



## **Are L2 (English) and L1 (Persian) Affected Similarly in Cognitive and Affective Domains?: Revisiting Interdependence Hypothesis**

**Morvarid Movahedi**

*University of Mazandaran, Iran*

**Seyed Hassan Talebi**

*University of Mazandaran, Iran*

The current study attempts to put to the test the nature of interdependence between L2 and L1 in a bilingual mind. It aims to find out if reading strategy instruction (RSI) in L2, a) affects reading comprehension ability and attitude toward reading both in L2 and L1, and b) if so, in which language (source (L2) or target (L1)) each of these two dependent variables are more affected. To meet the purposes of the study, a quasi-experimental design was employed. Measures of reading comprehension and attitude toward reading in L2 and L1 were distributed as pretests and posttests to 48 Iranian EFL learners. The experimental group received RSI in L2, but the control group received traditional reading instruction. Reading comprehension and attitude toward reading improved significantly both in L2 and L1 for the experimental group, but not for the control group; however, for the experimental group the magnitude of improvement in reading comprehension was more in L1 than in L2, and the magnitude of improvement in attitude toward reading was more in L2 than in L1. Therefore, although languages are interdependent in one mind, cross-linguistic influences are not the same in magnitude in terms of the languages and domains involved.

**Keywords:** EFL, ESL, TEFL, English as a medium of instruction, globalization, challenges

### **Introduction**

According to Kim and Piper (2018), “the language in which literacy skills are acquired first, regardless of language status (L1 or L2), helps literacy acquisition in other languages” (p. 4). In bilingual and second language acquisition research it is accepted that not only knowledge of L1 affects knowledge of L2, but the reverse also happens (e.g., Cook, 2003; Marian & Spivey, 2003). The influence of L1 on the learning and use of L2 was well-researched in bilingualism and second language acquisition studies (Vanhove, 2019). Yet, L2-on-L1 effects are under-explored (Kaushanskaya, Yoo, & Marian, 2011; Spies, Lara-Alecio, Tong, Irby, Garza, & Huerta, 2017). The main goal of the current study is to explore if as a result of an intervention program, namely reading strategy instruction (RSI) in L2, there will be similar improvements both in L2 and L1 reading comprehension and attitude toward reading. This study has its theoretical underpinnings in Cummins' (1979) Common Underlying Proficiency hypothesis and Cook's (2003) multicompetence model. It is generally accepted that L2 influences L1 in many aspects. However, there is lack of literature on cross-linguistic influences (or reverse transfer as is meant in the current study) to analyse if magnitude of effects of an interventionist program (i.e., instruction of reading

strategies) in L2 (English) would be the same on L2 and L1 (Persian), both in cognitive (reading comprehension) and affective (attitude toward reading) domains.

## **Background of the Study**

### **Strategic Reading**

Reading is a rapid process through which there is a simultaneous integration of information in working memory to already existing knowledge (Grabe, 2002). Kabilan, Seng, and Kee (2010) asserted that the act of reading is the exchange or transaction between the reader and the text. An effective strategic reader employs a set of strategies to cope with the text. Reading comprehension strategies, according to Moreillon (2007), are defined as tools for successful readers to overcome their comprehension problems. According to Carrell (1998) "Reading strategies are of interest not only for what they reveal about the ways readers manage interactions with written text, but also for how the use of strategies is related to effective comprehension" (p. 97). Pressley (2006) states that language learners should be taught how to read strategically through explicit instruction of reading strategies. As Javed, Lin, Mohamed, and Mohamed Ismail (2016) mentioned reading strategies help English teachers to teach reading comprehension effectively. In strategy-based instruction learning strategies are taught during the teaching of language (Cohen, 1998; Chamot, O'Malley, Barnhardt, El-Dinary, & Robbins, 1999). Li and Chun (2012) found that metacognitive knowledge of strategies plays a significant role in EFL reading comprehension ability. Employing an experimental design with a control group, Carrell, Pharis and Liberto (1989) found that instruction of metacognitive strategies improved reading in the experimental group. They concluded that implementation of explicit strategy instruction would benefit learners in second language reading.

### **Attitude toward Reading**

Talebi (2015) recommended that along with linguistic proficiency and knowledge of strategies, affective variables be considered in reading classes. Attitude is one of the most studied affective concepts in the field of psychology, and has been investigated in a wide variety of domains (Maio & Haddock, 2009). The concept of attitude has been defined in myriad ways; however, most of the definitions ever provided contain the tripartite view that attitudes are an amalgamation of affective (feelings or emotions), behavioral or conative (action readiness and behavioral intentions), and cognitive (represented by personal, evaluative beliefs) processes (Fazio & Olson 2003). Pertaining to reading, Alexander and Filler (1976, p. 1) describe attitude as "a system of feelings related to reading which causes the learner to approach or avoid a reading situation". McKenna (2001, p. 139) distinguished the three main factors that impact the development of reading attitude as: "(a) the direct impact of episodes of reading, (b) beliefs about the outcomes of reading, and (c) beliefs about the cultural norms concerning reading (conditioned by one's desire to conform to those norms)." The link between positive reading attitude and higher reading achievement is well recognized (Kush, Watkins, & Brookhart, 2005; Morgan & Fuchs, 2007; Wigfield & Guthrie, 1997); Learners with a positive attitude toward reading probably read more independently (Sainbury & Schagen, 2004), invest more time reading on assignments (Coles & Hall, 2002), and read for pleasure (Baker & Wigfield, 1999). Evidence also shows that negative reading attitude plays the most prominent part for poor readers (Chapman, Tunmer, & Prochnow, 2000).

