WHAT IS VALIDITY AND RELIABILITY STUDY OF LEARNING STYLE SURVEY?

(ÖĞRENME STİLLERİ ANKETİNİN GEÇERLİK ve GÜVENİRLİK ÇALIŞMASI NEDİR?)

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ABSTRACT

This study was designed to investigate the validity and reliability of the Turkish version of Learning Style Survey (LSS), which was developed by Cohen, Oxford, and Chi (2001). The survey was applied to the subjects of 768 prep students who were enrolled English Prep Classes in seven different universities such as Yildiz Technical University, Istanbul Technical University, Bogazici University, Maltepe University, Bahcesehir University, Istanbul Bilgi University, and Sabanci University, in Istanbul, Turkey. Pearson's correlations between Turkish and English versions of the survey ranging from, except for the items 46, 86 and 87, 0.36 to 0.83 among the 23 subscales indicated acceptable reliability. The correlations were significant at the 0.00 and 0.01 level. The results of factor analysis for construct validity of the survey addressed 12 subscales under the six dimensional constructs with 52 items. The total internal reliability of scale was 0.88 reliability coefficients. Findings demonstrated that the subscales had internal consistency reliabilities, item total correlation, ranged from 0.20 to 0.45. Test re-test reliability for external reliability of subscales was between 0.51-0.79. The results were discussed in terms of the validity and reliability of the Turkish version.

Keywords: Learning styles, scale development, validity and reliability.

ÖZ

Bu çalışmanın amacı, Cohen, Oxford ve Chi (2001) tarafından geliştirilen 'Öğrenme Stilleri Anketi' (ÖSA)'nin Türkçe formunun dil eşdeğerliğinin, geçerliğinin ve güvenirliğinin incelenmesidir. Anket, Yıldız Teknik Üniversitesi, İTÜ, BÜ, Maltepe Üniversitesi, Bahçeşehir Üniversitesi, İ. Bilgi Üniversitesi ve Sabancı Üniversitesinin aralarında bulunduğu toplam yedi üniversitenin hazırlık sınıfı programına devam eden 768 öğrenciden oluşan çalışma grubuna uygulanmıştır. ÖSA'nın İngilizce ve Türkçe formu arasındaki tutarlığını incelemek için yapılan Pearson korelasyon katsayıları sonucunda 48., 86. ve 87. dışındaki tüm maddelerde 0.36 ile 0.83 arasında değişen ve 0.01 düzeyinde pozitif ve anlamlı değerlere ulaşılmıştır. Anketin yapı geçerliğini saptamak için yapılan faktör analizi altı temel boyut altında, 12 alt ölçekli, 52 maddeli yapı ortaya koymuştur. Anketin bütününün iç tutarlık güvenirliği 0.88 alpha katsayısıdır. Bulgular, alt ölçek maddelerinin iç tutarlık güvenirliğinin 0.20-0.45 arasında değişen madde-toplam korelasyonu olduğunu göstermiştir. Alt ölçeklerin dış tutarlık güvenirliği için yapılan test-tekrar test tekniği bulguları ise 0.51- 0.79 arasında korelasyon değeri almıştır. Sonuçlar, anketin Türkçe formunun geçerliği ve güvenirliği bakımından tartışılmıştır.

Anahtar Sözcükler: Öğrenme stilleri, ölçek geliştirme, geçerlik ve güvenirlik.

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INTRODUCTION

Learning style is the usual way one prefers in the process of acquiring, proceeding and storing new information. In other words, learning style reflects one's approach and general attitude towards learning process. In this process, what determines style is his own and accustomed way to perceive and his pattern to interact with learning environmet.

In English Language Teaching (ELT) learning styles are rather constant and unchanging phenemena between ability and language learning strategies. Styles differ from the language ability in that styles do not make a clasification between 'students who can or cannot'. They just define learning styles preferences unique for individuals. Hence learning styles are important to overcome linguistic and cultural differences and they enable objective evaluation in language learning aiming to develop language skills. In ELT, some researches have the evidence that learning styles can account for the achievement in language learning (Choi, Lee, Jung, 2008; Demirbaş ve Demirkan, 2007; Demirel, 2006; Khalil, 2005).

Besides learning styles differ from learning strategies in that styles consist of strategies used consistently in certain tasks. Unlike strategies, styles are rather permanent characteristics and thay have physiological bases. On the other hand strategies are used in performing tasks in certain situations. Besides, they can be learned and improved in time (Ehrman, 1993; Snow, Corno ve Jackson, 1996; Stenberg ve Grigorenko, 2001 Riding, 2000). In other words, the difference is using them conciously. Whereas one uses learning styles unconciously, he chooses learning strategies delibarately according to the situation or task. Styles plays an important role when determining which strategies to use in certain tasks.

In ELT literature, a variety of terms are used to describe learning styles such as cognitive styles, personality type, perceptual preferences and modality. The reason for the various terms is the defition of learning itself. Because 'learning' has different definition. That is, there is no 'one' definition of learning (Dörnyei, Skehan, 2003).

Learning Styles in ELT

In some researches and articles the terms 'learning styles' or 'cognitive styles' has been used interchangably and sometimes there hasn't been made any distinction between them (Bailey, Onwuegbuzie & Daley, 2000; Ehrman & Leaver, 2003; Ehrman, Leaver & Oxford, 2003; Reid, 1995, 1998). In ELT, however, learning styles have attracted more attention with Reid's (1995, 1998) researches in second language acquisition.

The first instrument widely known in second language (L2) field was Reid's (1995) Perceptual Learning Style Preference Questionaire (PLSPQ) which was developed in 1984. In the following years, in 1990s, there have

been many researches on the role of learning styles in SLA (e.g., Cohen & Dörnyei, 2002; Ehrman, 1998, 1999, 2001; Ehrman & Leaver, 2003; Ehrman & Oxford, 1990, 1995; Ehrman and et al., 2003; Kinsella, 1995; Oxford & Ehrman, 1993; Oxford, Ehrman & Lavine, 1991). Following PLSPQ, another learning style instrument Style Analysis Survey (SAS) was developed by Oxford (1993).

Learning Style Survey

Learning Style Survey (LSS) by Cohen, Oxford and Chi (2001) is an improved version of SAS. The authors increased the quality of the original instrument in two ways. First, they added several dimensions. Second, it was focused on language related subjects. It contains 11 dimensions, 23 subscales and 110 items. The rating scale has been changed from a 4-point format to a 5-point format. The last change was to add global and particular dimensions.

