Researching (Non) Fluent L2 Speakers' Oral Communication Deficiencies: A Psycholinguistic Perspective

A. Mirzaei [*]
Assistant Professor, TEFL
Shahrekord University
email: mirzaei-a@lit.sku.ac.ir

N. Heidari
M.A., TEFL
Shahrekord University
email: heidari_najmeh67@yahoo.com

Abstract

Fluency in a second language (L2) involves a quintessentially cognitive processing system that operates quickly and effectively. The perceived importance of researching fluency through a psycholinguistic lens has motivated the related L2 research to resort to current cognitive speaking-specific models. This study, drawing on Levelt's (1999a) psycholinguistic model, probed the deficiency sources (DSs) (non)fluent L2 speakers encounter in L2 communication and then surveyed the problem-solving mechanisms (PSMs) they happen to engage in to circumvent or mitigate the bottle-neck effects of the deficiencies. First, an analytic fluency rating scale was developed to assess the audio-recorded (monologic and dialogic) speech samples of a large number of L2 speakers and identify the fluent and nonfluent speakers. Two questionnaires and output-related retrospective interviews were employed to explore the (non)fluent L2 speakers' DSs and PSMs. The MANOVA results and the interpretative analysis of retrospective data revealed that the nonfluent participants mainly suffered from resource deficits, processing time pressure, and perceived deficiencies in the interlocutor's performance. Specifically, they felt adversely pressured by an onrush of competing plans or the absence of any to chart their minds, floundered on feeling incapable of configuring a viable syntactic structure for their intended meanings, were restrained groping for the right lemma to fit their notions, or faltered due to a daunting uncertainty of the phonological accuracy. Meanwhile, they resorted to ineffective oral-

production strategies such as message abandonment and reduction, which resulted in disfluent speech. The fluent participants, however, did not suffer from these DSs and employed PSMs more consistently. They were able to dynamically reformulate the notions or the preverbal message, apply a revitalized encoding mechanism, use various stalling mechanisms, and negotiate meaning in order to monitor the articulation. The findings suggest that any attempt intended to improve or assess L2 fluency pivot on a psycholinguistic approach to L2 oral production.

1. Introduction

Speaking a foreign or second language (L2) fluently plays a pivotal role in L2 education and research and is increasingly becoming the principal goal of most L2 learners and practitioners all over the world (Burns & Seidlhofer, 2002; Martínez-Flor, Usó-Juan, & Soler, 2006; Nunan, 2003). Fluency in speech production is an automated procedural ability, and fluent speech is natural and effortless necessitating not much concentration and attempt (Schmidt, 1992). Because of the nature of working memory and the speed with which speech is usually produced, procedural knowledge is the quintessence of fluent speech production (Levelt, 1989). Although first language (L1) speakers need to pay attention only to speech planning and monitoring, L2 speakers at the beginning levels, or even at the advanced levels, cannot automatically encode syntactic and phonological processes (de Bot, 1992; Sajavaara, 1987).

The importance of adopting a cognitive approach towards speech production has resulted in the development of several psycholinguistic models seeking to demonstrate the speech production processes. Levelt's (1989, 1993, 1995, 1999a, 1999b) modular model of speech production is one of the most comprehensive and widely used theoretical frameworks. Levelt's (1999a) model includes declarative and procedural knowledge and is composed of five autonomous components: conceptualizer, formulator, articulator, audition, and speech comprehension system. This model was developed based on extensive psycholinguistic research and a wealth of empirical data investigating and observing speech errors or disfluencies. Since then, several researchers (Segalowitz, 2004; Towell, Hawkins, & Bazergui, 1996) have tried to account for where disfluencies occur in the model and explain the reasons for difficulties in attaining complete automaticity in the L2 cognitive processes. The findings indicated that disfluency originates mainly in the formulator because lexical access, phonological short-term memory, and control of attention dominate the

output of the articulator and it is where declarative knowledge is transformed into procedural knowledge. Levelt's (1989) influential speaking-specific model has been used in the studies of L2 learners' oral production (e.g. de Bot, 1992; de Jong, Steinel, Florijn, Schoonen, & Hulstijn, 2012; Dörnyei & Kormos, 1998; Towell et al., 1996). Specifically, Dörnyei and Kormos (1998) provided an inclusive framework of the underlying problem-management processes in L2 communication drawing on the model. Because L2 speakers spend considerable time to handle various problems during even a brief spontaneous speech (Gass & Varonis, 1991), the knowledge of problem types and PSMs of fluent and nonfluent L2 speakers has important theoretical and practical implications for L2 research and pedagogy.

Despite its perceived priority in theory, fluency is often overlooked at the cost of accuracy and teachers simply rely on input to enable learners to speak effortlessly and naturally. In addition, most of the fluency-oriented work in L2 assessment and research has largely focused on the external, easily-measurable performance-related facets of the concept and has relatively failed to conceptualize it from a cognitive standpoint as an information-processing, problem-solving process. This is clearly a challenging task in the second language acquisition (SLA) field for the cognitive bases of this elusive notion have not yet been fully recognized. Encouraged by the scarcity of research on the cognitive foundations of fluency, this study drew on Levelt's (1999a) speaking-specific model to research L2 fluency as a cognitive process and explore deficiency sources (DSs) and problem-solving mechanisms (PSMs) of fluent and nonfluent L2 speakers. To this end, four main DSs, namely resource deficits, processing time pressure, perceived deficiencies in one's own language, and perceived deficiencies in the interlocutor's performance as well as the related PSMs needed to surmount these DSs were theoretically recognized and operationalized in the scope of the study.