### **Cross-linguistic Influence and Reverse Transfer**

As an alternative concept to interlanguage, the concept of dual language (Kecskes & Papp, 2003) proposes that the two languages in a bilingual mind are constantly in interaction and affect one another

through the conceptual system that commonly exists between them. An intriguing question in teaching English to speakers of other languages is if, and to what extent this teaching is effective in improving learners' language ability, and if the improved ability transfers (James, 2016).

The theoretical underpinnings of language transfer have their roots in Contrastive Analysis Hypothesis (CAH) (Lado, 1957) claiming where two languages are similar to each other, positive transfer is expected, and where they are different, negative transfer (also known as interference) occurs. Odlin (1989, p. 27) defines the term language transfer as the "influence resulting from the similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired". L1 and L2 in bilingual minds coexist and are in interaction. The native language or L1 influences L2 (e.g., in foreign accents). This phenomenon is called forward transfer. Baker (2011) states language attributes are inseparable in the cognitive system and transfer readily and are interactive. For example, when a school lesson is taught through the medium of Spanish, it does not just feed the Spanish part of the brain and can affect the other part of the brain for another language. Likewise, even brief L2 experience can influence production in L1. There are many terms used to refer to the effects of L2 on L1, such as L2 influence, bidirectional transfer, cross-linguistic influences, reverse/backward transfer, cross language transfer, and cross language influence (see Cook, 2003; Seliger & Vago, 1991, p. 6).

The concept of multicompetence as, 'the knowledge of two or more languages in one mind' (Cook 2003, p. 1) refers to knowledge of learner's both L1 and L2. As Cook (2003) asserts, this concept simply puts it that "since the first language and the other language or languages are in the same mind, they must form a language super-system at some level rather than completely separate systems" (p. 2). In this model L1 knowledge is influenced by the other languages learnt, in terms of syntax (Cook, Iarossi, Stellakis, & Tokumaru, 2003), lexicon (Laufer, 2003), stylistic complexity (Kecskes & Papp, 2000), pragmatics (Pavlenko, 2000), phonology (Flege, 1987), concepts (Kecskes & Papp, 2003), rhetorics (Kecskes & Papp, 2000), and so on. Regarding syntax, as an example, Cook, Iarossi, Stellakis, and Tokumaru (2003) found that compared to the Japanese who do not know English, those who know English have more preference for plural subjects in the Japanese sentences. Thus, "it seems clear that the language processing of people who know another language is no longer the same as monolinguals, even in their first language" (Cook 2005, p. 6).

## **Linguistic Interdependence Hypothesis**

In Cummins' (1980) terms, Cognitive/Academic Language Proficiency (CALP) refers to "those aspects of language proficiency which are closely related to the development of literacy skills in L1 and L2" (p. 177), and linguistic interdependence hypothesis (LIH) (Cummins, 1979) posits that the core cognitive academic proficiencies are common across languages in one's mind. Therefore, according to Cummins (1980) at the beginning of exposure to L2, development of proficiency in L2 hinges on the level proficiency in L1, and "because L1 and L2 CALP are manifestations of the same underlying dimension, previous learning of literacy-related functions of language (in L1) will predict future learning of these functions (in L2)" (p. 179).

In most studies conducted to investigate Cummins' propositions, the direction of transfer is from L1 to L2 (e.g., Pae, 2018; Proctor, August, Carlo, & Snow, 2006; Saiegh-Haddad, & Geva, 2009; Sparks, Patton, Ganschow, Humbach, & Javorsky, 2008). Pae (2018) investigated the relationship in reading between L1 and L2 among 211 upper middle school Korean EFL students, and found that L1 reading ability significantly predicted reading ability in L2.

Interdependence, however, implies that there is mutual dependence between languages. Therefore, development in L2 may also influence development in L1 (Marian & Kaushanskaya, 2007). Studies reported positive but small effects for L2 to L1 transfer in reading. For example, Lindsey, Franklin, Manis, and Bailey (2003) found English vocabulary knowledge had a significant, though small correlation with Spanish reading comprehension among Spanish learners of English. Tang (1997) found that readers in their two languages (i.e., Chinese L1 and English L2) made use of the same strategies for their

comprehension tasks. Using questionnaires to collect data to find out correlation between L1 and L2 attitude toward reading, Yamashita (2004) investigated the relationship between L1 and L2 reading attitude among Japanese learners of English. She identified four subcategories of reading attitude, namely anxiety, comfort, value ascribed to reading, and self-perception as a reader, and found correlations in them between L1 and L2. However, though many studies investigated cross-linguistic influences between languages, no study has ever reported if the two languages involved are affected to a similar degree both in the cognitive and affective domains. Findings of the study would open a new perspective in elaborating the relationship and interdependence between languages from the perspective of Cummins' (1979) LIH, and if degree of the possible interdependence would be similar in different cognitive and affective domains.