For theoritical foundation, opposite to Riding's taxomony, LSS contains many learning style models with brief statements. The first dimension in LSS is composed of visual, auditory and tactile learning styles and it is similar to PLSPQ physical senses dimension. LSS's random sequential dimension is based on Gregorc's (1982) study on learning experiences and their designs.

Another dimension in LSS is global- particular dimension based on Riding and Cheema's (1991) model for learning styles. Synthesizing-analytic dimension originated from Guilford's (1967) studies on thinking styles and learning style taxonomy of problem solving strategies.

LSS's sharpener-leveler dimension is based on Holzman and Gardner's taxonomy by investigating how knowledge is assimilated in memory (Dörnyei, 2005). In the same way, field-dependent and field-independent dimension comes from Witkin, Moore, Goodenough and Cox's (1977) research about the influence of the environmental motives on individual perception and performance. On the other hand, impulsive-reflective dimension is from the model about speed of conceptualization by Kagan, Roman, Day, Albert and Phillips (Dörnyei, 2005).

Eleven dimensions and twenty subscales of LSS ,which is discussed in this study, are as follows in Table 1.

Table 1. Dimensions and Subscales of LSS

Part 1. How I use my physical senses
a. visual
b. auditory
c. tactile
Part 2. How I expose myself to learning situatıons
a. extraverted
b. introverted
Part 3. How I handle possibilities.
a. random
b. sequential
Part 4. How I deal with ambiguity and with deadlines
a. closure-oriented
b. open
Part 5. How I recieve information
a. global
b. particular
Part 6. How I further process information
a. synthesizing
b. analytic
Part 7. How I commit material to memory
a. sharpener
b. leveler
Part 8. How I deal with language rules.
a. deductive
b. inductive
Part 9. How I deal with multiple inputs
a. field-dependent
b. field-independent
Part 10. How I deal with response time
a. impulsive
b. reflective
Part 11. How literally I take reality
a. metaphoric
b. literal

There is a great literature discussing the role of learning styles in SLA. On the other hand, since there is a shortage of valid and reliable mesurement instrument, most of the studies treat the concept as an important but somewhat underresearched topic. (e.g., Bailey & et al., 2000; Brown, 2000; Chapelle, 1995; Choi, Lee, Jung, 2008; Demirbaş & Demirkan, 2007; Demirel, 2006; Ehrman & Leaver, 2003; Ehrman & et al., 2003; Hoffman, 1997; Jie, Xiaoqing, 2006; Johnson & et al., 2000; Khalill, 2005; Lincoln, Rademacher, 2006; Morton-Rias & et al., 2008; Oxford, 1995, 1999; Oxford, Ehrman,

Lavine, 1991; Reid, 1995, 1998; Riding, 2000; Skehan, 1998; Stenberg & Grigorenko, 2001)

The results of these studies showed that learning styles would be of great use in SLA field. It can also be said that learning styles would be of beneficial for students' language proficiency, communication in L2, building grammar knowledge and language tasks. In addition, LSS can be used in language learning styles studies by researchers, in language schools and prep classes by teachers. Therefore, it is considered as a need to make the validity and reliability checks of LSS.

Although there are many studies on learning styles in SLA (e.g., Cohen & Dörnyei, 2002; Ehrman, 1998, 1999, 2001; Ehrman & Leaver, 2003; Ehrman & Oxford, 1990, 1995; Ehrman & et al., 2003; Jie, Xiaoqing, 2006; Kinsella, 1995; Lincoln, Rademacher, 2006; Oxford & Ehrman, 1993; Oxford, Ehrman & Lavine, 1991; Morton-Rias & et al., 2008) no reliability study of LSS has been reported yet. The aim of this study is to provide the researchers with a reliable instrument in literature and to validate Turkish version of LSS developed by Oxford, Chi and Cohen (2001). That is why in the current study, the following research aim was addressed: what is the validity and reliability study of the Turkish version of LSS?

METHOD

Research Model and Participants

This study is a descriptive research because it describes the present situation with quantitive data (Karasar, 1994).

Individuals who attended to university prep classes were accepted as participants for this research. Therefore, the research subjects were comprised of 768 students who enrolled and attended prep classes at seven different major universities in Istanbul, Turkey.

In literature, there are different points of views to decide the number of subjects needed in sample group. Some researches state that it should be at least 100 or 250 so that you can check construct validity and factor analysis (Sapnas, 2004, Preacher& MacCallum, 2002).

On the other hand, some researchers this number depending on the number of items the questionaire contains (Tavşancıl, 2002). In other words, the number of subjects should be ten times of that of the items.The subject/item ratio is 5:1 for Gorsuch (1983) and Hatcher (1994), for Nunually it is 10:1 (Osborne & Costello, 2004). Preacher and MacCallum (2002) state that this ratio can change between 3 to 10 times between subjects and items. However, according to Osborne and Costello (2004), a subject number of 1000 or a ratio of 20:1 can give reliable results in factor analysis. In this study number of subjects is seven times of that of scale items. For this reason the

number of subjects is thought to be enough in the study. The characteristic of the subjects is given in Table 2.

Table 2. The Characteristics of the Subjects in the Study

		f	*%*
Sex	Male	474	62,6
	Female	283	37,4
	Missing	11	
	Total	768	100
Age	17	17	2,5
	18	134	19,4
	19	279	40,4
	20	169	24,5
	21	50	7,2
	22	24	3,5
	23 and over	18	2,5
	Missing	77	
	Total	768	100
Field of Study	Social	235	31,1
	Science	520	68,9
	Missing	13	100
	Total	768	
High School Graduated	Anadolu	302	43,2
	Science	57	8,2
	Public	247	35,3
	Private	65	9,3
	Vocational	26	3,7
	Other	2	0,3
	Missing	69	
	Total	768	100
Prep Level	A	129	18,2
	B	347	48,9
	C	233	32,9
	Missing	59	
	Total	768	100
University Type			
	Public University	578	75,3
	Private University	190	24,7
	Total	768	100

Of the total number of participants, 31 percent (N=235) were from social sciences, 69 percent (N=520) science and technology. Among the participants, 38 percent (N=283) and 62 percent (N=474) were female and male respectively. The age of the participants ranged from 17 to 23 years, with 40 percent (N= 279) of them 19 years old. 18 percent (N=129) of the total

participants were at A Level, 49 percent (N=347) at B Level and 33 percent (N=233) at C Level. Among participants, 75 percent (N=578) were attending public universities, whereas 25 percent (N=190) at private universities.

