, 1989), indicative of a good fit. The values of GFI (.909), TLI (.921), CFI (.937) for the four-factor model are above the commonly recommended threshold = .90, indicative of a good fit. The AGFI value (.870) indicates an acceptable fit

(Doll et al., 1994). The RMSEA value (.058) indicates a good fit (Hu & Bentler, 1999). Only the NFI value (.854) for the four-factor solution is below the commonly recommended cut-off point of 0.9.

Indices of parsimony also indicate that the four-factor model is a more parsimonious model (AIC = 201.621, BCC = 209.404, smaller than those for $M_1$). Taking together indices of fit and indices of parsimony, the four-factor model appears to be better fit to the data. The relationships among latent factors for the four-factor model are shown in Table 4.

**TABLE 4**
**LCPS Factor Correlations for the Confirmatory Factor Analysis**

| Factor | CFA | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| 1 Meaning | 0.58 | | | |
| 2 Attention and Memory | .587 | 0.55 | | |
| 3 Words | .654 | .336 | 0.51 | |
| 4 Sounds | .468 | .301 | .239 | 0.50 |

*Note*. Values of AVE are presented on diagonal.

## Reliability and Validity

*Internal Consistency Reliability*

The present study uses Cronbach's alpha because it is a popular method for measuring internal consistency (Jung & Goldenson, 2008). In the early stages of research on an assessment instrument, reliabilities of 0.7 or higher are considered sufficient for narrow constructs (Van DeVen & Ferry, 1980). As shown in Table 2, the Cronbach's alpha value for the 15-item scale is .862. The standardized alphas for the four factors are: Meaning = .804, Attention and Memory = .739, Words = .715 and Sounds = .701, respectively. All Cronbach's alpha values exceed the recommendation of 0.7, indicating adequate internal consistency reliability for the empirically derived scale and each subscale.

*Indicator Reliability*

Indicator reliability expresses the part of an indicator's variance which is explained by its underlying latent variable and not by the measurement error. Academics propose that at least 50% of the indicator variance should be explained by the variance of the underlying latent construct, translated into a minimum factor loading of 0.7 (Bentler, 1999). For relatively newly developed constructs even lower factor loadings until 0.4 have been accepted (Chin, 1998; Hulland, 1999). As shown in Table 1, loadings for the four-factor model range from 0.439 to 0.804. Overall, the variance explained fits the context of listening comprehension problems.

*Content Validity*

Content validity is defined as the degree to which the indicators of a measurement model belong to the content-semantic sphere of a construct (Venkatraman & Grant, 1986). It is usually assessed by exploratory factor analysis (Bohrnstedt, 1970). The exploratory factor analysis of the data in our study indicated this four-factor model accounted for 70.17% of the variance. The value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy is .85, and the value of Bartlett's Test of Sphericity is significant at a .01 level. These results indicate adequateness and appropriateness of the LCPS as a reflective measurement model.

*Discriminant Validity*

Discriminant validity refers to the degree to which measures of distinct constructs differ. Therefore, the correlation of the indicators within individual constructs must be significant and greater than the correlation of the indictors between different constructs (Fornell & Larcker 1981, p. 41). Discriminant validity can be measured both on the indicator level and on the construct level (Hutzschenreuter, 2009). On the indicator level, discriminant validity

requires indicators to correlate most with their respective constructs. Hence, no indicator is permitted to correlate more with another construct than its associated construct. Discriminant validity on the construct level determines significant semantic differences between the constructs. Constructs are expected to measure conceptually different concepts and not identical ones.

One way to examine the discriminant validity is to look at the correlations among factors. If all the correlations are below the commonly considered cutoff point of 0.85, the proposed model has adequate discriminant validity. As shown in Table 4, all correlations among factors for the four-factor solution are below 0.85, which indicates adequate discriminant validity. Furthermore, all values of average variance extracted (AVE) are greater than 0.5 (Fornell & Larcker, 1981). Based on these results, the discriminant validity of the measures appears to be satisfactory.

Finally, in order to establish a relationship between the listening behavior reported in the LCPS and the actual listening behavior, we correlated the data from the LCPS with the participants' scores on a listening comprehension test. The correlation coefficient obtained was significant, $r = -.486$, $p < 0.01$, confirming the relationship between listening comprehension problems and listening comprehension ability. In addition, to further reinforce the strength of this relationship, we regressed the scores of listening test (the dependent variable) on the LCPS scores (the independent variable). The results of this regression analysis suggest that listening comprehension problems significantly predicted participants' listening scores, $F = 72.81$, $p < 0.01$, with the $R^2$ value of 0.236. This indicated that about 24% of the variance in listening performance could be explained by L2 learners' listening comprehension problems.