## The Study

L2 Knowledge does affect the ability to use L1 (e.g., Marian & Spivey, 2003). This study, which employs an experimental design, is unique for many reasons. Previous studies, which put to the test the LIH, were mostly correlational in design, where linguistic and literacy indicators were correlated using regression analysis (Leider, Proctor, & Silverman, 2018). Therefore, according to Saiegh-Haddad and Geva (2009), these studies, “do not warrant a causal connection entailed by the concept of transfer” (p. 265). Furthermore, no research study, to the best of our knowledge, investigated the influence of L2 on L1 and the concept of reverse transfer from the perspective of LIH. Cummins (1981, p. 29) stated, “to the extent that instruction in Lx is effective in promoting proficiency in Lx, transfer of this proficiency to Ly will occur provided there is adequate exposure to Ly (either in school or environment) and adequate motivation to learn Ly”. Therefore, researchers mostly regarded Lx as the first language and L2 as the second or foreign language of the learner; however, this study regards Lx as the second language and Ly as the first language of the learner to test LIH. In addition, what LIH did not explain is if the existing languages in one mind are affected equally as a result of a change or intervention in one of them, or the effect is relative, and what role the language domain plays in defining this interdependence. As far as the reading skill is concerned, however, what is under-researched is the effect of RSI in L2 (English) on reading comprehension ability (the cognitive domain) and attitude toward reading (the affective domain) both in L2 and L1. If this happens, another positive effect of L2 on L1, and as a result, another manifestation of reverse transfer can be shown to exist. With this in mind, another main goal of the current study is to explore if the effects of RSI in L2 will be the same in L2 and L1 both in reading ability and attitude toward reading, or they will improve at different magnitudes. Pedagogically, since improvements in reading comprehension ability and attitude toward reading are usually taken for granted in many L1 educational systems, including Iranian educational system just because it is the mother tongue of students, L2 teachers can improve the cognitive and affective domains in L1 in the multicompetent minds of their learners while working on these domains in L2. Therefore, it would be interesting to investigate if instructional programs in a foreign language (in this study English) would affect L1, and if so, if this effect is the same in magnitude between L2 and L1 in both cognitive and affective domains. Therefore, to examine these issues the following questions are put forward:

- 1- Does Reading strategy instruction in L2 have any effect on reading comprehension ability in L2 and L1? If so, in which language is reading comprehension ability more affected?
- 2- Does reading strategy instruction in L2 have any effect on attitude toward reading in L2 and L1? If so, in which language is attitude toward reading more affected?

For each of the above questions a null hypothesis is proposed.

## Method

To meet the purposes of the study, a quasi-experimental design was employed. This section describes the participants and how they were selected, the instruments used, the data collection procedure, and analysis of data.

### Participants

Participants of this study were students of two General English co-educational classes (first semester 2015), at the University of Mazandaran in northern Iran. They were BA level students from different fields of study including Law, Political Sciences and Basic Sciences with the age range of 19-21. The shared point between all these students, as they revealed at the very beginning of the study was that they had received strategy instruction neither in their L1 (Persian), nor in L2 (English). The purpose of the study was illustrated briefly to the participants at the beginning of the study. After homogenization based on general English reading proficiency, 25 (17 female and 8 male) and 23 (18 female and 5 male) students were chosen to be in the experimental and control groups, respectively.

### Instruments

For the purpose of this study the following instruments were employed:

#### Test of reading comprehension in L2 (English)

In developing the test of reading comprehension in English, four passages were adopted from the Internet by the researchers. These passages were chosen on the basis of the difficulty level of the passages of their course book (*ACTIVE Skills for Reading*, by Neil J. Anderson, 2nd ed, 2007). The mean difficulty level of the passages was 80 as calculated through Flesch readability formula (see Flesch, 1948), a reliable measure to assess text difficulty. This formula was developed to measure reading difficulty on a range from 1 to 100. The lower the score, the more difficult the text is. The Flesch readability score employs the sentence length (number of words per sentence) and the number of syllables per word in an equation to calculate the reading ease. However, this formula does not consider the cognitive difficulty of the text. In fact, readability formulae look at texts just as a product. As Rigg (1896, p. 75) puts it, "The basic assumption underlying any readability formula is that meaning is in the print, in the text. There is no recognition that meaning is created by each reader as the reader engages with the text." Each of the four passages contained seven items. The comprehension questions that were designed for each passage were developed on the basis of Day and Park's (2005) taxonomy of the types of comprehension questions (i.e., Literal comprehension, Reorganization, Inference, Prediction, Evaluation and Personal Response). In the current study, the first three types of comprehension questions were employed as they were more objective to be marked. The researchers added a fourth type, vocabulary knowledge, considering the importance of vocabulary in reading comprehension. Of the 7 items for each passage, 2 items assessed literal comprehension, 1 item assessed inferential comprehension, 1 item assessed reorganization, and 3 items assessed vocabulary knowledge. Overall, there were 28 items in the reading test battery which were of the same nature across the four passages. Using KR-21 formula at the piloting stage with 15 similar students, the reliability of the test was calculated and the result turned out to be 0.79. The proper time to be allowed for the test was 40 minutes as verified at the piloting stage. This test had double purposes. Firstly, it was used both as a means of homogenizing students in terms of their reading proficiency, and secondly, as a pretest for measuring participants' reading comprehension. The test was also shown to two experts with a Ph.D. degree in TEFL to comment and confirm its suitability for the current study in terms of cognitive difficulty.