2. Theoretical Background

Speaking involves the processing of a considerable amount of data in a limited period of time; that is, two or three words are produced per second in natural speech (Levelt, 1989). Fulfilling this great task requires automaticity not conscious monitoring as human capacity is too limited to focus consciously on the information (Segalowitz & Hulstijn, 2005). Automaticity is an integral component in every theory of cognitive skill acquisition and thus a related issue to SLA (e.g. DeKeyser, 2001; Hulstijn, 2001; Schmidt, 2001; Skehan, 1998). In SLA, interest in automaticity is linked to the importance of fluency (Segalowitz, 2003). McLaughlin, Rossman, and

Mcleod (1983) also relate fluency to automatic processing and propose that one difference between fluent and nonfluent L2 speakers is the extent to which lexical processing is automatized.

Despite the fact that fluency is related to communicative effectiveness and it has received considerable attention in L2 research (Bygate, 2009), there has been no consensus over its definition and measurement. Fluency has also been regarded as a thorny issue by the interested language testers (Luoma, 2004). Fluency can be used in two senses in L2 context. In the broad sense, it refers to global oral proficiency in the sense that a fluent speaker shows a good command of L2. In its narrower sense, it refers to temporal features of language proficiency, and, in procedures for scoring oral examinations, it is one component of oral proficiency (Lennon, 1990, 2000). However, as Lennon (1990) argues, the narrower sense can include other facets of oral proficiency, and fluency in delivering speech is the crucial determiner of perceived oral proficiency.

Fluency should obviously be distinguished from general language proficiency in order to become a practical and efficient concept for L2 research (Chambers, 1997). The related literature on fluency has focused on the important temporal variables of speech (such as speech rate, repairs, amount and frequency of hesitation, location of pauses, and length of runs of fluent speech between pauses) that are associated with the psycholinguistic facets of performance and production (e.g. Lennon, 1990; Möhle, 1984; Towell et al., 1996). The study of temporal variables yields a more discernable and measurable interpretation of fluency and also allows psycholinguistic research to collect useful empirical evidence because language production processes are not directly accessible (Chambers, 1997).

Fulcher's (1996) refined fluency scale typically indicates how temporal variables in L2 speech can be associated with the underlying psycholinguistic mechanisms. Fulcher, dissatisfied with the existing fluency rating scales, looked for a more concrete description of the scales and suggested a data-based approach to their development. He examined several speech samples, summarized rater interpretations of them, and outlined a new scale of fluency. Although the description of each band in this rating scale is long (more than 200 words for each level), Fulcher (1996) claims that the descriptions are instructive and informative for raters. Because temporal measures of fluency are assumed to be linked to holistic ratings of speech quality (Ginther, Dimova, & Yang, 2010), Fulcher's scale is expected to be a holistic one. Despite the fact that holistic scales have the practical advantages of speed of scoring and lower expenses, analytic scales are believed to be more beneficial because the score given to each criterion yields diagnostic facts about various aspects of learner performance (Carr,

2000). In contrast to holistic scales, analytic scales give raters the opportunity to concentrate on fewer facets of language in giving a score; thus, they are more reliable (Hamp-Lyons, 1991). Therefore, to have an analytic fluency rating scale, this study integrated the descriptors of both Fulcher's fluency rating scale (i.e. hesitation, repetition and restructuring, circumlocution, and coherence) and IELTS speaking scale (accuracy and variation of forms, and pronunciation) based on expert judgments and an intensive revision process. This adapted fluency scale also had six bands.

Considering fluency as a performance phenomenon, Lennon (1990) maintains that fluency differs from other components of oral proficiency (e.g. idiomaticness, appropriateness, lexical range, and syntactic complexity) and, thus, defines fluency as "an impression on the listener's part that the psycholinguistic processes of speech planning and speech production are functioning easily and efficiently" (p. 391). Lennon (2000) refines his definition and suggests that fluency is the ability to transform thought or communicative intention into language naturally, correctly, and effectively under the temporal constraints of immediate processing. Levelt (1989) also maintains that the components of speech production are automatic and "this automaticity makes it possible for them to work in parallel, which is a main condition for the generation of uninterrupted fluent speech" (p. 2).

L2 speaking proficiency is believed to have three components: language knowledge, linguistic processing skills, and pronunciation skills (de Jong et al., 2012). L2 speech production is thus the outcome of the complicated, interrelated system of linguistic and cognitive processes. The comprehensive speech production system proposed by Levelt (1989, 1993) for monolinguals comprises a number of autonomous components in charge of various features of speech production. Messages are generated in the conceptualizer where the speaker can retrieve information from a knowledge store that contains the discourse model as well as situational and encyclopedic knowledge. Because the message is still in nonlinguistic form, it is called preverbal. Levelt (1989) assumes that this preverbal message is produced through macroplanning and microplanning. Communicative intentions, expressed as speech acts, are defined at the macroplanning stage. Then, at the microplanning stage, the semantic representation (or the message content) is formed. The preverbal message serves as the input to the formulator which consists of lexical entries and retrieves information from the speaker's mental lexicon. Each lexical entry consists of (a) lemmas that specify semantic and syntactic information and (b) lexemes that have phonological and morphological information. In the formulator, lemma activation takes place primarily. Finally, the output of the formulator (phonetic plan) transfers to the articulator, which is composed of the outer

loop of monitoring, in order to be transformed into overt speech (Levelt, 1993).

Although the monitor is placed in the conceptualizer, it receives information from a distinct speech comprehension system (parser) which is connected to the mental lexicon. It is thus believed that, in order to produce and perceive one's own speech without duplication, the same lexicon is employed, and, to concentrate on one's own speech and examine the expressions of other speakers, the same speech comprehension system is employed (Levelt, 1989). These consistent and interrelated underlying processes necessitate a psycholinguistic account of L2 problem management to explain the occurrence of self-correction and meaning-negotiation mechanisms in L2 speech production.