Measures

LSS which was developed by Cohen, Oxford, and Chi (2001) has been one of the published instruments available for teachers and researchers to measure learning styles in second language acqusition. LSS like the other learning style instruments follow a self report format. In other words, it has been developed for practical rather than research purposes in order to raise the learners' awareness of style issues. Thus in literature there has not been any standardization process or realibility and validity data for LSS reported yet. LSS is a self-report test with 110 items, which contains 23 subscales. It was designed to assess eleven dimensions of learning styles.

Participants were asked how well each item describes them and were asked to rate themselves on a five-point Likert scale ranging from 0 to 4 (0 = never, 4 =always) in order to assess one of the 23 learning styles (see Appendix 1).

Procedure

Data were collected from the volunteer students during the second semester of the 2006-2007 academic years.

Data Analysis

The data gathered from the application of LSS to the university students and they were tested by SPSS 11.5 program.

The application of the same instrument in two different language versions to the same group gives the linguistic equality (Ergin,1995). The pearson correlation of data based on two applications on the same subject group indicates the equality between Turkish and English version of the instrument. For this reason in order to find the reliabity between two versions pearson correlation test was done.

In literature, there has been approaches to do factor analysis only when developing new instrument (Ergin,1995), but in this study to get more information about construct validity of Turkish version of LSS it is preferred to do factor analysis. For this reason Turkish version of LSS is examined in regards to reseachers suggestions (Balcı, 2001; Bryman & Cramer, 1997; Büyüköztürk, 2002; Hovardaoğlu & Sezgin, 1998; Tezbaşaran, 1997; Turgut & Baykul, 1992) and exploratory factor analysis was applied. For factor analysis rotation method such as varimax was tried and in the end principal component analysis supplied the data to reach some result.

In addition, reliability of LSS Turkish version was examined in regards to reseachers suggestions (Bryman ve Cramer, 1997; Özçelik, 1998; Tekin,

1996; Tezbaşaran, 1997; Turgut, 1997; Yıldırım, 1999). Therefore, internal consistency reliability and reliability coeffcients, Cronbach's alpha, was checked together with item-total correlation. For external reliability, test re-test reliability of subscales was done and pearson correlation was preferred.

FINDINGS

Back Translation

Mertens (1998) states that if the subjects native language is different from the language of the instrument then a back translation is needed for the scale. It is also important to avoid word by word translation and to take the linguistic, cultural and regional characteristics of the language into account when translating. In the same way, Alpas and Akçakın (2003) express that it is not only vital to translate an instrument sticking to the orginality but also to consider subjects characteristics. In this respect, LSS was translated to Turkish by five English teachers individually.

Following this, the Turkish version was back-translated into English by five different English teachers. In the current study, the participants responded to a Turkish version of LSS that was translated and back-translated between Turkish and English. In this translation and back-translation process, each statement was considered for its cultural appropriateness.Then a native English speaker, an English teacher with a Ph D degree in ELT and another English teacher with a MS degree in Educational Sciences compared the original statements and the ones translated and back-translated. It was seen that original and back-translated statements weren't different from one another.

The Pearson correlation defining internal consistency between English and Turkish versions were examined with the students from ELT Department in METU and Math Department in Bilgi University (Ergin,1995). The time between two applications should be four (Özgüven, 1994) or six weeks (Ergin, 1995). The applications of LSS were given in Table 3.

Tablo 3. Applications of the English and Turkish Versions of LSS

Groups	*I.Application*	*4 weeks*	*II. Application*
Group I METU	English		Turkish
Group II. Bilgi Üni.	Turkish		English

The English and Turkish versions of LSS were applied to the 35 subjects to test the appropriateness between the Turkish and English versions of the survey. The students in METU answered the survey in English, however the students in Bilgi University responded Turkish version. Four weeks later,

whereas the ones in METU answered the Turkish version, those in METU did the English one.

Pearson's correlations between two versions of the survey were given in Table 4.

Table 4. Pearson's Correlations between the English and Turkish Versions of LSS

Item No	r	p	Item No	r	P	Item No	r	p
1	,69	.01	38	,62	.01	75	,51	.01
2	,66	.01	39	,52	.01	76	,53	.01
3	,57	.01	40	,75	.01	77	,56	.01
4	,57	.01	41	,66	.01	78	,50	.01
5	,72	.01	42	,53	.01	79	,56	.01
6	,50	.01	43	,84	.01	80	,75	.01
7	,45	.01	44	,45	.01	81	,56	.01
8	,53	.01	45	,83	.01	82	,47	.01
9	,65	.01	46	,45	.01	83	,57	.01
10	,47	.01	47	,69	.01	84	,55	.01
11	,54	.01	48	,37	.05	85	,56	.01
12	,55	.01	49	,60	.01	86	,34	.05
13	,58	.01	50	,79	.01	87	,38	.05
14	,74	.01	51	,57	.01	88	,54	.01
15	,73	.01	52	,47	.01	89	,52	.01
16	,43	.01	53	,56	.01	90	,67	.01
17	,65	.01	54	,63	.01	91	,68	.01
18	,67	.01	55	,69	.01	92	,48	.01
19	,66	.01	56	,80	.01	93	,48	.01
20	,59	.01	57	,53	.01	94	,60	.01
21	,56	.01	58	,46	.01	95	,67	.01
22	,48	.01	59	,68	.01	96	,71	.01
23	,68	.01	60	,53	.01	97	,54	.01
24	,71	.01	61	,39	.01	98	,39	.01
25	,65	.01	62	,49	.01	99	,36	.01
26	,72	.01	63	,68	.01	100	,50	.01
27	,78	.01	64	,62	.01	101	,61	.01
28	,44	.01	65	,61	.01	102	,58	.01
29	,55	.01	66	,65	.01	103	,49	.01
30	,77	.01	67	,62	.01	104	,65	.01
31	,50	.01	68	,54	.01	105	,73	.01
32	,88	.01	69	,55	.01	106	,41	.01
33	,74	.01	70	,54	.01	107	,55	.01
34	,79	.01	71	,44	.01	108	,63	.01
35	,62	.01	72	,42	.01	109	,59	.01
36	,54	.01	73	,47	.01	110	,55	.01
37	,60	.01	74	,51	.01			

It can be seen on Table 4 that Pearson's correlations between two versions of the inventory, except for the items 46, 86 and 87, ranging from 0.36 to 0.83 among the 23 subscales indicated acceptable reliability. The correlations were significant at the 0.00 and 0.01 level.