## DISCUSSION AND PEDAGOGICAL IMPLICATIONS

The primary objective of this study is to develop and validate a rating scale, the LCPS, to assess L2 learners' metacognitive awareness of their problems

encountered in L2 listening. Examinations of strengths of the one-factor model and the four-factor model lend support to our acceptance of the four-factor model: meaning, attention and memory, words, and sounds. The results of the factor analyses suggest that the LCPS is a relatively homogeneous, coherent measure. Finally, a significant relationship between LCPS scores and listening performance is established.

## Relationship Between the Factors and Anderson's Three Phases

The first factor (meaning) included six listening comprehension problems encountered by L2 listeners while listening to oral texts: I do not understand the intended message of the whole text, although it seems that I understand the text; I do not understand the intended message of some parts, although it seems that I understand them; I do not understand the key ideas of the whole text; I do not understand the next part of the text because of earlier problems; I do not understand the long sentences, although I understand most words in the sentences and, I do not understand the word that has more than one meaning. The first three problems represent those in the utilization phase in Anderson's cognitive framework, while the last three represent the problems in the parsing phase (Goh, 2000; Hu, 2009; Sun & Li, 2008). It is interesting to note that the problems belonging to two phases (parsing and utilization, respectively) did not emerge as distinct from each other. Anderson (1995) explained that all three phases are interrelated and recursive and can happen concurrently during a single listening event. Such a connection between the two phases (parsing and utilization) just demonstrates a relatively strong interconnectedness between mental representations of words as well as segments and the existing knowledge.

The second factor, attention and memory, included three listening comprehension problems: I often forget the previous sentences quickly; I often neglect the next part while thinking about the previous part; I cannot chunk streams of speech. These problems challenge the limitation of L2 learners' cognitive capacity, thus named "attention and memory". Goh (2000)

assigned the first problem to Anderson's parsing phase and the second to the perceptual phase, while Sun and Li did it oppositely. Hu (2009) and Wang (2008) categorized the first two problems into the parsing phase. Goh (2000) claimed that the fact that students forgot quickly what they heard indicated a limited capacity of their short-term memory and short-term memory was constantly cleared for new input. Anderson (1995) and Howard (1983) argue that unless some form of association or fixation between new input and long-term memory occurs immediately, the information in the short-term memory will be deleted. Thus, the first problem could be treated as one in the parsing phase. As for the second problem, we argue that the students' inability to manage the earlier input and the subsequent input simultaneously resulted from the constraints of a limited short-memory. Hence, we categorize the second problem into the parsing phase. Sun and Li (2008) and Hu (2009) assigned the third problem to the parsing phase.

The third factor, words, included three listening comprehension problems: I cannot recognize words due to my own wrong pronunciations; I cannot respond to the words quickly enough and, I cannot recognize sounds of the words I have learned. These problems were unanimously classified into the perceptual phase.

The fourth factor, sounds, represents the problems in the perceptual phase. These problems include: I cannot discriminate sounds due to linking, assimilation, omission in speaking; I cannot discriminate sounds due to fast speaking; and I cannot discriminate sounds due to speaker's accent and intonation.

Before proceeding with our discussion on the potential uses of the LCPS, we think that it is important to note the significant relationship between the behaviors that listeners report (LCPS scores) and the actual listening performance (listening test scores). Not only was the relationship significant, but the regression analysis further verified a meaningful relationship between metacognition and listening comprehension success. Although the correlation between the scores was moderate, it is meaningful because it accounts for about 24% of the variability in listening performance.

## Pedagogical Utility of the LCPS

Results of our analysis demonstrate the validity and reliability of the LCPS. In addition, our analyses of a second holdback sample strongly support the validity of the scale. Accordingly, we assume that the scale might become a valuable tool for students, instructors, and researchers.

First, students can use the LCPS for self-assessment to determine their current listening problems. The LCPS can be particularly useful for diagnosing L2 listening difficulties and positively influencing students' attitudes and perceptions of the listening process so that, ultimately, they can become skilled listeners who self-regulate metacognitive comprehension processes automatically.