Whereas a number of components such as conceptualizer and monitor function under controlled processing in this model, other components such as formulator and articulator function automatically (Levelt, 1989). However, processing in L2 speech production is different in that L2 learners may encounter difficulty with formulation and articulation (de Bot, 1992). In this respect, Towell et al. (1996), in their study of 16 advanced learners of French who spent six months in a French-speaking country, found that increases in fluency were linked to increases in the degree of proceduralization of linguistic knowledge. They argued that L2 learners can increase fluency by spending a period of time in the L2 context because proceduralization occurs in formulator which encodes messages grammatically and phonologically and converts declarative knowledge into automatic speech production. Therefore, de Bot (1992) adapts this model for L2 speech production and states that a bilingual model should consider different features of L2 speech such as code switching, crosslinguistic influences, slower L2 speech production, and differences in L1 and L2 mastery. Producing utterances in L2 involves remarkable effort and attention, which, consequently, reduces the speed of delivery and makes L2 speakers spend considerable time negotiating meaning and struggling to handle the communication breakdowns (Kormos, 2006).

From Levelt's psycholinguistic point of view, there are four main sources of L2 communication problems: (a) resource deficits, (b) processing time pressure, (c) perceived deficiencies in one's own language, and (d) perceived deficiencies in the interlocutor's performance (Dörnyei & Scott, 1997). Resource deficit is the outcome of L2 speakers' deficient L2 competence. It is linked to three PSMs in the planning and encoding of the preverbal message. *Lexical PSMs* first deal with the regular incapability to remember the appropriate L2 lemma that conforms to the concepts defined in the preverbal plan. Similarly, *grammatical PSMs* cope with the

inadequate knowledge of the grammatical form and the argument structure of the lemma and the word-ordering rules of the L2. And finally, *phonological and articulatory PSMs* handle complexities in the phonological encoding and articulatory phases (Dörnyei & Kormos, 1998).

Because L2 speech processing is serial, it needs more attentional resources and processing time than speech production in L1. By utilizing different processing time pressure mechanisms, L2 speakers can temporize and devote more attention to processing (Dörnyei & Kormos, 1998). Deficiencies in one's own language output, which might be revealed after encoding the message, lead to self-initiation, self-correction, or self-repair. Self-repairs can be prompted by three different circumstances: a lapse in the encoding process, the generation of an inappropriate or inadequate message, and incomplete knowledge of L2 system. Finally, other-performance related problems, including meaning-negotiation mechanisms, constitute the fourth main level of the framework because the speech comprehension system (parser) forms an essential part of Levelt's speech processing model (Dörnyei & Kormos, 1998).

Fluency is an essential yet complex concept in language testing and SLA research (Luoma, 2004), and there have been several attempts to develop reliable scales of fluency (e.g. Fulcher, 1996; Weir, 1993). Besides the significance of developing reliable scales of fluency, which is one of the pivotal aims of this study, identifying the characteristics of fluent speakers is of great importance in L2 education. Knowing whether differentially fluent L2 speakers differ in DSs in L2 communication or whether they employ different PSMs encountering similar DSs yields important implications from psycholinguistic and educational perspectives. The differences between DSs and PSMs of fluent and nonfluent L2 speakers can also benefit the language testing field for developing a cognitive model for L2 fluency assessment.

3. Study

The linguistic knowledge of L2 speakers is not perfect, and they naturally suffer from a series of problems that originate in their different cognitive and communication DSs. L2 research has shown that fluent L2 speakers employ effective communication strategies or PSMs to circumvent such deficiencies and this endows them greater facility to maintain the flow of communication. Fluency and communicative effectiveness thus might be better explored by using a cognitive model of L2 speech production that provides an account of DSs that the fluent and nonfluent L2 speakers might encounter and the PSMs they employ to handle those cognitive or communicative inadequacies. Given as such, this study specifically addressed the following research questions.

1. Do fluent and non-fluent L2 speakers have different main L2 deficiency sources in L2 communication?
2. Do fluent and non-fluent L2 speakers employ different problem-solving mechanisms grappling with their L2 deficiency sources?

4. Methodology

4.1 Participants

The participants were 180 graduate and undergraduate university students majoring in English Translation, Literature, and TEFL at several universities in the southwest and center of Iran. They were 80 males and 100 females whose ages ranged from 20 to 30. The audio-recorded speech samples of the participants were assessed using the developed analytic fluency scale, and 50 fluent (26 males and 24 females) and 50 nonfluent (23 males and 27 females) L2 speakers were selected. The fluent participants were from MA (n=19), senior (n=22), and junior (n=9) levels, and the nonfluent participants were also from MA (n=2), senior (n=16), and junior (n=32) levels. All of them were native speakers of Persian and had no prior experience of being in English speaking countries. They had been formally taught English as a foreign language (EFL) for seven years during junior and senior high schools with little exposure or access to authentic face-to-face oral English during this time.

4.2 Instrumentation and data collection procedure

At first, two fluency and speaking rating scales primarily developed and used by Fulcher (1996) and IELTS (2008) were integrated and adapted to develop an analytic fluency scale to identify the fluent and nonfluent L2 speakers. The scale consists of six descriptors (i.e. hesitation, repetition and restructuring, circumlocution, coherence, accuracy and variation of forms, and pronunciation) and six bands that ranged from zero to five. The rationale for choosing these descriptors was, firstly, the fact that they are associated with the psycholinguistic mechanisms underlying speech production (Lennon, 1990; Möhle, 1984; Towell et al., 1996). Secondly, there is a general consensus in the related literature over the inclusion of these descriptors as benchmarks for assessing L2 fluency (e.g. de Jong & Perfetti, 2011; Fulcher, 1996, 2003; IELTS, 2008; Kormos & Denes, 2004). Finally, the choice of descriptors and the scale-development process received constant expert consultation and judgment in order to ensure both validity and practicality. An interpretive coding system (Fulcher, 1996) was also developed and discussed during the raters' standardization meetings focusing on each of these descriptors explaining, for instance, why fluency appeared to have been disrupted by the occurrence of a particular

phenomenon in one situation but not everywhere with respect to language use. As Fulcher argues, rating fluency solely based on easily-codeable surface phenomena with no explanations of the effects of these phenomena on language use is of little use by itself. For instance, raters do not tend to consider some pauses as breakdowns in communication but as thinking time for remembering the content of the next expression.