In addition, Pearson correlations for the dimensions are 0.60 for the first dimension, 0.64 for the second, 0.60 for the third, 0.57 for the fourth, 0.56 for the fifth, 0.54 for the sixth, 0.49 for the seventh, 0.57 for the eighth, 0.52 for the nineth, 0.57 for the tenth and 0.58 for the eleventh dimension. The average for all dimensions is 0.64 and significant at 0.01 level.

Validity

Exploratory factor analysis is used for the situation in which links between the observed and latent variables are uncertain. The analysis thus proceeds in an exploratory mode to determine how and to what extent the observed variables are linked to their underlying factors. It is important in exploratory factor analysis to identify the minimal number of factors that underlie covariation among the observed variables. In other words, exploratory factor analysis is used to determine the extent to which the observed variables were related to latent ones. In factor analysis, these relations are represented by factor loadings (Balcı, 2001; Bryman & Cramer, 1997; Büyüköztürk, 2002; Hovardaoğlu & Sezgin, 1998; Tezbaşaran, 1997; Turgut & Baykul, 1992).

In order to examine construct validity, factor analysis was examined. When determining number of factors, the items with the eigenvalues of 1 or more are considered as significant ones (Büyüköztürk, 2002). Factor loadings which show the relations between the observed variables and latents should be 0.45 or more. For several items a value of 0.30 can also be accepted. However, the diffference between two loadings should be at least 0.10. Because these items are considered as cross-loadings and therefore should be omitted.

An exploratory factor analysis with varimax rotation was conducted to examine construct validity of LSS. First, in factor analysis to check the data availbity from the subjects Kaiser-Meyer-Olkin (KMO) was tested. A value of 1 is considered as an excellent match, on the other hand a value less than 0.50 cannot be accepted. The KMO value was found as 0.84 for this study. This value proved that the size of sample group and the data was appropriate and enough for factor analysis (Kulaksızloğlu, Dilmaç, Ekşi & Otrar, 2003; Aşkar & Dönmez, 2004). The distribution of data in population should be normal (Tavşancıl, 2002). Therefore Bartlett's value was checked. A high Bartlett value shows the significance of the data. The Bartlett value for LSS data was found significant (23058,51, sd: 5995, p: 0.00).

After the factor analysis for 110-item-LSS, the variances for the items were found to range from 0.45 to 0.74. The analysis also yielded thirty two factors (components) with eigenvalues greater than one, accounting for 60

percent of the total variance in the data. 19 items with cross-loadings or with a value of less than 0.30 factor loadings were omitted. None of the items was observed with an item-total value of less than 0.30. However 38 items with a correlation value less than 0.30 were found and therefore omitted. And if an item is omitted the cronbach alpha of the inventory should be re-checked (Buluş, 2001; Dağ, 2002; Özgüven, 1994; Tekin, 1996; Turgut, 1997). After extraction the same analysis repeated with 72 items. Therefore, a varimax rotation method was conducted to determine the pattern of relationships of the 23 subscales. The variances for the items range from 0.25 to 0.74. The analysis yielded twelve factors (components) with eigenvalues greater than one, accounting for 46 percent of the total variance in the data. The 15 percent of total variace is explained by the first factor, 6.1 percent by the second, 4.1 percent by the third, 3.1 percent by the fourth, 2.9 percent by the fifth, 2.5 percent by the sixth, 2.3 percent by the seventh, 2.1 percent by the eighth and between 2 and 1 percent by the other four factors. Visual inspection of eigenvalues with the scree test supported the possible extraction of twelve factors. Scree plot of 72 item LSS is given in Figure 1.
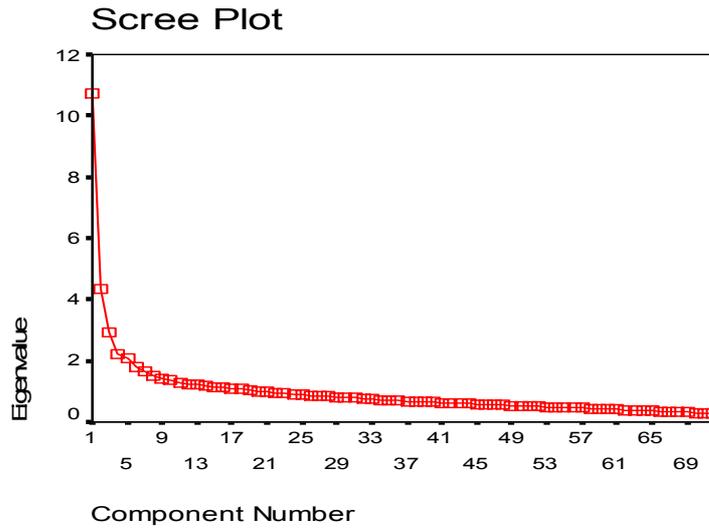

Figure 1: Scree Plot for LSS with 72 Items

Visual inspection of eigenvalues with the scree test supported the possible extraction of twelve factors. The dramatic falls in the figure gives the significant number of factors in Scree plot test (Büyüköztürk, 2002). Therefore, a varimax rotation method was conducted to determine the pattern of relationships (Bryman & Cramer, 1997; Büyüköztürk, 2002; Turgut & Baykul, 1992). The result of varimax rotation indicated that two items had no factor loadings and therefore omitted. Then 70-item-LSS addressing 12 subscales was re-checked through the same procedures. The results of varimax rotation is given in Table 5.

Table 5. Factor Analysis of 70-item-LSS after Varimax Rotation Test

Factor 1			Factor 2			Factor 3			Factor 4		
Eigenvalue =10,57 Variance%=15,11			Eigenvalue =4,32 Variance %=6,17			Eigenvalue =2,87 Variance %=4,10			Eigenvalue =2,20 Variance %=3,14		
IN	*V*	*FL*	*IN*	*V*	*FL*	*IN*	*V*	*FL*	*IN*	*V*	*FL*
73	.59	.72	56	.56	.65	103	.55	.67	8	.51	.63
74	.53	.63	55	.55	.65	101	.50	.63	9	.50	.62
75	.48	.53	54	.52	.60	85	.49	.53	7	.45	.59
65	.48	.51	50	.45	.57	102	.45	.53	6	.45	.55
76	.46	.51	2	.44	.48	70	.44	.48	1	.41	.41
77	.46	.50	57	.44	.45	96	.44	.46	68	.39	.41
43	.46	.45	52	.41	.43	97	.44	.45	11	.37	.30
44	.46	.42	42	.43	.42	95	.41	.43			
37	.45	.37	51	.42	.40	86	.40	.36			
47	.44	.35				92	.38	.33			
45	.43	.32									
19	.30	.31									

