

---

## Two Short Lists for Measuring the Use of Specific Strategies When Learning Languages

Peter Grimbeek, Indika Liyanage, Fiona Bryer, & Gary Birch

*Griffith University, School of Cognition, Language, and Special Education*

Previous studies have examined associations between learner variables and selective use of language learning strategies. The typical approach has involved collation of responses to items in terms of conceptually defined strategies and strategy types (e.g., metacognitive, cognitive, and social-affective). Yet, preconceived links between items, strategies, and types of strategies in typical item inventories are questionable in nature; specifically, item design procedures have imposed methodological limitations on this approach. Moreover, the relative number of items and strategies used to measure types of strategies limits direct comparisons. In one version of a language learning strategies test, for example, Liyanage (2004) collated 20 items for 7 strategies thought to be metacognitive learning strategies, 34 items for 15 strategies thought to be cognitive strategies, and 9 items for 4 strategies thought to be social-affective strategies. One outcome of this disparity in items per strategy type is to render measures of metacognition more reliable than measures of social-affective strategies. The current study reports the outcome of using factor analytic techniques to re-examine data collected in two previous studies (Liyanage, 2004; Liyanage, Birch, & Grimbeek, 2004). Data from four ethnic groups yielded two contrasting and statistically acceptable short lists for measuring specific strategies used to learn languages.

### **Inventorying strategies for learning language**

Language learning strategies (LLS) have been defined in terms of a learner's actions. O'Malley and Chamot (1990) described "the special thoughts or behaviours that individuals use to help them comprehend, learn or retain new information" (O'Malley & Chamot, 1990, p. 1). Oxford (1990, p. 8) described "specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective and more transferable to new situations" (p. 8). In both definitions, learners have been said to use strategies deliberately, consciously, and selectively (i.e., in a way that reflects preferences in how to learn a new language).

The definition and classification of LLS has been problematic from the early days of this field of research (O'Malley & Chamot, 1990). Even today, difficulties have arisen from the lack of common consensus among distinct LLS taxonomies (Oxford, 1994). The absence of adequate theory has been a particular problem for classification of strategies. It has been argued that a theoretical basis was required in order to describe the influence of LLS on learning and memory processes of learners (Chamot et al., 1987;

Chamot & O'Malley, 1993; O'Malley & Chamot, 1993). Without a theoretical model for the learner's actions, researchers could and did introduce new schemes of classification and description of strategies, but they could not validate any scheme (Chamot et al., 1987).

The prominent place in LLS research played by the taxonomies of Oxford (1990) and those of O'Malley and Chamot (1993) reflected their efforts to acknowledge and classify LLS according to how different strategies affect processes involved in second language learning. These taxonomies have served as a rich resource of ideas for research. The 62 strategies listed in Oxford's LLS taxonomy provided a widely used platform from which to generate items for a questionnaire and, thus, to assess the uses of strategies in second language learning. However, this taxonomy was criticised by O'Malley and Chamot (1990), because the approach taken in Oxford's classification of strategies lacked any underlying cognitive theory and, instead, included every strategy previously cited in the learning strategy literature. Consequently, Oxford's taxonomy did not prioritise strategies of most importance to learning and did not specify clear, nonoverlapping boundaries between some subcategories.

O'Malley and Chamot (1985), however, based their classification on a cognitive theory proposed by Anderson (1981, 1996, 2000). They described LLS in terms of how and at what level—metacognitive, cognitive, and social-affective—learners process new information. Detailed discussion of this information-processing approach has been provided elsewhere (Chamot et al., 1987; Liyanage, 2004). The 48 items in the original strategy inventory developed by O'Malley and Chamot were used to gather information about 16 different strategies. At the end of their study, they discovered 10 more strategies for which no questions had been framed. Liyanage (2004) adapted the original language learning strategy inventory of Chamot et al. (1987) to embrace these 10 novel strategies from their study. His adaptation of the O'Malley and Chamot LLS inventory added 16 questions to increase the total to 63 items and 26 strategies.