## Test of reading comprehension in L1 (Persian)

Since there was no standard reading comprehension test in Persian for the purpose of the study, the researchers developed it on their own. This test consisted of three passages that were adopted from 'Bardasht Akhar' (2006) by Roya Sadr, 'Yeki Bud, Yeki Nabud' (1921) by Mohammad Ali Jamalzadeh, and 'Pelle Pelle ta Molaghate Khoda' (1998) by Abdolhossein Zarrinkoob. Each passage had 9 items measuring literal comprehension, inferential comprehension, reorganization, and vocabulary knowledge. The test was shown to two experts in the field of Persian Language to comment and confirm its suitability for the current study. As there is no reading comprehension test in Persian, there is no objective readability formula and the researcher had to rely on experts' comments. Adminstrating the test at the piloting stage with 15 similar students, the reliability of the scores according to KR-21 formula was calculated to be .75. To construct the test of reading comprehension in Persian, the following features were considered:

- a) Length of the test: Number of words in a test can influence readers' strategy use. Short texts are inappropriate for expeditious reading. The three passages of the test had 2700 words.
- b) Content: Regarding the importance of the effect of background knowledge on reading comprehension, texts with general content were chosen.
- c) Difficulty level: In view of the fact that there was no objective measure of the readability of text in Persian, the readability was determined based on Persian language teachers' comments and the researcher's own experience. Moreover, at the piloting phase, students were asked to share their opinion about the clarity and difficulty of the test and the ambiguous or unclear items were modified or discarded.
- d) Format of the test items: In developing the Persian reading test items, a multiple-choice format was employed to enhance the objectivity and reliability of the test results. In addition, as Iranian students are familiar with this format of test, the researchers were sure that results would not be contaminated with unfamiliarity of students with test format.
- e) Time: The time factor was monitored cautiously because assigning too much time changes rapid expeditious reading into slow careful reading. Based on the experience with the pilot group, 35 minutes were decided as appropriate.

## Questionnaire of attitude toward reading

In order to explore participants' attitude toward reading, a modified version of Yamashita's (2007) five-point Likert-scale questionnaire employed in Yamashita (2013) was used. This questionnaire was constructed to measure students' affective reaction toward reading in L1 and L2. The 22 items of the questionnaire assessed both affective (i.e., feeling) and cognitive (i.e., evaluative beliefs) aspects of reading attitude. The reliability of the questionnaire was measured to be .78 using KR-21 formula. The questionnaire was translated into Persian (participants' L1) with the purpose of better comprehension of items. It was also shown to two experts to comment and confirm the intelligibility of the translated version. The wording of each questionnaire item was identical in the L1 and L2 except for the word Persian for L1 and English for L2. The Likert scale ranged from 1 (*I totally disagree*) to 5 (*I totally agree*). Participants were reminded that there was no right or wrong answer.

## Procedure

In each semester there are many General English courses offered at the University of Mazandaran. The second author of the current study had two general English classes and they agreed to participate in this study. The total number of students was 61. They were already assigned to two classes before the study began. Therefore, there was no randomization in assigning the participants to different classes and as a result the design of the study was quasi-experimental (pretest-posttest control group design). One class

was chosen as the experimental group and the other as the control group. The purpose of the study was explained to the students and they consented to take part in the research by signing a letter of consent given to them. In the first step the test of reading comprehension in English was administered. This test served two purposes; first it was used to homogenize students in terms of their reading proficiency. Those whose scores were between  $-1$  and  $+1$  Standard deviation on the normal distribution curve (i.e., 12-20;  $SD = 3.5$ ;  $Mean = 16.45$ ) were involved in the study. In the two groups of experimental and control 48 students scored within this range. Then, these 48 students' scores were also considered as the pretest scores in reading comprehension in L2, too. Immediately after the distribution of the reading test in English, the attitude questionnaire was administered as another pretest to measure students' attitude toward reading in English before receiving strategy instruction. Next session, test of reading comprehension in Persian (L1) followed by the attitude questionnaire was distributed to measure students' reading comprehension and attitude toward reading in Persian.

After the pretests, reading strategies were instructed to the experimental group, but the control group were trained only their routine classroom materials that were just based on learning grammar and vocabulary for reading comprehension, with no focus on reading strategies.