Two oral production tasks that necessitated the production of L2 speech in both monologic and dialogic conditions were used and the speech samples were audio-recorded using a digital audio-recorder in a quiet room. The monologic task was a picture description consisting of six pictures in a logical order that was two to three minutes long on average. The dialogic task required two participants to discuss the advantages and disadvantages of the media (e.g. the Internet, satellite, and TV) taking four-five minutes. The oral recordings were analyzed and rated by two raters (researchers) using the developed analytic fluency scale. Because examiner training is also a perquisite for ensuring reliability and validity of second language performance (Bachman, 2000), five standardization meetings were held to ensure inter-rater reliability. To make sure about the raters' consistency in rating the recordings, Kappa measure of agreement was run. The Kappa value was .781 (p <0.05). A Kappa value above 0.7 represents a good agreement (Peat, 2001) and hence a good estimate of inter-rater consistency.

The participants' oral outputs were assessed using the developed analytic fluency rating scale, and 50 fluent and 50 nonfluent L2 speakers were selected. To identify the fluent and nonfluent participants' DSs and PSMs in L2 use, two Likert-type questionnaires (Appendix) were constructed drawing on the descriptions proposed by Dörnyei and Scott (1997) and Dörnyei and Kormos (1998) as well as benefiting from expert judgment. These questionnaires were assessed on a four-point Likert scale ranging from *never* (1) to *always* (4). The content validity of the instruments was delineated through the development and use of two detailed item specifications as the blueprint, experts' judgments, and pilot testing to ensure that the instruments were carefully and accurately planned to include a representative sample of the DSs and PSMs of L2 speakers in L2 communication.

The construct validity of the tests was examined using factor analysis (Principal Component Analysis). A primary inspection of the screeplots, Catell's scree, and Parallel Analysis (PA) and the subsequent use of the oblimin rotation indicated the presence of four components in each test with a number of strong loadings. The complementary analysis of the item loadings on the main components in each test supported the use of the instruments for surveying L2 speakers' DSs and PSMs. The results of the

Cronbach's alpha for the DSs instrument was 0.86 and for the PSMs instrument was .89, indicating good internal consistencies.

Retrospective interviews were also conducted randomly sampling participants from both groups to further address the research questions. Besides identifying the main PSMs that the fluent and nonfluent participants employ, it was also important to know which specific categories of PSMs were employed by the fluent and nonfluent participants.

5. Results

Both quantitative and interpretative approaches were adopted to data analysis to be able to make sound claims about the significance or implications of the findings. Descriptive statistics and complementary one-way between-groups multivariate analysis of variance (MANOVA) were computed to analyze the data. The results of the descriptive statistics for the DSs are shown in Table 1.

Table 1. Results of the descriptive statistics for DSs

DSs	Fluency	N	Min	Max	Mean	SD.	Skewness	Kurtosis
Resource deficits	Fluent	50	1.00	2.00	1.4	.243	.514	-.299
	Nonfluent	50	3.10	4.00	3.52	.22	.647	-.095
Processing time pressure	Fluent	50	1.00	2.00	1.36	.364	.493	-.553
	Nonfluent	50	2.00	4.00	3.1	.494	.105	-.631
Own output deficiencies	Fluent	50	2.00	4.00	2.87	.492	-.060	-.458
	Nonfluent	50	2.00	4.00	2.95	.448	-.354	-.628
Interlocutor's deficiencies	Fluent	50	2.00	3.00	2.81	.407	-.414	.587
	Nonfluent	50	2.60	4.30	3.44	.368	.327	.362

The results showed that the mean scores ranged from 1.36 to 2.87, for the fluent L2 speakers, and from 2.95 to 3.52, for the nonfluent L2 speakers. The minimum score for each DS was 1 and the maximum score was 4. The nonfluent L2 speakers suffered from resource deficits (M=3.52, SD=.22), processing time pressure (M=3.10, SD=.49), perceived deficiencies in their own output (M=2.95, SD=.44), and perceived deficiencies in the interlocutor's performance (M=3.44, SD=.36) more than the fluent L2 speakers. The fluent participants' mean scores were as follows: resource deficits (M=1.4, SD=.24), processing time pressure (M=1.36, SD=.36), perceived deficiencies in own output (M=2.87, SD=.49), and perceived deficiencies in the interlocutor's performance (M=2.81, SD=.4). Descriptive statistics were also obtained for the fluent and nonfluent L2 speakers' use of PSMs. Table 2 shows the results.