Factor 5			Factor 6			Factor 7			Factor 8		
Eigenvalue =2,07 Variance %=2,96			Eigenvalue =1,76 Variance %=2,51			Eigenvalue =1,66 Variance %=2,37			Eigenvalue =1,51 Variance %=2,15		
IN	*V*	*FL*	*IN*	*V*	*FL*	*IN*	*V*	*FL*	*IN*	*V*	*FL*
105	.68	.77	82	.56	.66	107	.74	.74	32	.73	.81
104	.56	.69	69	.49	.58	108	.73	.73	34	.71	.79
106	.53	.63	81	.49	.57	3	.43	.43	35	.61	.70
			84	.47	.39	89	.40	.40			
			83	.46	.38	94	.35	.35			
			71	.30	.37						

Factor 9			Factor 10			Factor 11			Factor 12		
Eigenvalue =1,41 Variance %=2,01			Eigenvalue =1,34 Variance %=1,91			Özdeğer=1,27 Variance %=1,82			Eigenvalue =1,22 Variance %=1,74		
IN	*V*	*FL*	*IN*	*V*	*FL*	*IN*	*V*	*FL*	*IN*	*V*	*FL*
12	.45	.62	33	.41	.48	90	.52	.63	20	.48	.51
13	.44	.52	36	.31	.46	91	.49	.58	14	.45	.54
18	.35	.38	39	.25	.41	80	.36	.30	5	.44	.44
33	.25	.31							88	.42	.40
									48	.42	

IN: Item Number   V: Variance   FL: Factor Loadings

In Table 5, it is seen that variance rage from 0.24 to 0.74 and factor loadings change 0.30 and 0.81. The analysis yielded twelve factors (components) with eigenvalues greater than one, accounting for 46 percent of the total variance in the data. The 70-item-LSS subscales correlations are given below in Table 6.

Table 6. 70-item-LSS Subscales Pearson Correlations

Subscales	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Visual	-																				
2. Auditory	.32	-																			
3. Tactile	-	-	-																		
4. Extraverted	.23	.33	-	-																	
5. Introverted	.32	.23	-	.18	-																
6. Random	.45	.34	-	.32	.22	-															
7. Sequential	.35	.21	-	.03	.27	.26	-														
8. Closure-Oriented	.45	.09	-	.10	.27	.31	44	-													
9. Open	-	-	-	-	-	-	-	-	-												
10. Global	.08	.16	-	.16	.11	.05	.02	.03	-	-											
11. Particular	.36	.33	-	.26	.27	.25	.22	.32	-	.15	-										
12. Synthesizing	.21	.35	-	.34	.32	.22	.13	.15	-	.39	.36	-									
13. Analytic	.23	.23	-	.18	.23	.17	.25	.23	-	.20	.43	.31	-								
14. Sharpener	.28	.24	-	.23	.20	.27	.24	.38	-	.12	.52	.35	.45	-							
15. Leveler	.26	.21	-	.17	.21	.19	.17	.22	-	.13	.32	.32	.23	.45	-						
16. Deductive	.31	.21	-	.16	.25	.27	.29	.23	-	.18	.24	.29	.29	.30	.31	-					
17. Inductive	.23	.22	-	.15	.18	.21	.26	.30	-	.04	.32	.25	.23	.38	.33	.25	-				
18. Field Independent	.23	.22	-	.22	.19	.28	.26	.31	-	.21	.40	.37	.34	.49	.32	.31	.36	-			
19. Field Dependent	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
20. Impulsive	.17	.25	-	.32	.07	.28	.07	.18	-	.20	.34	.34	.23	.38	.24	.19	.29	.42	-	-	
21. Reflective	.32	.20	-	.07	.31	.23	.35	.31	-	.06	.29	.19	.20	.26	.29	.28	.24	.31	-	.11	-
22. Metaphoric	.32	.18	-	.14	.15	.17	.14	.20	-	.09	.31	.26	.19	.34	.30	.26	.29	.26	-	.18	.30
23. Literal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* For correlations between 0.02 and 0.09 $p<0.05$, correlations 0.10 or more $p<0.01$

As can be seen on Table 6, the correlations for subscales are positive and range between 0.03 and 0.52. Nine subscales have significant correlations. The correlations between sequential and closure-oriented, analytic and particular, particular and sharpener, particular and field-independent, sharpener and analytic, field-independent and analytic learning styles are some of them. Besides, these correlations suppot the factor analysis. On the other hand, the correlations between visual and random, visual and closure-oriented, closure-oriented and impulsive could not be explained.

Reliability

Testing of whether each subscale is measuring a single idea and whether the items that make up the subscale are internally consistent, internal reliability data have been obtained through both Cronbach's alpha coefficient and Pearson's correlations among the 23 subscales. Reliability of LSS with 110 and 70 items are shown in Table 7.

Table 7: Reliability for Subscales of LSS with 110 and 70 Items

Subscales	Item Number (70-item-LSS)	α1	α2	r1	r2	r3
1. Visual	1,2,3,5,6,7,8,9	.64	.69	.16-.39	.30-.47	.73
2. Auditory	11,12,13,14,18, 19,20	.52	.52	.07-.39	.15-.29	.63
3. Tactile	-	.71	-	.07-.34	-	.62
4. Extraverted	32,33,34,35,36	.66	.68	.22-.37	.22-.62	.71
5. Introverted	37,39,42	.45	.46	.04-.32	.12-.23	.54
6. Random	43,44,45,46,47,48	.69	.69	.24-.37	.34-.53	.66
7. Sequential	50,51,52,54	.57	.62	.20-.35	.35-.53	.60
8. Closure-Oriented	55,56,57	.68	.69	.28-.35	.45-.56	.71
9. Open	-	.43	-	.01-.18	-	.51
10. Global	65	.54	-	.03-.27	-	.58
11. Particular	68,69,70,71	.48	.52	.16-.41	.17-.40	.52
12.Synthesizing	73,74,75,76,77	.73	.73	.30-.40	.43-.58	.75
13. Analytic	80,81,82	.33	.43	.11-.32	.06-.32	.55
14. Sharpener	83,84,85	.65	.65	.34-.46	.42-.47	.73
15. Leveler	86,88	.27	.31	.06-.39	.22-.22	.59
16.Deductive	89,90,91	.45	.45	.24-.38	.21-.38	.61
17. Inductive	92,94	.29	.42	.07-.35	.30-.30	.57
18. Field Independent	95,96,97	.61	.61	.34-.36	.33-.50	.74
19. Field Dependent	-	.62	-	.12-.23	-	.52
20. Impulsive	101,102,103	.63	.63	.28-.40	.40-.50	.74
21. Reflective	104,105,106	.75	.75	.33-.42	.55-.60	.79
22. Metaphoric	107,108	.74	.74	.35-.35	.59-.59	.73
23. Literal	-	.47	-	.06-.21	-	.65

α1: 110 items correlations
α2: 70 items correlations
r1: 110 items LSS item-total correlations
r2: 70 items LSS item-total correlations
r3: 110 items test re-test results

As seen on Table 7, findings demonstrated that the total internal consistency reliability of 110-item-LSS for 23 subscales had an average Cronbach alpha coefficient of 0.89. The Cronbach's alphas of the 23 subscales in 110-item-LSS for these subjects ranged from 0.27 to 0.75.