Studies have shown that reading comprehension strategy instruction which includes multiple reading strategies has been effective in building up strategic reading competence and boosting reading comprehension (i.e., Koda, 2005; Palincsar & Brown, 1984; Pressley, 2006). In the current study, to teach reading strategies an adapted version of Mokhtari and Sheorey's reading strategy inventory (2002) was employed. This instrument contains 30 statements grouped into three categories of Global Reading Strategies, focusing on how students monitor their reading, Problem Solving Strategies, focusing on techniques that learners employ to solve reading problems during reading, and Support Reading Strategies which are supportive tools helping readers to solve their problems such as using a dictionary and taking notes. O'Malley and Chamot's (1987) Cognitive Academic Language Learning (CALLA) model was employed as a model of reading strategy instruction in the current study. CALLA was employed in many other studies and its efficiency in improving reading comprehension was confirmed (e.g., Karbalaei, 2011; Olson & Land, 2007; Takallou, 2011). The five phases of introducing, teaching, practicing, evaluating, and applying learning strategies are not always followed in strict sequence but are often recursive, since, for instance, teachers may continue to abstract students' prior knowledge at different stages. The five phases of CALLA, in relation to reading strategies, are briefly explained below:

#### 1. Preparation

Teachers help students to identify the strategies that they already know and find out the relationship between their awareness of reading strategies and their reading comprehension ability. Teachers also help students to learn additional reading strategies they need.

#### 2. Presentation

At this phase, the teacher explains the characteristics of each strategy, how useful they are, and when, where and how to apply them. The teacher models the strategy use to students by the 'thinking aloud' technique.

#### 3. Practice

Following teacher modelling, students can practice using strategies by doing different reading tasks, individually or in group.

#### 4. Self-Evaluation

To find out how effect strategic readers they are, students evaluate strategy use, by activities such as having a checklist of the strategies that they used, debriefing discussions after strategy practice, and employing an open-ended questionnaire to ask students about their opinions about the usefulness of particular strategies.

### 5. Expansion Activities

Students will learn to apply these strategies to new texts, and orchestrate use of a combination of reading strategies.

The intervention phase took 10 sessions and each session lasted for 75 to 90 minutes. During the intervention, the 30 strategy items were covered. In each session, about three strategy items were instructed and practiced, along with the practice of previously instructed strategies. As a final step, the reading tests along with the attitude questionnaires were administered as posttests to measure changes in the participants' reading comprehension and attitude toward reading both in L2 and L1 as a result of strategy instruction in L2.

## Results

Data analysis was done using SPSS version 23. Descriptive (mean and standard deviation) and inferential (analysis of co-variance or ANCOVA) statistics are given below followed by each question.

Research Question 1: Does Reading strategy instruction in L2 have any affect reading comprehension ability in L2 and L1? If so, in which language is reading comprehension more affected?

Null hypothesis 1: Reading strategy instruction in L2 has no effect on reading comprehension ability in L2 and L1.

Descriptive characteristics (mean and standard deviation) of variables in question 1 are shown in Table 1 below:

TABLE 1

*Mean and Standard Deviation of Reading Comprehension Scores in L2 and L1*

Group		Pretest L2	Posttest L2	Pretest L1	Posttest L1
Experimental	<i>n</i>	25	25	25	25
	<i>Mean</i>	16.0400	19.3200	19.5200	22.5600
	<i>Std. Deviation</i>	2.42350	2.13542	3.80920	2.56710
Control	<i>n</i>	23	23	23	23
	<i>Mean</i>	14.4783	15.5652	15.9130	16.7391
	<i>Std. Deviation</i>	1.97414	2.23253	2.79469	2.81582

As there are more than one dependent variable being investigated, and regarding the correlation (.49) that exists between the dependent variables (dependent variables correlated from about .3 to about .7 are eligible), ANCOVA was employed.

There are some assumptions to use ANCOVA. Variables are to be normally distributed. For this purpose, Shapiro-Wilk test was run for the experimental and control groups as the size of the sample was small in number (48). The results verified normal distribution of variables in both groups. In addition, each dependent variable needs to prove similar levels of variance across each independent variable. After running Levene's Test of Equality of Variances, the assumption of homogeneity of variance was satisfied. Satisfying the above-mentioned assumptions, ANCOVA was applied. Table 2 shows the results:

TABLE 2

*ANCOVA on the Effect of Reading Strategy Instruction on Reading Comprehension in L2 and L1*

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Posttest L2	293.291	3	97.764	45.429	.000	.756
	Posttest L1	506.896	3	168.965	32.103	.000	.686
Intercept	Posttest L2	10.705	1	10.705	4.974	.031	.102
	Posttest L1	82.506	1	82.506	15.676	.000	.263
Pretest L2	Posttest L2	117.717	1	117.717	54.701	.000	.554
	Posttest L1	.002	1	.002	.000	.985	.000
Pretest L1	Posttest L2	7.976	1	7.976	3.706	.061	.078
	Posttest L1	100.980	1	100.980	19.186	.000	.304
Group	Posttest L2	39.689	1	39.689	18.443	.000	.295
	Posttest L1	148.880	1	148.880	28.287	.000	.391
Error	Posttest L2	94.688	44	2.152			
	Posttest L1	231.583	44	5.263			
Total	Posttest L2	15123.000	48				
	Posttest L1	19501.000	48				
Corrected Total	Posttest L2	387.979	47				
	Posttest L1	738.479	47				