O'Malley and Chamot also prioritised strategies. They argued that metacognitive strategies served to facilitate the learner's planning for learning tasks and, thus, could help the learner to oversee how well the plan is implemented. On completion of the task, these strategies also help learners to evaluate their success. At a more basic level, cognitive strategies serve to perform three tasks (i.e., rehearsal, organisation, and elaboration). Rehearsal refers to strategic use of small mental activities such as repeating a list. Organisation refers to strategies of grouping new information into meaningful categories. Elaboration refers to strategies for linking different parts of new information. Social-affective strategies serve to facilitate the interaction between a learner and a speaker of another language. The inclusion of these strategies provided recognition of the interactional exchanges involved in learning a second language and the social context within which information is processed. However, relatively little research effort has been invested into the influence of personality, cultural background, and socioemotional aspects of the mother tongue on language learning.

In a series of studies, Liyanage used the O'Malley-based language learning strategy inventory with school students in Sri Lanka (Liyanage, 2004) and with Japanese high school students studying in Australia (Liyanage, Birch, & Grimbeck, 2004). First, Liyanage (2004) explored the association between LLS and learner variables (e.g.,

personality type, ethnicity, gender, religion, and mother tongue) with a sample of 886 Sri Lankan learners of English as a second language. He found extremely significant associations between these variables ( $p < 0.000$ ). However, the complex links between items, specific substrategies, and the three types of strategies in the adapted inventory posed methodological limits on these findings. The disproportionate numbers of items and strategies used to measure the three types of strategies has been recognised as a basic concern. The adapted version collated by Liyanage contained (a) metacognitive learning strategies with 7 substrategies and 20 items, (b) cognitive strategies with 15 substrategies and 34 items, and (c) social-affective strategies with some representation in 4 substrategies and 9 items. Measures of metacognition, therefore, were likely to be more reliable than measures of social-affective strategies.

Second, Liyanage et al. examined whether ethnicity and religion was more important in determining ESL students' choice of language learning strategies. The LLSI used with the Sri Lankan study (Liyanage, 2004) was translated into Japanese by a competent translator and administered to a group of Japanese students ( $N = 134$ ) studying English in Queensland. The rationale for including this Japanese sample was that, despite being ethnically different to the Sinhalese sample, their religious identity (Buddhism) was similar. Therefore, the two religiously similar but ethnically different groups could be compared to another two groups (Tamil-Hinduism and Muslim-Islam) with closely related ethnic and religious identities.

It was hypothesised that similarities between the Japanese and Sinhalese groups would indicate that religious identity had superior influence on the learners' choice of language learning strategies. On the other hand, marked differences between these two groups would indicate the superior influence of ethnicity. Similarities found between the Sinhalese and Japanese students supported the view that the religious identity of learners was more important than ethnic identity in determining the selection of learning strategies. Further replication studies in various other contexts (e.g. with ethnically different Muslim and ethnically different Hindu students) appeared to be necessary to determine the specificity or generality of this conclusion.

### **Aims**

This study has undertaken to re-analyse item data from these samples. The methodological issues in test construction made it worthwhile to undertake this work in order to determine whether the inventory could be improved. This further analysis was made possible by the comparatively large size of the two data sets (Sri Lanka  $n = 886$ ; Japan  $n = 134$ ). The aim in this study was to identify a statistically viable subset of items derived from these 63 items. A combination of Rasch item analysis, exploratory factor analysis, and confirmatory factor analysis was used in order to enquire about the extent to which items cluster within factors. That is, to ascertain whether the theorised strategies performed as assumed and whether the items representing those strategies functioned as strategy-discriminative.

### **Method**

This study revisited samples collected in two studies (Liyanage, 2004; Liyanage et al., 2004). In those studies, participants completed the 63-item LLSI questionnaire as part of the

larger research agenda. In the first study, Liyanage (2004) surveyed a representative sample of students ( $N = 948$ ) learning English as a Second Language (ESL) in six government schools in Colombo, Sri Lanka. These schools belonged to and operated under the country's ministry of education. The three dominant subcultures in the country with their differing ethnicity, first language, and religion were represented in the sample, which comprised Sinhalese ( $n = 317$ ), Tamil ( $n = 316$ ), and Muslim ( $n = 315$ ). Numbers of males and females in each subgroup were approximately equal: Sinhalese ( $M = 158$ ;  $F = 159$ ), Tamil ( $M = 156$ ;  $F = 160$ ) and Muslim ( $M = 156$ ;  $F = 159$ ). In the second study, a smaller sample of Japanese students and their teachers ( $N = 179$ ) was reduced to 141 learners after the 38 teachers were excluded from analysis.