However the internal consistency of 70-item-LSS increased a bit and had an average Cronbach alpha coefficient of 0.91. The Cronbach's alphas of

the 23 subscales in 70-item-LSS for these subjects ranged from 0.31 to 0.75. As the Cronbach alpha coefficient increases to 1, the internal consistency also inreases in the same way (Bryman & Cramer, 1997; Tekin, 1996; Turgut, 1997; Yıldırım, 1999).

As for findings on Table 7, internal consistency of some the subscales like tactile, open, global, leveler, field-dependent and literal were low or did not exist at all, and that's why they were omitted. In addition, the other pair of the above mentioned subscales like closure-oriented, particular, sharpener, field independent and metaphoric were also omitted. As a result under 5 dimensions 11 subscales were taken out of the survey. These dimensions are 'Part 4. How I deal with ambiguity and with deadlines', 'Part 5. How I recieve information', 'Part 7. How I commit material to memory', 'Part 9. How I deal with multiple inputs' and 'Part 11. How literally I take reality'. Their subscales are tactile, closure-oriented and open, global and particular, sharpener and leveler, field-independent and field-dependent, metaphoric and literal.

The Cronbach's alphas of the other subscales such introverted, analytic, inductive and deductive were significant. After the extraction of 5 dimensions and 11 subscales, LSS was thought to be composed of 6 dimensions with 12 subscales and 52 items. These dimensions are 'Part 1. How I use my physical senses', 'Part 2. How I expose myself to learning situatııons', 'Part 3. How I handle possibilities', 'Part 6. How I further process information', 'Part 8. How I deal with language rules', 'Part 10. How I deal with response time'. The subscales are visual and auditory, extraverted and introverted, random and sequential, synthesizing and analytic, deductive and inductive, impulsive and reflective. The 52-item-LSS are given on Table 8.

Besides, external reliability had been examined to test the degree of consistency of the survey over time via test re-test reliability in each subscale. For this aim, 110-item-LSS was applied by administering the same survey on two occasions, over a period of 4 weeks (Özgüven, 1994), to the same group of 38 subjects, from Math Department in İstanbul Bilgi University, who were similar to those of the participants for the present research. As can be seen in the Table 7, Pearson's correlations between two applications of the inventory ranging from 0.51 to 0.79 among the 12 subscales were significant at the 0.01 level, with an avarage correlation of 0.64, indicating acceptable external reliability.

Finally, six dimensional twelve subscaled 52-item-LSS internal reliability through item-scale correlation was checked. On Table 8 item-total correlation, averages, standart deviations, standart errors of 52-item-LSS were given.

Table 8. Averages, Standart Deviations and Item-total Correlations of 52-Item-LSS

IN	NS	X	SE	SD	r1*	IN	NS	X	SE	SD	r1*
1	728	3.21	.03	.97	.33	46	728	2.74	.03	.97	.28
2	728	2.10	.06	1.67	.30	47	728	2.30	.03	1.05	.28
3	728	2.43	.04	1.14	.43	48	728	3.07	.03	.94	.37
5	728	1.09	.04	1.25	.25	50	728	2.10	.04	1.31	.25
6	728	2.26	.04	1.28	.33	51	728	2.30	.03	1.00	.20
7	728	2.29	.04	1.24	.35	52	728	2.56	.03	1.00	.35
8	728	3.09	.04	1.12	.37	54	728	2.46	.03	1.04	.39
9	728	3.31	.03	1.02	.37	73	728	2.59	.03	.92	.40
11	728	2.20	.03	.90	.40	74	728	2.55	.03	.97	.41
12	728	1.77	.03	1.09	.22	75	728	2.97	.03	.88	.45
13	728	2.67	.04	1.10	.28	76	728	2.70	.03	.93	.41
14	728	1.77	.04	1.16	.20	77	728	2.88	.03	.87	.35
18	728	2.67	.03	1.05	.22	80	728	2.07	.04	1.21	.25
19	728	2.98	.04	.94	.20	81	728	2.62	.03	.99	.30
20	728	1.58	.04	1.14	.21	82	728	2.61	.03	1.02	.44
32	728	2.35	.04	1.12	.34	89	728	2.62	.03	1.00	.42
33	728	2.07	.04	1.18	.24	90	728	2.19	.04	1.10	.26
34	728	2.13	.04	1.17	.26	91	728	2.49	.03	.99	.30
35	728	2.70	.04	1.12	.39	92	728	2.28	.03	1.01	.39
36	728	2.33	.04	1.15	.24	94	728	2.34	.03	1.02	.37
37	728	2.95	.04	1.06	.33	101	728	2.05	.03	.99	.44
39	728	2.60	.04	1.09	.27	102	728	2.26	.03	.94	.27
42	728	2.76	.04	1.08	.28	103	728	2.20	.03	.95	.32
43	728	2.96	.03	.97	.35	104	728	2.56	.03	1.01	.31
44	728	2.97	.03	.90	.40	105	728	2.71	.03	.93	.38
45	728	2.67	.03	1.03	.43	106	728	2.80	.03	.96	.42

X: Ortalama   IN : Item Number
SE: Standart Error   r1: Item-total Correlations.
SD: Standart Deviation   * : p< .01

As it can be seen on Table 8, item-total correlations of 52-item-LSS range from 0.20 to 0.45 and significant at 0.01 level. In any scale, an item receiving 0.20 or more is acceptable, 0.30 or more is considered as ideal. In addition, item-total correlation shouldn't be negative (Özgüven, 1994; Tekin, 1996; Turgut, 1997). Therefore item-total correlation of 52-item-LSS indicated acceptable reliability.