As Table 2 presents, the effect of the covariate pretest L2 was significant on the dependent variable, posttest L2 ( $F(1, 44) = 54.70, p = .000$ ), but not on the dependent variable posttest L1 ( $F(1, 44) = .000, p = .985$ ). In addition, the effect of the covariate pretest L1 was not significant on the dependent variable, posttest L2 ( $F(1, 44) = 3.70, p = .061$ ), but significant on the dependent variable posttest L1 ( $F(1, 44) = 19.18, p = .000$ ). According to the results in Table 2, there is a remarkable difference ( $p < .05$ ) between the two groups at the posttest stage. Thus, the assumption that there is homogeneity in the scores of the participants after partialing out the effect of the pretests is rejected. It could be concluded from the means of the scores presented in Table 2, that RSI has improved reading comprehension ability both in L2 and L1. As it could be noticed in the column of Partial Eta Squared in Table 2 above, 29.5 % of the change in L2 test scores ( $\eta^2 = .295$ ), and 39.1 % of the change in L1 test scores ( $\eta^2 = .391$ ) were due to the effect of RSI, respectively. Larger values of partial eta squared indicate a greater amount of variation accounted for by the model effect, to a maximum of one. Therefore, the null hypothesis as 'RSI has no effects on reading comprehension in L2 and L1' was rejected. However, as the effect size in L1 is greater than in L2, we conclude that reading comprehension ability improved more in L1 than in L2 as a result of reading strategy instruction in L2.

Research Question 2: Does Reading Strategy Instruction in L2 have any effect on attitude toward reading in L2 and L1? If so, in which language is attitude toward reading more affected?

Null hypothesis 2: Reading Strategy Instruction in L2 has no effect on attitude toward reading in L2 and L1.

Descriptive statistics (mean and standard deviation) for the questionnaires showing attitude toward reading in L2 and L1 are given in Table 3.

TABLE 3

*Mean of Attitude Questionnaire Scores in L2 and L1 for Experimental and Control Groups*

Group		PretestL2	PosttestL2	Pretest L1	Posttest L1
Experimental	<i>n</i>	25	25	25	25
	<i>Mean</i>	49.6000	51.9600	76.1200	82.4000
	<i>Std. Deviation</i>	2.91548	3.64555	4.57639	4.46281
Control	<i>n</i>	23	23	23	23
	<i>Mean</i>	41.5217	40.3913	43.7913	42.1739
	<i>Std. Deviation</i>	2.79398	3.62741	4.08700	3.00987

Regarding the strong correlation (.96) between the dependent variables of the current hypothesis, (dependent variables correlated from about .3 to about .7 are eligible), analysis of covariance was alternatively run, satisfying the necessary assumptions. See Tables 4 and 5 for the results for ANCOVA.

TABLE 4

*ANCOVA on the Effect of Reading Strategy Instruction on Reading Attitude in L2*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	19448.642	2	9724.321	714.314	.000	.969
Intercept	339.370	1	339.370	24.929	.000	.356
Pretest L2	64.696	1	64.696	4.752	.035	.096
Group	5287.381	1	5287.381	388.392	.000	.796
Error	612.608	45	13.614			
Total	211330.000	48				
Corrected Total	20061.250	47				

The ANCOVA in Table 4 shows that the scores of the attitude questionnaire in L2 after treatment, were dependent on the initial scores of attitude questionnaire in L2 ( $F(1, 45) = 4.75, p = .03$ ; partial  $\eta^2 = .09$ ). As shown in Table 4, the main effect for group was statistically significant after partialling out the differences in the initial scores of attitude questionnaire ( $F(1, 45) = 388.39, p = .000$ ; partial  $\eta^2 = .79$ ). Therefore, the null hypothesis as 'RSI has no effects on reading attitude in L2', is rejected. Table 5 shows the results of the questionnaire on attitude toward L1 reading.

TABLE 5

*ANCOVA on the Effect of Reading Strategy Instruction on Attitude toward Reading in L1*

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12859.299	2	6429.649	343.418	.000	.939
Intercept	706.910	1	706.910	37.757	.000	.456
Pretest L1	27.605	1	27.605	1.474	.231	.032
Group	3018.504	1	3018.504	161.223	.000	.682
Error	842.514	45	18.723			
Total	189031.000	48				
Corrected Total	13701.812	47				

The ANCOVA presented in Table 5 depicts that the scores of L1 attitude questionnaire after the intervention, were not dependent on the initial scores of L1 attitude questionnaire ( $F(1, 45) = 1.47, p = .23$ ; partial  $\eta^2 = .03$ ). Regarding Table 5, the main effect for group was statistically significant after partialling out the differences in the initial scores of L1 attitude questionnaire ( $F(1, 45) = 161, p = .000$ ; partial  $\eta^2 = .68$ ). Therefore, the null hypothesis as 'RSI has no effects on attitude toward reading in L1', is rejected.

However, to see in which language attitude toward reading is more affected, from the magnitude of the effect size (as shown in Tables 4 and 5) and the column of Partial Eta Squared where 79% of the change in

L2 attitude ( $\eta^2 = .79$ ), and 68% of the change in L1 attitude ( $\eta^2 = .68$ ) were attributable to the effect of RSI in L2, it can also be inferred that attitude toward reading improved more in L2, than in L1; in other words, larger values of partial eta squared indicate a greater amount of variation accounted for by the model effect, to a maximum of one. As the effect size in L2 is greater than the effect size in L1, it is concluded that attitude toward reading improved more in L2 than in L1 as a result of reading strategy instruction in L2.