Table 2. Results of the descriptive statistics for PSMs

PSMs	Fluency	N	Min	Max	Mean	SD.	Skewness	Kurtosis
Resource deficits	Fluent	50	2.91	4.00	3.4	.251	.818	-.238
	Nonfluent	50	2.16	3.25	2.61	.219	.666	.384
Processing time pressure	Fluent	50	2.50	4.00	3.33	.5	-.144	-.023
	Nonfluent	50	1.50	4.00	2.24	.664	.997	.108
Own output deficiencies	Fluent	50	1.66	3.33	2.68	.428	-.169	-.558
	Nonfluent	50	2.66	4.00	3.32	.395	.194	-.671
Interlocutor's deficiencies	Fluent	50	2.66	4.00	3.24	.348	.097	.515
	Nonfluent	50	2.00	4.00	2.75	.507	.534	.640

The mean scores of the fluent L2 speakers for PSMs ranged from 2.68 to 3.4 and those of the nonfluent L2 speakers from 2.24 to 3.32. The findings indicated that the fluent L2 speakers employed PSMs related to resource deficits (M=3.4, SD=.25), processing time pressure (M=3.33, SD=.5), and perceived deficiencies in the interlocutor's performance (M=3.24, SD=.34) more than the nonfluent L2 speakers. The nonfluent participants' mean scores were as following: resource deficits (M=2.61, SD=.21), processing time pressure (M=2.24, SD=.66), and perceived deficiencies in the interlocutor's performance (M=2.75, SD=.5). Nevertheless, the nonfluent L2 speakers (M=3.32, SD=.39) used PSMs related to perceived deficiencies in their own output more than the fluent participants (M=2.68, SD=.42).

To see if the differences between the fluent and nonfluent L2 speakers' DSs were statistically significant, one MANOVA was run. The dependent variables involved in the analysis were the four main types of DSs. The independent grouping variable was fluency (fluent and nonfluent L2 speakers). Preliminary assumption testing was performed to check for normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, and no serious violation was evidenced. Table 3 displays the MANOVA results for the DSs.

Table 3. Results of multivariate tests of significance for strategies for DSs

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Fluency	Pillai's Trace	.952	467.916[a]	4.000	95.000	.000	.952
	Wilks' Lambda	.048	467.916[a]	4.000	95.000	.000	.952
	Hotelling's Trace	19.702	467.916[a]	4.000	95.000	.000	.952
	Roy's Largest Root	19.702	467.916[a]	4.000	95.000	.000	.952

As seen in Table 3, there was a statistically significant difference between the fluent and nonfluent L2 speakers on the combined dependent variables, F (4, 95)=467.91, p<0.05; Wilks' Lambda =.048; partial eta

squared =.95. The results of the tests of between-subjects effects are shown in Table 4. In order to reduce the chance of type 1 error, a Bonferroni adjusted alpha level of .012 was used.

Table 4. Results of the tests of between-subjects effects for DSs

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Fluency	Resource deficits	1013370.396	1	1013370.396	581.765	.000	.929
	Processing time pressure	748225.000	1	748225.000	399.271	.000	.803
	Own output	3931.792	1	3931.792	2.051	.155	.020
	Interlocutor	104544.229	1	104544.229	72.662	.000	.426

The above results indicate that the difference in the resource deficits, F (1, 98)= 581.76, $p<0.05$, partial eta squared =.92; processing time pressure, F (1, 98)= 399.27, $p<0.05$, partial eta squared=.8; and perceived deficiencies in the interlocutor's performance, F (1, 98)=72.66, $p<0.05$, partial eta squared = .42, was statistically significant. An inspection of the mean scores revealed that the nonfluent L2 speakers were restrained by these DSs more than the fluent L2 speakers. It can be concluded that the nonfluent L2 speakers lacked the necessary lexical, grammatical, and phonological knowledge to properly formulate and produce their messages.

In order to explore the PSMs the L2 speakers employed while grappling with their DSs in L2 communication, another MANOVA was performed after checking the preliminary assumptions. The four dependent variables were PSMs related to the four main DSs, and the independent grouping variable was fluency. Table 5 presents the MANOVA results for the PSMs.

Table 5. Results of multivariate tests of significance for strategies for PSMs

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
fluency	Pillai's Trace	.815	104.950[a]	4.000	95.000	.000	.815
	Wilks' Lambda	.185	104.950[a]	4.000	95.000	.000	.815
	Hotelling's Trace	4.419	104.950[a]	4.000	95.000	.000	.815
	Roy's Largest Root	4.419	104.950[a]	4.000	95.000	.000	.815

The table demonstrates that the difference between the fluent and nonfluent L2 speakers on the combined dependent variables was statistically significant, F (4, 95)=114.2, $p<0.05$; Wilks' Lambda=.172; partial eta squared=.82. This finding suggests that the fluent and nonfluent participants employed different types of PSMs and that these differences might account

for their discrepancies in L2 speaking fluency. Table 7 displays the results of the tests of between-subject effects.

Table 6. Results of the tests of between-subjects effects for PSMs

Source Variable	Dependent	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Fluency	Resource deficits	158007.045	1	158007.045	284.111	.000	.744
	Processing time pressure	152100.000	1	152100.000	50.821	.000	.341
	Own output	102401.920	1	102401.920	60.292	.000	.381
	Interlocutor	71110.222	1	71110.222	48.380	.000	.331

Table 6 indicates that the difference in the PSMs related to resource deficits, F (1, 98)=284.11, $p<$ 0.05, partial eta squared=.74; processing time pressure, F (1, 98)= 50.82, $p<$ 0.05, partial eta squared=.34; perceived deficiencies in one's own output, F (1, 98)= 60.29, $p<$ 0.05, partial eta squared =.38; and perceived deficiencies in the interlocutor's performance, F (1, 98)=48.38, $p<$ 0.05, partial eta squared=.33, using a Bonferroni adjusted alpha level of .012, reached a statistical significance. A closer examination of the mean scores showed that the fluent L2 speakers employed PSMs related to resource deficits, processing time pressure, and perceived deficiencies in the interlocutor's performance more than the nonfluent L2 speakers to avoid communication breakdowns. In contrast, the nonfluent L2 speakers only used PSMs related to perceived deficiencies in their own output more significantly.

For a close scrutiny of the specific PSMs categories that the fluent and nonfluent participants employ, retrospective interviews were also conducted. Retrospective data focused on the intentions or reasons for using certain PSMs that are not easily discernable from the quantitative data.