DISCUSSION

This study was designed to investigate the validity and reliability of the Turkish version of Learning Style Survey (LSS), which was developed by Cohen, Oxford, and Chi (2001). The survey was applied to the subjects of 768 prep students.

Pearson's correlations between Turkish and English versions of the survey ranging from, except for the items 46, 86 and 87, 0.36 to 0.83 among the 23 subscales indicated acceptable reliability.

The results of factor analysis for construct validity of the survey addressed, at the beginning, 12 subscales under the six dimensional constructs with 70 items accounting for 46 percent of total variance in the data. The first factor consists of synthesizing, random, global; the second factor sequential, closure-oriented; third factor impulsive, field-independent, inductive; fourth factor visual, particular; fifth factor reflective; sixth factor analytic, leveler; seventh factor metaphoric, deductive; eighth factor extraverted; nineth factor auditory; tenth factor extraverted; eleventh factor deductive; twelfth auditory subscales. That synthesizing, random and global; sequential and closure-oriented; field-independent and inductive learning styles are each in the same factor groups and that seven factors consist of only one of learning styles showed LSS might have 12 subscales under six dimensions. Besides, the results of factor analysis also addressed 12 subscales under the six dimensional constructs with 52 items. These 12 subscales are visual-auditory, extraverted-introverted, random-sequential, synthesizing-analytic, deductive-inductive, impulsive-reflective style dimensions.

RESULT AND SUGGESTIONS

It can be said that the results of factor analysis for construct validity of the Turkish version of the survey is highly significant. Although there are many studies on learning styles in SLA (e.g., Cohen & Dörnyei, 2002; Ehrman, 1998, 1999, 2001; Ehrman & Leaver, 2003; Ehrman & Oxford, 1990, 1995; Ehrman and et al., 2003; Jie, Xiaoqing, 2006; Kinsella, 1995; Lincoln, Rademacher, 2006; Oxford & Ehrman, 1993; Oxford, Ehrman & Lavine, 1991; Morton-Rias and et al., 2008) no reliability study of LSS has been reported yet (Dörnyei, 2005). In this study it was found that LSS is composed of 52 items, and 12 subscales under the six dimensional constructs.

The analysis for Turkish version of LSS yielded twelve factors (components) with eigenvalues greater than one, accounting for 46 percent of the total variance in the data.

In correspondence with the reliability, total internal consistency reliability of 52-item-LSS for 12 subscales had an average Cronbach alpha coefficients of 0.88. Except for the measure of inductive style (Alpha = .42), the Cronbach's alphas of the scales for these subjects were reasonably high for

the 12 subscales. The internal and external reliabilities in each scale obtained from the current study were considered sufficient for this research.

In addition, the reliability and validity of the survey obtained from the current study were considered sufficient for this research. Reliability checks of Turkish version of LSS proved that it is a dependable survey. Internal consistency reveals the construct validity at the same time (Dağ, 2002). Thus it is thought that this study has reached its aim by proving Turkish version of LSS as a reliable scale.

As a result Turkish version of LSS would provide researchers as a reliable scale describing learning styles. It should be noted, however, that there was a major limitation to the present study. That is, this is the first study that investigated language learning styles among 768 Turkish university prep class students in Turkey. Because in literature there are different opinions about the number of subjects constituiting sample group. For example Comfrey and Lee (2004) give this number as 1000 or more, therefore the number of subjects in this study would not suffice (Osborne & Costello, 2004). Besides, the conclusion drawn regarding learning styles should be considered preliminary. Further investigation is required to specify adequately learning styles of students and their socialized variables that may be influenced their learning styles.

Nevertheless, the results of the present research may be of interest to educational psychologists, researchers, educators, and to the educational process. That is, LSS may be used as an efficient instrument in order to measure language learning styles of students. These may open new perspectives in the field of SLA and assessment.

The results of this study also point to the direction for future researches. Further researches are needed to clarify the nature of learning styles as assessed by the LSS at different educational levels and culture to facilitate a better understanding of the learning styles of students.

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APPENDIX 1

Learning Style Survey (LSS)

Learning Style Survey:
Assessing your own Learning Styles*
Andrew D. Cohen, Rebecca L. Oxford, & Julie C. Chi

Purpose:
The Learning Style Survey is designed to assess your general approach to learning. It does not predict your behavior in every instance, but it is a clear indication of your overall style preferences.

Instructions:
For each item circle the response that represents your approach. Complete all items. There are eleven major activities representing twelve different aspects of your learning style. When you read the statements, try to think about what you generally do when learning.

Timing:
It generally takes about 30 minutes to complete the survey. Do not spend too much time on any item. Indicate your immediate response (or feeling) and move on to the next item.

* NOTE: This instrument constitutes a revised and expanded version of Rebecca L. Oxford's Style Analysis Survey (1993). It is still in draft form (6.19.01) and has not yet been validated.

For each item, circle your immediate response:

0 = Never
1 = Rarely
2 = Sometimes
3 = Often
4 = Always

Part 1: HOW I USE MY PHYSICAL SENSES

1. I remember something better if I write it down.   01234
2. I take detailed notes during lectures.
       01234
3. When I listen, I visualize pictures, numbers, or words in my head.   01234
4. I prefer to learn with TV or video rather than other media.   01234
5. I use color-coding to help me as I learn or work.   01234
6. I need written directions for tasks.   01234
7. I have to look at people to understand what they say.
       01234
8. I understand lectures better when they write on the board.   01234
9. Charts, diagrams and maps help me understand what someone says.   01234
10. I remember peoples' faces, but not their names.   01234
                                                                          A - Total

11. I remember things better if I discuss them with someone.   01234

12. I prefer to learn by listening to a lecture rather than reading.
     01234
13. I need oral directions for a task.   01234
14. Background sound helps me think.   01234
15. I like to listen to music when I study or work.   01234
16. I can understand what people say even when I cannot see them.   01234
17. I remember peoples' names, but not their faces.   01234
18. I easily remember jokes that I hear.   01234
19. I can identify people by their voices (e.g., on the phone).   01234
20. When I turn on the TV, I listen to the sound more than watch the screen.   01234
            B - Total

21. I'd rather just start to do things, rather than pay attention to the directions. 01234
22. I need frequent breaks when I work or study.   01234
23. I need to eat something when I read or study.   01234
24. If I have a choice between sitting and standing, I'd rather stand.   01234
25. I get nervous when I sit still too long.   01234
26. I think better when I move around (e.g., pacing or my tapping feet).   01234
27. I play with or bite on my pens during lectures.   01234
28. Manipulating objects helps me to remember what someone says.   01234
29. I move my hands a lot when I speak.   01234
30. I draw lots of pictures (doodles) in my notebook during lectures.   01234
            C - Total