The 63-item LLSI scale was arranged in five subscales associated with distinct scenarios (e.g., "The teacher has assigned a short composition or paragraph to be written entirely in English. This might be to write a report or to describe a picture or a personal experience") and with a 4-point Likert response category scale ("Almost never true of you" > "Almost always true of you"). The five scenario-based subscales were labelled Listening in class (14 items), Speaking in class (12 items), Listening and speaking outside of class (9 items), Reading English (16 items), and Writing in English (12 items).

### Data analysis

In order to identify a statistically viable subset of the 63 items, the data sets from the two samples were analysed from differing starting points. In the case of the Sri Lankan sample, items were subjected to exploratory and then confirmatory factor analyses with the aim of identifying a statistically viable subset regardless of conceptually defined strategies, strategy types, and contexts. In the case of the Japanese sample, the starting point was taken to be the conceptual model of three types of learning strategies (i.e., metacognitive, cognitive, and social-affective), and this model was refined iteratively. That is, the theorised strategy structure of the inventory was maintained as the standard, conceptually bound model against which each item was tested.

In each case, diagnostic screening of items was used to identify a smaller subset of items and factors with statistically acceptable properties. Exclusionary criteria were defined for each set of analyses. A process of systematically excluding items screened out statistically nonviable items with either (a) nonsignificant factor loadings or (b) highly correlated error terms (indicating that these items related similarly to the latent variable). However, for confirmatory analyses based on the conceptual model (Japanese dataset), further exclusions were made. This decisionmaking process systematically excluded items from subsequent analyses that were either (a) redundantly associated with items from other latent variables or (b) significantly associated with latent variables other than those assigned conceptually.

### Results

After items were excluded from each analysis according to the set criteria, the two data sets were entered into exploratory and then confirmatory factorial analyses without (Sri Lankan) and with (Japanese) conceptual modeling of strategies.

**Exploratory and confirmatory factor analyses based on the Sri Lankan sample**

SPSS Frequencies and WINSTEPS were used to undertake diagnostic screening of items in the 63 items forming part of the Language Learning Strategy Inventory (LLSI). First, data screening across frequencies was used to inspect (a) the distribution of responses across response categories per item and (b) the ordering of response categories per item. This data screening resulted in the exclusion of two items based on positively skewed (approximately 90%) responses by Sinhalese participants. Next, WINSTEPS-based examination of the remaining 61 items indicated that the average score per response category was out of sequence for another three items.

The remaining 58 items were examined by exploratory factor analytic procedures (Maximum likelihood, Varimax rotation). Another preliminary problem for this analysis was that the initial SPSS exploratory factor analysis procedure reported the correlation matrix to be not "positive definite." A linear dependency between items would be the most likely reason for this problem. After examination of the correlation matrix, 26 linearly dependent variables were excluded from further analyses.

The residual 32 variables were entered into a series of exploratory factor analyses (Maximum Likelihood, Oblimin). These analyses produced a 13-item four-factor solution. This short list of items was further examined via confirmatory factor analysis (AMOS CFA), leading to the 9-item two-factor model illustrated in Table 1.

**Table 1**

Two-factor solution with a 9-item LLS inventory for nonstandard, conceptually free strategic mix

<b>Factor 1: Looking ahead</b>
I guess at the meaning of unfamiliar words by using my knowledge of prefixes and suffixes.
If I don't completely understand what the other person says to me, I think about the words I did understand and try to guess what he or she might be saying.
When I know I'm going to be around Native speakers, I plan a few things to say previously metacognitive strategy item of advance organisation).
If I don't understand what the other person says to me, I ask them to speak more slowly or to say it in a different way (previously social-affective strategy item of questioning for clarification).
I take notes when I read, listing the new words or phrases I find in the passage.
I scan for special words, phrases, or information to get the most important points when I read (previously metacognitive strategy item of selective attention).
I carefully reread what I've written to make sure there are no mistakes (previously metacognitive strategy item of self-evaluation).
<b>Factor 2: Checking up</b>
I use a monolingual (English-English) dictionary or other English reference materials when I write in English.
I use my textbook and dictionary to look up spelling, verb conjugations, and gender agreement, etc.

