



# Interface Among Motivation, Strategy Application, Comprehension, and Attribution: an Examination of Taiwanese Adolescent Readers of English-as-a-Foreign-Language

動機、策略運用、理解力和歸因關係之研究：以台灣青少年英語讀者為例

Jia-ling Charlene Yau<sup>1</sup>

Received: 5 August 2020 / Revised: 1 May 2021 / Accepted: 24 May 2021 /  
Published online: 24 June 2021

© National Taiwan Normal University 2021

## Abstract

Adopting a social-cognitive perspective, this study aims to explore the relationships among reading motivations, strategy use, literacy performance, and causal attributions in a second/foreign language (L2/FL) context. These relationships, especially as they concern L2/FL readers in secondary education, remain infrequently examined. Three hundred and ninety-six Taiwanese high-school students, including 208 boys and 188 girls, participated in the study. The instruments used included three questionnaires presented in Mandarin Chinese (the participants' first language), as well as an English-as-a-Foreign-Language (EFL) literacy test. The questionnaires measured L2 learners' intrinsic and extrinsic motivations, rates of strategy use, and causal attributions, respectively. The EFL test assessed the participants' knowledge of words, phrases, and sentence structures, as well as their ability to understand English passages. The structural equation modeling (SEM) was performed to examine the relations between those factors. The results showed positive and significant relationships among the factors examined. Reading motivations had a direct effect on strategy use, as did strategy use on L2 performance. Equally important, L2 performance also had a significant direct effect on causal attributions, which, in turn, had a significant effect on reading motivations. The findings support the contention that reading comprehension involves a coordination of motivational processes with cognitive and metacognitive operations [1, 2].

---

✉ Jia-ling Charlene Yau  
jyau2001@yahoo.com; 141784@mail.tku.edu.tw

Extended author information available on the last page of the article

### 摘要

本研究從社會認知的角度探討第二語言或外語背景下，閱讀動機、策略運用、閱讀理解、因果歸因，四者之間的關係。這些關係至今仍然很少被研究，尤其是針對中等教育的第二語或外語學習者。總共三百九十六名臺灣的高中學生，包括二百零八名男生及一百八十八名女生，參與此項研究。研究資料包括三份問卷及一份英語測驗卷。問卷檢視受試者學習英語的內在和外動機、閱讀策略使用頻率、以及對於閱讀成效的歸屬原因。測驗卷主要評量受試者英語的字、詞、句子結構的知識，以及他們理解文章的能力。分析方法採用結構方程式模式。研究結果顯示四者關係呈現顯著正相關。閱讀動機對策略運用有直接效應；策略運用對閱讀理解的表現也有直接的效應。同樣重要的是，閱讀理解的表現對學習者的因果歸因有直接效應；因果歸因對閱讀動機也有直接效應。研究結果支持社會認知學者的論點：閱讀理解涉及到動機過程與認知及後設認知操作的協調 ([1]; [2])。

**Keywords** Self-regulation · Second/foreign language reading · Reading motivation · Causal attribution · Secondary education

**關鍵詞** 自我調節 · 第二語閱讀/外語閱讀 · 閱讀動機 因果歸因 · 中等教育

Self-regulated learning plays a vital role in literacy development [3], academic performance, and motivation [4]. Schunk and Zimmerman [5] describe self-regulated learning as self-regenerated thoughts, feelings, and actions that assist learners in reaching their goals. To self-regulate, learners establish goals, monitor, regulate, and control their cognitions, motivations, and behaviors within various contextual constraints [6]. The act of reading is regarded as “a self-regulated activity” [7]. In view of that, learning to read a second/foreign language (L2/FL) requires learners to self-regulate as well. Together with reading-specific skills (e.g., decoding, word recognition, and syntactic parsing), successful L2 reading relies on knowledge and skills to self-regulate comprehension. The process of self-regulated learning, according to Zimmerman [6, 8], begins with motivation, followed by performance or volitional control, and, finally, self-reflection; these three stations are deemed to be cyclical rather than linear in essence.

Skilled readers are characteristically motivated, strategic, and reflective [37]. Guthrie and Wigfield [9] postulate that “becoming an excellent, active reader involves attunement of motivational processes with cognitive and language processing in reading” (p. 408). Dörnyei and Ryan [10] see strategies adopted for learning a L2/FL as “examples of motivated learning behavior; therefore, meaningful links with motivation are expected to exist” (p. 152). Paris, Wasik, and Turner (1991) contend that “strategic reading reflects metacognition and motivation because readers need to have both knowledge and disposition to use strategies” (p. 609). Nevertheless, the ways in which motivation, strategy application, reading comprehension, and reflection on the ascription of perceived causes for success or failure interrelate remain infrequently explored in L2/FL extant reading research [11]. Adopting a social-cognitive perspective, this study aims to explore the connections among L2 reading motivation, strategy use, performance, and causal attributions among high-school seniors in Taiwan.