Part 2: HOW I EXPOSE MYSELF TO LEARNING SITUATIONS

1. I learn better when I work or study with others than by myself.   01234
2. I meet new people easily by jumping into the conversation.   01234
3. I learn better in the classroom than with a private tutor.   01234
4. It is easy for me to approach strangers.   01234
5. Interacting with lots of people gives me energy.   01234
6. I experience things first, and then try to understand them.   01234
            A – Total

7. I am energized by the inner world (what I'm thinking inside).   01234
8. I prefer individual or one-on-one games and activities.   01234
9. I have a few interests, and I concentrate deeply on them.   01234
10. After working in a large group, I am exhausted.   01234
11. When I am in a large group, I tend to keep silent and just listen.   01234
12. I want to understand something well before I try it.   01234
            B - Total

Part 3: HOW I HANDLE POSSIBILITIES

1. I have a creative imagination.   01234
2. I try to find many options and possibilities for why something happens.   01234
3. I plan carefully for future events.   01234
4. I like to discover things myself rather than have everything explained to me.01234
5. I add many original ideas during class discussions.   01234
6. I am open-minded to new suggestions from my peers.   01234

A - Total

7. I look at situations as they are now. — 01234
8. I read instruction manuals (e.g., for computers or VCRs) before using the device. — 01234
9. I trust concrete facts instead of new, untested ideas. — 01234
10. I prefer things presented in a step-by-step way. — 01234
11. I dislike it if my classmate changes the plan for our project. — 01234
12. I follow directions carefully. — 01234

B - Total

Part 4: HOW I DEAL WITH AMBIGUITY AND WITH DEADLINES

1. I like to plan language study sessions carefully and do lessons on time or early. 01234
2. My notes, handouts, and other school materials are carefully organized. — 01234
3. I like to be certain about what things mean in a target language. — 01234
4. I like to know how rules are applied and why. — 01234

A - Total

5. Finishing assignments on time is not a priority of mine. — 01234
6. I have many piles of papers on my desk at home — 01234
7. I don't worry about comprehending everything. — 01234
8. I don't feel the need to come to rapid conclusions about a topic. — 01234

B - Total

Part 5: HOW I RECEIVE INFORMATION

1. I prefer short and simple answers rather than long explanations. — 01234
2. I can ignore details that do not seem relevant. — 01234
3. It is easy for me to see the overall plan or big picture. — 01234
4. I get the main idea, and that's enough for me. — 01234
5. When I tell an old story, I tend to forget lots of specific details. — 01234

A - Total

6. I need very specific examples in order to understand fully. — 01234
7. I pay attention to specific facts or information. — 01234
8. I'm good at catching new phrases or words when I hear them. — 01234
9. I enjoy activities where I have to fill in the blank with missing words I hear. — 01234
10. When I tell a joke, I remember the details, but forget the punch line. — 01234

B - Total

Part 6: HOW I FURTHER PROCESS INFORMATION

1. I can summarize information easily. — 01234
2. I can quickly paraphrase what other people say. — 01234
3. When I create an outline, I consider the key points first. — 01234
4. I enjoy activities where I have to pull ideas together. — 01234
5. By looking at the whole situation, I can easily understand someone. — 01234

A - Total

6. I have a hard time understanding when I don't know every word. — 01234

7. When I tell a story or explain something, it takes a long time. 01234
8. I prefer to focus on grammar rules. 01234
9. I'm good at solving complicated mysteries and puzzles. 01234
10. I notice differences more often than similarities. 01234

B – Total

Part 7: HOW I COMMIT MATERIAL TO MEMORY_____

1. When learning new material, I can perceive even small difference. 01234
2. When I memorize different bits of language material, I am able to retrieve these different bits pretty easily – as if I had stored them in separate slots in my brain. 01234
3. I am able to distinguish among speech sounds, grammatical forms, and fine

distinctions of meaning in the target language. 01234

A - Total

4. When learning new information, I may clump together data by eliminating or reducing differences and focusing on similarities. 01234
5. I sometimes ignore distinctions that would make what I say more accurate in the given context. 01234
6. Similar memories become blurred in my mind; I merge new learning experiences with previous ones. 01234

B - Total

Part 8: HOW I DEAL WITH LANGUAGE RULES_____

1. I like to go from the general to the specific in learning a target language. 01234
2. I like to start with rules and theories rather than specific examples. 01234
3. I like to begin with generalizations and then find experiences that relate to those generalizations. 01234

A - Total

4. I like to learn rules of language indirectly through being exposed to lots of examples of grammatical structures and other language features. 01234
5. I don't really care if I hear a rule stated since I don't remember rules very well anyway. 01234
6. I figure out rules based on the way I see language forms behaving over time. 01234

B - Total

Part 9: HOW I DEAL WITH MULTIPLE INPUTS_____

1. I can separate out the relevant and important information in a given context even when distracting information is present. 01234
2. When I produce an oral or written message in a target language, I make sure that all the grammatical structures are in agreement with one another. 01234
3. I not only to attend to grammar, but check for appropriate level of formality and politeness. 01234

A - Total

4. Language material that is right in my face may divert my attention away from making an important language distinction while speaking or writing.   01234
5. If I am speaking or writing in a language that requires me to pay attention to grammatical agreement across structures, I am likely to make errors.   01234
6. When I am using lengthy sentences in a target language, I am likely to get distracted enough so that I neglect some aspect, whether it be grammatical or stylistic. 01234

B - Total

Part 10: HOW I DEAL WITH RESPONSE TIME

1. I tend to react quickly in language situations.   01234
2. I just go with my instincts in a target language.   01234
3. I just jump in, see what happens, and make on-line corrections if needed.   01234

A - Total

4. I need to think things through before speaking or writing.   01234
5. I like to look before I leap when it comes to determining what to say or write in a target language.   01234
6. I attempt to find supporting material in my mind before I set about producing language.   01234

B - Total

Part 11: HOW LITERALLY I TAKE REALITY

1. I find that building metaphors in my mind helps me deal with language (e.g., viewing the language like a machine with component parts that can be disassembled). 01234
2. I learn things through metaphors and associations with other things. I find stories and examples help me learn.   01234

A - Total

3. I take learning language very literally and don't engage in metaphorical work. 01234
4. I like language material that says what it means directly. I tend to take things at face value.   01234

B - Total