*Note.* Most items retained in this set were LLSI-designated items from Cognitive Strategies, but some items from theorised metacognitive and social-affective strategies were found to migrate into this set; see bracketed descriptors.

This model was refined initially based on the full Sri Lankan sample. An important feature of the analytic process involved checking this model by examining the statistical viability of the solution separately for Japanese, Sinhalese, Tamil, and Muslim participants from the two studies. Table 2 includes results from a list of four types of statistical measures relevant to CFAs and structural equation models (SEM) more generally:

- (a) Chi-square/degrees of freedom (*df*) computation (correcting chi-square for model complexity), which should approximate the 0-3 range;
- (b) RMR and RMSEA (estimating residual variance), which should approximate the 0-.05 range;
- (c) NFI, TLI, CFI, and RFI (comparing tested model to baseline model), which should approximate the 0.9-1.0 range; and
- (d) GFI and AGFI (estimating goodness of fit), which should approximate the 0.9-1.0 range.

Examination of values listed in Table 2 indicated that the various estimates of goodness of fit approximated a range considered to be statistically acceptable in most cases. The exception was a subset comparing the tested model to the baseline model, in which the tested model is compared to a baseline or independence mode that assumes the latent variables to be uncorrelated. That is, the chi-square value adjusted for model complexity, the estimates of residual variance, and estimates of goodness of fit were statistically acceptable, but the analyst's model did not improve sufficiently on the baseline. Strictly speaking, the model should be respecified to the point of obtaining statistically acceptable values for the third group of measures. However, given the severe trimming of the LLS model needed to reach this point, further model trimming seemed unwise.

**Table 2**

Estimates of goodness of fit for the standard 7-item cognitive strategies CFA

MEASURE	JAPANESE	SINHALESE	TAMIL	MUSLIM
Chi square ( $\chi^2$ )	31.414	63.402	55.375	35.573
<i>df</i>	26	26	26	26
Probability	0.213	0.000	0.001	0.100
$\chi^2/df$	1.208	2.439	2.130	1.368
RMR	0.055	0.051	0.035	0.032
RMSEA	0.040	0.069	0.063	0.035
<b>NFI</b>	<b>0.847</b>	<b>0.790</b>	<b>0.882</b>	<b>0.879</b>
<b>RFI</b>	<b>0.788</b>	<b>0.709</b>	<b>0.837</b>	<b>0.833</b>
<b>TLI</b>	0.956	<b>0.805</b>	0.906	0.949
<b>CFI</b>	0.968	<b>0.859</b>	0.932	0.963
GFI	0.949	0.952	0.961	0.972
AGFI	0.911	0.917	0.932	0.952

*Note.* Bolded numbers represent poor fit between the tested model and the baseline model of uncorrelated latent variables.

### Confirmatory factor analysis based on the standard conceptual model, using the Japanese sample

For this second analysis, the responses of 141 Japanese student participants to the 63-items of the LLSI questionnaire were entered into a confirmatory factor analysis. The usual screening of items resulted in exclusion on the basis of (a) nonsignificant loadings on factors, (b) highly correlated errors, and (c) significant cross-factor redundancy, with particular emphasis on this last criterion for item exclusion. That is, the preferential basis for exclusion of items from the model was a significant correlation of an item with items (or latent variables) related to one of the other two subscales (see Table 1).

An iterative series of CFAs, followed by comparative examinations that extended this analytic process to include the other three ethnicities (Sinhalese, Tamil, Muslim), resulted in a 7-item single factor solution based exclusively on items from the Cognitive Strategies subscale, as illustrated in Table 3. As with the previous analysis, an important feature of this solution was that items loaded significantly on factors and CFAs were statistically acceptable regardless of ethnic subgroup.