5.1 Retrospective interviews with the fluent L2 speakers

In support of the quantitative data analysis, the retrospective interviews of the fluent L2 speakers showed that they used several strategies to keep the conversation going such as approximation, all-purpose words, literal translation, circumlocution, direct appeal for help, fillers, asking for clarification, interpretive summary, and guessing. Several instances of the retrospective interviews with the fluent L2 speakers are shown in Table 7.

Table 7. Retrospective interviews with the fluent L2 speakers

PSM Types	Examples	Retrospective Comments
Approximation	The girl and the boy were preparing for the journey.	I couldn't remember the word *trip*.
Use of All-purpose Words	Your eyes are gonna be … [a] what-do-you-call-it?	I forgot the word *weak* but say what-do-you-call-it.
Circumlocution	A naughty cat went to their basket and they didn't notice it.	I wanted to say a naughty cat stealthily went to their basket but couldn't remember the word *stealthily*.
Fillers	I try to classify and … let's say sort out what sources I have.	I was thinking about the verb and used let's say to remember the word.
Interpretive Summary	So, you asked a question regarding the advantages and disadvantages of a media like satellite.	When I repeated your question, I was thinking about the content of the message I wanted to say.

[a] […] refers to pauses less than three seconds.

5.2 Retrospective interviews with the nonfluent L2 speakers

The quantitative data showed that the nonfluent L2 speakers employed fewer PSMs than the fluent L2 speakers. Similarly, the retrospective interviews revealed that the nonfluent L2 speakers utilized several ineffective strategies such as message abandonment and reduction, grammatical reduction and substitution, mumbling, error repair, appropriacy repair, and rephrasing repair. Table 8 presents several examples of the retrospective interviews with the nonfluent L2 speakers.

Table 8. Retrospective interviews with the nonfluent L2 speakers

PSM Types	Examples	Retrospective Comments
Message abandonment	I watch TV to spend my … … [a] time …	I wanted to say *leisure* but couldn't remember it.
Message replacement	Watching too much TV affects on vision of … … of … our eyes.	I couldn't finish the sentence grammatically, so I changed the word.
Grammatical reduction	I think when they … … see TV.	I was uncertain about the tense but decided to use the present tense.
Error repair	I search in different book … … books.	I realized that I should use a count noun with different.
Rephrasing repair	We can make them … … allow them to speak.	I became aware that *make* is not a suitable verb in this sentence.

[a] [… …] refers to pauses longer than three seconds.

In sum, contrary to the nonfluent L2 speakers' use of ineffective strategies that resulted in disfluent speech, the fluent L2 speakers' use of effective strategies led to more continuous and natural speech. The retrospective data turned out to be very helpful and revealing in interpreting the findings that will be further discussed below.

6. Discussion

This study was an attempt to research L2 fluency as a cognitive process and explore the DSs and PSMs of fluent and nonfluent L2 speakers based on Levelt's (1999a) speaking-specific model. The results revealed that the nonfluent L2 speakers were hindered by resource deficits, processing time pressure, and perceived deficiencies in the interlocutor's performance in L2 communication. In clear terms, the nonfluent L2 speakers lacked the required lexical, grammatical, and phonological knowledge to express their intended meanings. In other words, they had difficulty in planning and encoding the preverbal messages and were not able to appropriately elaborate on the communicative goals and retrieve the necessary information to verbalize these goals. The findings point to the fact that L2 speakers must have access to both declarative and procedural knowledge to encode a message and, due to the nature of the working memory, fluent speech production necessitates procedural knowledge (Levelt, 1983). Nonfluent L2 speakers cannot use language communicatively and hesitate frequently because their declarative knowledge has not become procedural and automatized.

Several processing phases in the formulator and articulator of the nonfluent L2 speakers' speech production did not run apparently parallel and entailed more concentration and time for the cumbersome serial processing. Therefore, they suffered from online processing time pressure deficiencies. It is generally believed that retrieval in nonbalanced bilinguals takes more processing time than usual (de Bot, 1992). Moreover, in the retrospective interviews, the nonfluent L2 speakers often pointed to the fact that they paused lengthily when they were thinking about the appropriate lexical items or grammatical structures. In contrast, the fluent L2 speakers encoded the grammatical and phonological phases automatically and used language naturally because they were relatively more competent and also used strategies effectively. The following excerpts from the conversations with the nonfluent L2 speakers illustrate the point more clearly.

Episode 1:

I think about why I … … why I am going to present a lecture.

Retrospective comment: *When I'm thinking about the vocabulary or grammatical structure, I often pause lengthily.*

Episode 2:

I try to order them based on the … … based on the … importance.
Retrospective comment: *In search of appropriate words or grammatical structures, I regularly hesitate.*

The above excerpts indicate that the nonfluent L2 speakers often had difficulty in retrieving the appropriate lexical items and encoding grammatical utterances. The nonfluent L2 speakers were also restrained by perceived deficiencies in the interlocutor's performance. In conversations, they did not try to indicate their lack of understanding and hesitated lengthily making the interlocutor discouraged. Having avoided negotiating meaning with their interlocutors, the nonfluent L2 learners could not benefit from the additional input and improve their L2 acquisition. Meaning-negotiation strategies are believed to link input, internal learner capacities, especially selective attention, and output productively (Long, 1996). However, both data analyses and retrospective data showed that the fluent participants did not suffer from this deficiency because they often negotiated meaning with the interlocutor. They could better control both the form and lemma information in the lexicon to identify words and their meanings and compensate for disfluencies in speech production.