## Discussion

Transfer shows how the human mind functions (Day & Goldstone, 2012). This study showed RSI in L2 significantly improved reading comprehension ability and attitude toward reading in L2 and L1. However, it was found as a result of RSI in L2, reading comprehension improved more in L1 than in L2, and attitude toward reading improved more in L2 than in L1. In other words, as a result of RSI in L2, there were significant improvements both in L2 and L1 in reading comprehension, but magnitude of improvement in L1 was more than magnitude of improvement in L2. On the other hand, as a result of RSI in L2, there were significant improvements both in L2 and L1 in attitude toward reading, but magnitude of improvement in L2 was more than magnitude of improvement in L1. Therefore, the findings convey there is no balance in improvements in the two languages involved in one mind, neither in the cognitive domain, nor in the affective domain. As a result, it is true, even in reverse transfer, that there is interdependence between languages, but the magnitude of this interdependence is not the same across languages (i.e., between L2 and L1 in reading comprehension) and across domains (i.e., between cognitive and affective domains).

Many studies were carried out on the effectiveness of reading strategy instruction on reading comprehension in English (see Carrell et al., 1989; Payne & Manning 1992; Zhang, 2008) and attitude toward reading (e.g., Baker & Wigfield 1999; Chapman, Tunmer, & Prochnow 2000; Kush, Watkins, & Brookhart 2005; Wigfield & Guthrie 1997). Payne and Manning (1992) found that fourth-grade students who received reading strategy training, as compared with the students in the control group had greater reading comprehension ability and positive attitudes toward reading. Zhang (2008) found that strategy instruction affected learners' use of reading strategies and improved their reading comprehension. Reviewing available research about interdependence hypothesis, Dressler and Kamil (2006) found evidence for cross-language transfer of reading comprehension ability in bilinguals from both L1 to L2 and the reverse. Kecskes and Papp (2000, cited in Cook, 2003) found that compared to those who did not know English, Hungarian learners of English who knew English significantly employed more complex sentences in their L1. Investigating the effects of L2 (English) on L1 (Persian), Talebi (2012) found that RSI in L2 among Iranian EFL learners had significant influences on improving awareness and use of reading strategies and reading ability in L2 and L1. More recently, in a longitudinal study about the influences of developing English (L2) language and literacy on Spanish (L1) reading comprehension among Spanish learners of English in the US, and by using path analysis, Spies, Lara-Alecio, Tong, Irby, Garza, and Huerta (2017) found statistically significant transfer of reading comprehension from L2 to L1 for the intervention group. They also found that for the intervention group, and not for the comparison group, L2 vocabulary and grammar had an indirect influence on L1 reading comprehension. They concluded that even when instructional time in L1 was reduced, intervention activities in L2 influenced reading comprehension in L1.

The general finding of the above-mentioned studies regarding the effects of L2 on L1 are in line with the findings of the current study. However, this study also revealed that as a result of RSI in L2, not only the cognitive aspect of reading (i.e., reading comprehension) in both languages improved, but also the affective aspect of reading (i.e., attitude toward reading) in the two languages were positively affected. Studies are very rare on attitudinal reverse transfer. This study opened a new perspective on transfer of attitude in the affective domain from L2 to L1.

As another important aim of the study was to find out if the magnitude and pattern of cognitive and affective transfer from L2 to L1 is the same in a multicompetent mind, the current study revealed that as a

result of RSI in L2 different patterns emerged, in such a way that regarding the cognitive transfer, reading ability in L1 improved more than reading ability in L2, and regarding the affective transfer, attitude toward reading in L2 improved more than attitude toward reading in L1. The two languages might be interdependent, as LIH claims, in general, but transfer of development with necessarily the same magnitude in the source language might not be observed in the target language, and the magnitude of transfer to the target language even might be less or more than that of the source language in different domains, a point that available studies failed to consider in their testing of the interdependence between languages. LIH according to Genesee, Geva, Dressler and Kamil (2006, in Chung, Chen, & Geva, 2018, p.10) is very broad in perspective since it cannot predict how far a construct can transfer. According to Sierens, Slembrouck, Van Gorp, Agirdag, and Van Avermaet, (2019) the LIH does not apply to all areas of language. Cobo-Lewis, Pearson, Eilers, and Umbel (2002) also stated that interdependence between languages is affected by factors such as the type of skills being assessed. James (2009) also contended strength of transferability may be different in different aspects of learning.