Second, teachers can use the LCPS as a diagnostic or consciousness-raising tool. They can also assess the effectiveness of pedagogies and courses developed for improving learners' listening proficiency. Similar to what students can do with the LCPS for self-assessment purposes, teachers can administer the scale to an entire class in order to determine student awareness of the process of L2 listening and assess the degree of self-regulated use of listening strategies at a specific point in time or over a period of time. When teachers discover, for example, that the class as a whole is under-using a particular strategy or set of strategies, instruction can be adjusted to place greater emphasis on predicting and/or goal-setting before beginning a listening task. It is all too often assumed that language learners know how to listen effectively, and consequently, it is often the case that little attention is paid to teaching students how to listen (Cross, 2009; Zhang, 2008b). In an effective L2 program, it is not sufficient to merely assess comprehension; listening assessment and listening instruction must be integrated. The LCPS can serve such a purpose in L2 listening classes.

Finally, researchers and teachers as action researchers can use the LCPS as a research tool. They can use this instrument as a pretest/posttest to chart the impact of L2 listening instruction and assess learners' growing awareness of the processes underlying successful L2 listening in relation to L2 listening

comprehension gains. Student responses can also be correlated with listening test scores to determine which behaviors correlate best with listening success/achievement. Although correlations do not indicate causation, these relationships would provide some evidence for a theoretical prediction that metacognitive awareness could be indicative of high scores in L2 listening, or vice versa. Teachers as action researchers can use the data obtained through the LCPS to monitor students' metacognitive processes in L2 listening.

## CONCLUSION AND FURTHER RESERACH

Our study was set up to explore the internal structure of a survey tool for the purpose of identifying L2 students' listening problems as a way of enhancing their metacognitive knowledge about L2 listening processes. To this end, we described the procedures and the development and validation of the LCPS, which would be used to assess L2 learners' metacognitive awareness of listening comprehension problems.

Results of factor analyses show that the LCPS demonstrated robust psychometric properties as a measure of listening comprehension problems. The findings suggest that using the LCPS might also enable and empower L2 students in their effort to become self-regulated listeners who can better capitalize on the aural input they receive. By increasing their awareness of the listening process, students can learn how to become better listeners, which, ultimately, will enable them to learn/acquire another language more quickly and efficiently.

However, given that it remains a self-report instrument, it has limitations. As with all self-report instruments, we suggest that researchers and teachers consider the LCPS as one of the tools through which sources of information about the current problems L2 listeners encounter can be obtained. To our knowledge, ours is the first to report on an underlying latent structure of LCPS with a group of university students of English as an L2 in the curriculum, so the study is really exploratory.

Also, although results of factor analyses from our study suggest that all problems reported in the earlier studies might be condensed into a 15-item scale for measuring listening comprehension problems, evidence for the factor structure is still very preliminary. Whether the structure of listening comprehension problems is truly reflective of learners' specific situation requires further research. In particular, independent replication studies to test the factor structure of the 15-item scale with other larger samples from different populations are needed.

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# APPENDIX
## Listening Comprehension Problem Scale (LCPS)

This Listening Comprehension Problem Scale (LCPS) is intended for you who are students of English as a foreign language (EFL). You will find statements about the problems that you might encounter while listening to English texts. Please read each one and choose a response from among 1, 2, 3, 4 and 5 that best describes HOW TRUE OF YOU THE STATEMENT IS.

**1.** Never true of me; **2.** Usually not true of me; **3.** Somewhat true of me;

**4.** Usually true of me; **5.** Always true of me.

**Part A. Listening comprehension Problems**

1. I feel nervous.
2. I am unable to concentrate.
3. I do not recognize the learned words.
4. I do not respond to words quickly enough.
5. I have difficulty in recognizing words due to own incorrect pronunciations.
6. There are too many new words.
7. I have difficulty in recognizing sounds due to fast speaking.

8. I have difficulty in recognizing sounds due to linking, assimilation, omission in speech.
9. I have difficulty in recognizing sounds due to speakers' accent and intonation.
10. I cannot recognize the words with similar sounds.
11. I tend to neglect the next part when thinking about the meaning of the utterances just heard.
12. I do not understand abstract concepts.
13. I do not understand long sentences.
14. I cannot chunk streams of speech.
15. I forget quickly what is heard.
16. I do not understand the word that has more than one meaning.
17. I do not understand the next part of the text because of problems I encounter earlier in it.
18. I miss out the beginning of texts.
19. I do not understand the intended message of some parts of a text.
20. I feel confused about the key ideas in the message.
21. I do not understand the intended message of an entire text.

**Part B. Your Personal Data**

Sex: □ Male □ Female; Age: _____ years; Class No. _____;
Major: _____

In □ 1st □ 2nd □ 3rd year of the University;

The last five digits of your Student ID No. _____; You have learnt English for _____ years.