The findings related to the PSMs indicated that the fluent L2 speakers employed PSMs more frequently than the nonfluent ones. Specifically, the fluent L2 speakers used approximation, all-purpose words, literal translation, circumlocution, and direct appeal for help related to lexical PSMs. By using approximation strategies, the fluent L2 speakers deleted one or more feature of the lexical chunk or substituted extra features in order to avoid a communication breakdown. Furthermore, the use of all-purpose words helped the fluent participants to omit many features of the preverbal chunk and only use a broad specification, such as *thing* and *thingie*. Approximation and use of all-purpose words are associated with the substitution strategy use (Poulisse, 1993). That is, looking for an unfamiliar lemma, the fluent L2 speakers might have converted one or more conceptual specification group in the preverbal message so that the intended lexical item could be substituted with a different one. This is considered as an effective strategy in L2 communication employed by the fluent L2 speakers to keep the conversation going. The fluent L2 speakers also employed literal translation strategies more regularly than the nonfluent ones. It seems that they translated a lexical item, an idiom, or a compound word from an L1 or L3 automatically without conscious awareness resulting in an uninterrupted speech. The following retrospective interviews with the fluent participants who used approximation and all-purpose words back up the findings.

Episode 3:

At first, I will ask several questions because they help the children to have a background.

Retrospective comment: *I used children instead of audience.*

Episode 4:

I cannot memorize the lecture until I make a … what-do-you-call-it?

Retrospective comment: *I couldn't remember the word <u>outline</u>, so I said what-do-you-call-it to keep the conversation going.*

The fluent L2 speakers also employed circumlocution strategy more than the nonfluent participants. This means that when they forgot the intended lexical item, instead of abandoning their message, they exemplified, illustrated, or described the characteristics of the intended object or action. This strategy is included in the micro-reconceptualization group of lexical PSMs, which involves changing the entire preverbal chunk by encoding the conceptual aspects of the planned lexical item distinctly (Poulisse, 1993). Circumlocution has been found to be an effective strategy to solve breakdowns in L2 communication (Campillo, 2006; Savignon, 1983). Moreover, the fluent L2 speakers tended to get direct help from the interlocutor. This means that they were eager to sustain the conversation rather than bringing it to a halt.

The retrospective data revealed that when the nonfluent L2 speakers could not retrieve the appropriate lexical item, they mainly resorted to negative strategies such as message abandonment, reduction, or replacement which resulted in terminating the conversation incompletely. The related literature on communication strategies has found that the majority of the L2 speakers' problems in L2 communication stem from deficiencies in lexical retrieval (Kellerman, 1991). The following retrospective comments made by the nonfluent participants clarify the point.

Episode 5:

They should make the best use of any … ….

Retrospective comments: *I forgot the word media, so I decided to abandon it.*

Episode 6:

Before giving the lecture, I try to study what I was … … what I'm going to talk about.

Retrospective comment: *I'm often uncertain about the tense.*

The retrospective interviews also suggested that grammatical and phonological PSMs were used more frequently by the nonfluent L2 speakers. These grammatical and phonological PSMs were mostly transferred from their L1 or third language (L3). Therefore, the nonfluent participants did not benefit from these PSMs because, by relying on the L1

or L3, the structures turned out to be clumsy resulting in communication breakdowns. After retrieving the proper lemma and completing the grammatical processing stage, the surface structure should be encoded phonologically and articulated by means of lexical access (de Bot, 1992). When nonfluent L2 speakers encounter a phonological or articulatory difficulty, they may either try to retrieve a lexeme with deficient phonological information that results in tip-of-the-tongue phenomenon or just substitute particular phonological features to encode and articulate the difficult lexical items (Dörnyei & Kormos, 1998). The phonologically adapted language switches are the results of two successive errors. At first, L2 speakers incidentally retrieve an L1 lemma in place of the planned L2 lemma; secondly, they may choose L2 processes to encode the L1 lemmas phonologically (Poulisse & Bongaerts, 1994). These mechanisms are not conducive to fluency and result in an interrupted speech.

Moreover, the fluent L2 speakers utilized processing time pressure PSMs, especially umming and erring, fillers, and other-repetition, more regularly than the nonfluent ones. Using this type of strategy, the fluent L2 speakers showed that they were attempting to continue the conversation and bridge a communication gap. The crucial importance of using fillers and hesitation devices as a conscious medium to carry on conversation has been widely acknowledged in L2 research (e.g. Canale & Swaine, 1980; Ellis, 1985; Rose, 2008; Rubin, 1987). L2 speakers need more processing time in four phases of speech production: during macro- and micro-planning, when the content and the form of the message are generated; while the preverbal plan is processed to generate the articulated message; in the monitoring phase; and during the comprehension of the interlocutor's speech (Dörnyei & Kormos, 1998). Whereas the fluent L2 speakers resorted to stalling strategies during these phases to circumvent communication impasses, the nonfluent L2 speakers paused lengthily and discouraged the interlocutors.

The nonfluent participants, however, resorted more often to PSMs related to perceived deficiencies in their own output. It seems that they continually encountered unexpected errors in speech processing, gave improper or insufficient information in the utterance, and were hesitant about the appropriateness of the expressions arising from limited L2 competence. These deficiencies make the conversation hesitant and require more attentional resources. The following retrospective interviews illustrate the point.

Episode 7:

In order to make a lecture … … in order to give a lecture I prepare my materials.