**Table 3**

Standard 7-item single-factor (Cognitive Strategies) solution

I guess at the meaning of unfamiliar words by using my knowledge of prefixes and suffixes.
After I listen, I try to summarise mentally what the teacher says to understand it better.
If I don't completely understand what the other person says to me, I think about the words I did understand and try to guess what he or she might be saying.
I take notes when I read, listing the new words or phrases I find in the passage.
When I read new words, I try to think of what other situations they might be used in.
I use a monolingual (English-English) dictionary to understand other meanings of the words I read.
When I write, I replace words and phrases that I can't recall with other words or phrases that have the same meaning.

Examination of values listed in Table 4 indicated that the various goodness of fit estimates were statistically acceptable for most estimates. One exception, however, was the estimate for a subset comparing the tested model to the baseline model, where the baseline or independence model assumes that the items are totally uncorrelated. That is, the chi-square value adjusted for model complexity, the estimates of residual variance, and estimates of goodness of fit were generally statistically acceptable.

As shown in Table 5, a final step was to compare the two models for each of the four ethnicities by using chi-square values and degrees of freedom (*df*) to compute chi-square difference tests. This test examines the significance of the chi-value obtained by taking into account the difference in chi-values and the difference in degrees of freedom. As indicated in Table 5, the 7-item single-factor model proved statistically superior to the 9-item, 2-factor model for each of the ethnic subgroups except the Tamil.

**Table 4**

Estimates of goodness of fit for the standard 7-item Cognitive Strategies CFA

MEASURE	JAPANESE	SINHALESE	TAMIL	MUSLIM
Chi-square ( $\chi^2$ )	16.802	41.855	40.370	11.472
df	14	14	14	14
Probability	0.267	0.000	0.000	0.649
( $\chi^2$ )/df	1.200	2.990	2.884	0.819
RMR	0.046	0.047	0.042	0.022
RMSEA	0.039	0.081	0.082	0.000
NFI	<b>0.860</b>	<b>0.740</b>	<b>0.833</b>	0.919
RFI	<b>0.790</b>	<b>0.610</b>	<b>0.750</b>	0.879
TLI	0.958	<b>0.702</b>	<b>0.884</b>	1.031
CFI	0.972	<b>0.801</b>	<b>0.881</b>	1.000
GFI	0.966	0.960	0.960	0.989
AGFI	0.932	0.920	0.920	0.978

*Note.* Bolded numbers represent poor fit estimates between the tested model and uncorrelated latent variables model.

**Table 5**

Comparison of chi-square values for the two models (non-std. vs. std.) of goodness of fit for the standard 7-item Cognitive Strategies CFA, by ethnicity

GROUP	JAPANESE	SINHALESE	TAMIL	MUSLIM
Chi-square ( $\chi^2$ ) difference	14.612	21.547	15.005	24.101
Df difference	12	12	12	12
Probability of difference being significant	0.03	0.04	0.20	0.02

## Discussion

Other research, including previous work by Liyanage (2004) and Liyanage et al. (2004), has relied on broad types of strategies with complex links via strategies to items and with disproportionate ratio of items-strategies to the three proposed types of strategies. From the outcomes of the re-analyses of LLS inventory data, this complex set of linkages have been reconceptualised in favour of a choice between two greatly simplified models that focus on either one or two strategies. Hence, what this study has demonstrated clearly is that *a priori* allocation of items to strategies and types of strategies, while conceptually appealing, is also empirically blinding. The statistical properties of educational tests and inventories that claim to measure learning strategies need to be established by investigation prior to their application to differential assessment of strategies and, hence, to educational intervention to improve strategies.

Methodological limitations of this study included the necessary exclusion from the modelling process of a number of linearly dependent variables in the Sri Lankan dataset.



However, this early decision has not prevented the use of the Sri Lankan dataset to identify a two-factor model for learning strategies. Although this model does not adhere strictly to the conceptual presuppositions regarding the relationships between items, contexts, and types of strategies, it does constitute a short test of two types of learning strategies (Looking ahead, Checking up) that has already been shown to have application across the four ethnic subgroups in this study.

Furthermore, the use of the Japanese sample to identify a single-factor solution constitutes a second short test of learning strategies that again has been shown to have application across the four ethnicities considered in this study. Although it doesn't take account of context, this single-factor solution does adhere to the conceptual presuppositions regarding items and strategy types.