Findings of the study also showed that cognitive reverse transfer is stronger than affective reverse transfer, as reading comprehension ability improved more in L1 and attitude toward reading improved more in L2. It would be interesting to find out in case that the academic language proficiencies relating to different languages existing in mind are interdependent, why this occurs that the same magnitude of improvements is not observed in L1 and L2 in reading comprehension ability (the cognitive domain) and also in attitude toward reading (the affective domain) as a result of RSI in L2. Cummins (2016) states the degree of transfer depends on the contextual variables, specifically opportunities and motivation to develop language competencies. Tardy (2006), in an extensive review of studies on genre learning in L2 and L1 contexts concluded that, “transfer from one domain to another is, at the very least, difficult for learners” (p. 92). As Grabe (1991) states the effectiveness of strategy intervention depends on variables such as the duration of the intervention, clarity of stages to teach strategies, learner responsibility, and strategy transfer. As Singhal (1998) mentions, although there are shared basic elements between reading in L1 and L2, their processes may differ to a great extent. James (2006) posits that it is still possible to facilitate transfer through instructional programs. However, as it was not the aim of the study to investigate the reasons for this, further research is suggested to probe into the reasons why transfer occurs with different strengths for different aspects of language (cognitive and affective aspects in this study). Further research can take into account issues such as first language effect, language distance, gender, educational level, literacy in L1, EFL and ESL contexts, instructional time, motivation to read, practicing in transferring cognitive skills and affect to new tasks, motivation to transfer, individual differences, etc. to probe more deeply into the effects of RSI in L2 on the magnitude and pattern of transfer of different aspects of reading cross-linguistically.

## Conclusion

In pragmatic transfer from L1 to L2, Mitchell, Myles and Marsden (2013) stated, “one of the challenges of L2 pragmatics research is determining how far learners can transfer their existing L1 pragmatic competence (for example, their knowledge of how to be polite) to the new language” (p. 210). The relationship between languages, as LIH and multicompetence models posited can be viewed both generally and specifically. Generally, cognitive and academic language proficiencies are interdependent in mind. However, degree of this interdependence differs from one domain to another. From the findings of this study, it can be concluded that our concern regarding the relationship between languages is not if transfer occurs, but how far transfer can be expected to happen from the source language to the target language (in this study from L2 to L1). As in this study, the target language (L1) benefited less than the source language (L2) in attitude toward reading, it seems improvement of attitude toward reading should be a goal in the target language in a multicompetent mind. In learning another language, it is important that learners are aware of interaction of languages in their mind (Talebi, 2014). According to James (2016)

transfer is a relevant concern for English as a second or foreign language teachers, and without it the effect of teaching is limited. Many researchers studied L1 influences on L2 and viewed L1 as a linguistic repertoire to English acquisition (Genesee et al., 2006); however, some language learning programs are after improvement of native language proficiency beyond English acquisition (Wright, 2010). Therefore, "A common curriculum for all languages" can be designed (Hufeisen, 2005, in Henry 2013, p. 8) so that the learning experiences gained in one language transfer to another language (Jessner, 2006). Teachers are recommended to teach across languages and help students learn for transfer and give them the awareness that strength of transferability between languages differs in different domains, and therefore, take good measures to boost the specific domain in their students in the source or target language.

Studies show the effect of multiple-strategy instruction on reading comprehension (Grabe, 2009; Koda, 2005). RSI in L2 in this study improved students' reading comprehension and attitude toward reading both in L2 and L1 to a significant degree. Therefore, teaching of L2 reading strategies in contexts where L1 reading is not well-developed should be a main instructional goal for every reading teacher. Material developers should also design appropriate tasks to facilitate cross-linguistic transfer (Henry, 2013). According to the findings of this study, and in accordance with Cook's multicompetence and Cummins' LIH, and in contexts where L1 improvement is taken for granted, material developers in L2 or any further foreign language(s) are strongly recommended to design textbooks which teach for transfer and encourage learners to develop strategic reading competence with the aim of training more autonomous and self-regulated readers who finally build up a good attitude toward reading and improve their reading comprehension ability, both in the language where RSI is given (for example, L2) and in the L1 as a result of reverse transfer from L2 to L1. As L1 teaching materials usually disregard improving some cognitive (e.g., reading comprehension) and affective aspects of language learning in L1, just because it is the mother tongue of the learners, English language teachers can compensate for these failures and improve these aspects in L1 as a result of reverse transfer of reading comprehension ability and reading attitude from L2 to L1. However, to guarantee L1 optimal improvement as a result of interventions in L2, it is strongly recommended that L1 teachers be given enough awareness of cross-linguistic effects so that they practice at a required level the areas of language that are transferable from L2 to L1, and not waste much time on re-teaching the learnt skills and concepts already built up in L2. According to Monje and Macasieb (2004) it is imperative that teachers make conscientious efforts to help students become aware of their own reading processes and take control of it.

### Note

This paper is based on the MA thesis of Morvarid Movahedi, which was conducted at University of Mazandaran and under the supervision of Dr. Seyed Hassan Talebi.

### The Authors

*Morvarid Movahedi* is an M.A. in TEFL from University of Mazandaran. Her main research interests are Bilingualism, issues in reading, and task-based language learning.

Email: movahedi.mov@gmail.com

*Seyed Hassan Talebi* (corresponding author) is an assistant professor in the Dept. of English Language and Literature of University of Mazandaran in Iran. His current research interests cover multilingualism, cross-linguistic transfer, learning strategies, issues in EGP and ESP reading, and teacher education.

Email address: hstalebi@umz.ac.ir

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