Retrospective comment: *I understood I used an inappropriate verb.*

Episode 8:
Then, give an outline … … write an outline in my paper.
Retrospective comment: *I thought write was more suitable here.*

The fluent L2 speakers employed PSMs related to the perceived deficiencies in the interlocutor's performance (e.g. asking for clarification, asking for repetition, interpretive summary, and guessing) more than the nonfluent ones. To handle the comprehension problems, L2 speakers can negotiate meaning with the interlocutor (Dörnyei & Kormos, 1998). Fluent L2 speakers are concerned about completing their communicative intentions and believe in their linguistic competence to handle impasses in L2 communication. Relevant research has also pinpointed the significance of meaning-negotiation strategies for improving L2 acquisition (Ellis, 1999; Long, 1996; Nakahama, Tyler, & van Lier, 2001; Nakatani, 2005; Pica, 1996). Chen (2009) and Nakatani (2006) reported that meaning-negotiation strategies were employed more frequently by the fluent participants. Speech comprehension system, linked to the monitoring process, is also an integral part of the Levelt's model.

7. Conclusion

To sum up, the results indicated that the nonfluent L2 speakers were impeded by the main DSs in the sense that they were incapable of (or did longer pauses for) retrieving the right lemma that conformed to the concepts defined in the preverbal plan, had inadequate knowledge of morphosyntactic forms and phonological rules, could not monitor the conversation, and did not show facility at employing PSMs efficiently. These psycholinguistic inadequacies rose to the output surface in the form of disfluencies such as message reduction and abandonment, grammatical and phonological failures, error repairs, and appropriacy repairs that adversely affected the flow of communication and the assessment process. In other words, the learners' performance was replete with unfinished messages and communication breakdowns, and their speech sounded unnatural and halting. On the contrary, the fluent L2 speakers employed PSMs more frequently and effectively. In brief, they tended to retain the macro plan and only reformulated the preverbal message, applied a different encoding mechanism, used various stalling mechanisms, and negotiated meaning in order to monitor the articulation.

The results related to the cognitive facets of fluent or disfluent oral L2 production raise renascent concerns over how L2 research and education should deal with the overlooked aspects of L2 fluency as an information-processing problem-solving process in close association with the output- or performance-oriented facets focusing on L2 speakers' problem types and

problem-management mechanisms. For instance, the nonfluent L2 speakers' use of ineffective PSMs can be taken as benchmarks for specific underlying DSs in learners' linguistic and communicative knowledge repertoire and be used in developing or revisiting fluency assessing scales and designing remedial instructional programs. More patently, the knowledge of the DSs fluent and nonfluent L2 speakers struggle with and the PSMs they employ to surmount them can be employed in reshaping descriptors of fluency rating scales and also in educating well-prepared and discerning raters. This obviously necessitates an integration of a cognitive model of speaking and fluency into the existing merely product-oriented rating scales. Moreover, the knowledge of the underlying discrepancies in the nature of DSs and PSMs associated with fluent and nonfluent L2 speakers can be useful in screening L2 learners in placement testing situations.

In summary, speaking is a complicated task involving processing at various levels almost simultaneously (Rehbein, 1987). As a result, to be successful in L2 communication, it does not suffice to rely on one's linguistic knowledge and, as fluent L2 speakers do, a range of PSMs should be employed to circumvent communication impasses. Despite the importance of PSMs or communication strategies, L2 teachers do not mostly make learners ready to handle their oral production difficulties. Focusing on nonfluent speakers' ineffective PSMs as holding clues to the underlying DSs and related cognitive processes, L2 teachers can be in a better position to design deficiency-oriented and PSM-focused pedagogical activities to assist learners in improving their L2 oral communicative skills. Also, improving learners' awareness of effective PSMs to grapple with specific process- or product-based deficiencies in L2 communication will help them grow more autonomous and accountable for their own language learning.

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Appendix:
Deficiency Sources (DSs) Instrument

University: ……..   Major: …….   Semester: ……..
Age: …..   Gender: …….

How often real-life face-to-face communication did you have during high school, B.A. studies, and M.A. studies?

Always ☐   **Often** ☐   **Sometimes** ☐   **Rarely** ☐   **Never** ☐

Have you ever been to an English-speaking country?
No ☐   **Yes** ☐   **If yes, how much time did you spend there? ……….**
Directions: *Please read the following items, choose a response, and write it in the space after each item.*
1. Never   2. Sometimes   3. Generally   4. Always

1. I have difficulty retrieving specific L2 lexical items while communicating in L2.
2. I have insufficient lexical knowledge that hinders me from transferring my message.
3. I have difficulty distinguishing between or among L2 confusables (e.g., adapt, adopt/allusive, illusive, evasive, elusive) while communicating in L2.
4. When I know two or more words with very closely related meanings (e.g., desolate, deserted, abandoned, lonely, solitary), I have difficulty choosing the appropriate one that best fits the context.
5. I have insufficient knowledge of the idiomatic expressions while communicating in L2.
6. I am unable to say my intended message while communicating in L2 because I lack the knowledge of certain L2 structures.
7. I have difficulty remembering certain language structures while communicating in L2.
8. I am unsure about the structures I am using while communicating in L2.
9. I have difficulty articulating L2 utterances appropriately while communicating in L2.
10. I am unable to use my phonological knowledge while communicating in L2.
11. I have difficulty articulating some L2 words in spite of knowing their meanings.
12. I am in need of more time to process and plan L2 speech than would be naturally available in L2 conversation.
13. I have lengthy silences in L2 communication which results in terminating the conversation or discouraging the interlocutor.

14. I have difficulty speaking continuously and without stuttering (i.e., repeating the first sound of some words several times) to transfer my intended message in L2 communication.
15. I recognize the inappropriate words and structures in my speech processing or production and cannot find a way out.
16. I am uncertain of the correctness of my utterances in L2 communication.
17. I am unable of making self-initiated corrections when I identify the incorrect utterances in my speech.
18. I am unable to perceive mistakes in the interlocutor's speech while communicating in L2.
19. I am unable to understand the interlocutor's speech due to unknown words, idioms, or grammatical structures while communicating in L2.
20. I am unable to use contextual and discourse clues to make inferences or educated guesses about the intended meaning of the interlocutor.