The significant chi-square difference test for three of the four ethnic subgroups (Japanese, Sinhalese, and Muslims in Table 5) seemingly indicates the statistical superiority of the 7-item single factor model. However, given that the level of significance barely exceeded the  $p < 0.05$  level, it seems likely that the reduction in factorial complexity (one factor versus two) unduly favoured the 7-item model. Therefore, while these differences were statistically significant, they probably could not be regarded as substantively significant.

More generally, the contrasting outcomes from adopting purely empirical versus conceptually biased approaches to the process of identifying statistically viable factor structures illustrate the importance of this aspect of data analysis. The analytic process outlined in this paper demonstrates that the apparent objectivity of numerical data analytic procedures does not constitute an impermeable barrier to the biases of the researcher or analyst and that such biases can shape outcomes.

A minor speculative issue concerns the value of social-affective strategising for the multilingual enterprise of learning languages that, by its nature, has to bridge wide social and affective differences between learners and the languages being learned. It was noted that only one of the small set of proposed social-affective items survived exploratory factor analysis (Table 1). "If I don't understand what the other person says to me, I ask them to speak more slowly or to say it in a different way" was previously thought to be a social-affective strategy item of questioning for clarification. This item factored with the Looking Ahead factor with a mix of previously cognitive and metacognitive items to indicate an anticipatory strategy for learning language. However, it did not survive confirmatory factor analysis (Table 3). The two-factor solution in Table 1 seemed to address the temporal cognitive context of future and past. Some of the surviving items seemed to address the grammatical, semantic, and pragmatic context of language learning. Given that the strong ethnic basis of sampling in the Liyanage studies resolved into essentially cognitive strategies of learning language, the meaning of a construct of social-affective strategising remains uncertain. A conceptualisation of the kind of items to be included in further item generation is a challenge, before the notion of a social-affective strategy in a strategy testing instrument could receive a fair empirical opportunity for investigation.

## References

- Anderson, J. R. (Ed.). (1981). *Cognitive skills and their acquisition*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Anderson, J. R. (1996). *The architecture of cognition*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Anderson, J. R. (2000). *Cognitive psychology and its implications* (5th ed.). New York: Worth.
- Chamot, A. U., with others. (1987). *A study of learning strategies in foreign language instruction. First year report* (ERIC Document Reproduction Service No. ED352824). Retrieved May 14, 2001, from E\*subscribe/ERIC Reproduction Service database.
- Chamot, A. U., & O'Malley, J. M. (1993). Teaching for strategic learning: Theory and practice. In J. E. Alatis (Ed.), *Strategic interaction and language acquisition: Theory, practice, and research* (pp. 36–51). Washington, DC: Georgetown University Press.
- Liyanage, I. (2004). *An exploration of language learning strategies and learner variables of Sri Lankan learners of English as a second language with special reference to their personality types*. Unpublished doctoral thesis, Griffith University, Queensland, Australia.
- Liyanage, I., Birch, G., & Grimbeck, P. (2004). *Religion, ethnicity, and language learning strategies*. In B. Bartlett, F. Bryer, & R. Roebuck (Eds.), *Educating: Weaving research into practice* (Vol. 2, pp. 222–223). Brisbane, Australia: Griffith University, School of Cognition, Language, and Special Education.
- O'Malley, J. M., & Chamot, A. U. (1990). *Learning strategies in second language acquisition*. Cambridge, UK: Cambridge University Press.
- O'Malley, J. M., & Chamot, A. U. (1993). Learner characteristics in second-language acquisition. In A. O. Hadley (Ed.), *Research in language learning: Principles, processes, and prospects* (pp. 96–123). Lincolnwood, ILL: National Textbook Company.
- O'Malley, J. M., Chamot, A. U., Stewner-Manzanares, G., Kupper, L., & Russo, R. P. (1985a). Learning strategies used by beginning and intermediate ESL students. *Language Learning*, 35(1), 21–46.
- Oxford, R. L. (1990). *Language learning strategies: What every teacher should know*. New York: Heinle & Heinle.
- Oxford, R. L. (1994). *Language learning strategies: An update*. ERIC Digest (ERIC Document Reproduction Service No. ED376707). Retrieved May 17, 2000, from E\*subscribe/ERIC Reproduction Service database.