## Reading Motivation and Strategy Use

Reading motivation has a positive relationship with strategy use and, more importantly, could make a significant contribution to strategy use (e.g., [12]; Matsumoto, Hiromori, & Nakayama, 2013; Wang, Jia, & Jin, 2020). Wang et al. [13] investigated this relationship among adolescent readers in China. In their study, reading motivation included intrinsic and extrinsic motivations, while strategy use encompassed strategies for memorization, elaboration, and control. The results showed that not only did intrinsic and extrinsic motivations have positive relationships with reading strategy use, but they also had a direct effect on reading strategy use. The findings were partially in line with those found in [12] study on adolescent readers of Chinese in Hong Kong. On the one hand, both studies found a significant effect of intrinsic motivations on reading strategy use. On the other hand, Lau and Chan's study found no significant effect of extrinsic motivation on strategy use. Intrinsic motivation refers to desire or willingness to do something because it is characteristically intriguing or pleasing, while extrinsic motivation refers to desire or willingness to do something because it is driven by outside rewards, such as grades and praise [14].

Matsumoto and associates (2013) discerned a moderate relationship between reading motivations and strategy use among Japanese college students learning to read English as a foreign language (EFL). In their study, L2 reading motivation encompassed intrinsic motivation, extrinsic motivation, and self-efficacy, while reading strategy use comprised four types of strategies: main idea, monitoring, adjusting, and reasoning. There were positive and significant associations of intrinsic motivation with three of the four types of reading strategies, but the relationship between intrinsic motivation and adjusting strategies was thin and insignificant. On the other hand, extrinsic motivation had moderate and significant connections with all four types of strategies. The results suggested a reciprocal relationship between reading motivation and strategy use. The investigation on the impact of reading motivation on strategy use—particularly among adolescent readers in L2/FL contexts—appears to be relatively slim. Although some recent works have explored the effects of L2 reading instructions on motivation and strategy use in Asian contexts, they do not specifically examine the relationship between reading motivation and strategy use (e.g., [15–17]). As a whole, the findings from previous research have suggested a further examination of the nexus of reading motivation and strategy use, particularly among adolescent L2 readers.

## Strategy Use and Text Comprehension

Proficient readers are strategic. They are able to “read *flexibly* in line with changing purposes and the ongoing monitoring of comprehension” ([18], p. 18). In other words, they are able to apply appropriate skills and strategies prior to, during, and after reading in order to reach their comprehension goals. Strategies refer to “actions selected deliberately to achieve particular goals” and are deemed to be “skills under consideration” ([19], p. 611). In the present study, reading strategies refer to the linguistic processing abilities that can be automatic or controlling or intentional in their use and combination.

Pressley [20] identified 15 prominent strategies employed by good readers for careful comprehension. The strategies include planning, forming goals, making predictions prior to reading, reading selectively based upon one's reading goals, constantly monitoring one's reading, identifying important information, guessing unknown words and phrases, integrating ideas from the text, using text structure information to guide comprehension, and evaluating the text read [20].

Not only did skilled readers show a heightened level of metacognitive knowledge of strategic reading, but they also applied multiple strategies for text comprehension (e.g., Mokhtari, Dimitrov, & Reichard, 2018; [21, 22]). Mokhtari and his associates (2018) investigated metacognitive awareness and use of reading strategies among adolescent and adult readers of English in the USA. In this study, metacognitive awareness and use of reading strategies were assessed together using a five-point Likert scale, on which "1" was "I have never heard this strategy before" and "5" was "I know this strategy well, and I often use it when I need it" ([23], p. 244). The reading achievement, on the other hand, was measured by self-perceived competence. Results showed that metacognitive awareness and use of reading strategies were positively related to reading achievement. The finding suggests an association of reading achievement with strategy awareness and application.

Furthermore, Zhang and Wu [24] discerned individual differences in rates of strategy use among Chinese adolescents learning EFL. The proficient readers reported the highest rates on their application of global strategies and problem-solving strategies while engaging in EFL reading tasks. In contrast, the low-proficiency readers reported the lowest rates on both types of reading strategies [24]. In Zhang and Wu's study, global strategies referred to "those intentional, carefully planned techniques by which learners monitor or manage their reading" ([25], p. 51). Examples include having a purpose in mind, previewing the text, and using typographical aids. On the other hand, problem-solving strategies were those "localized, focused techniques used when problems develop in understanding textual information" ([25], p. 51). Examples include rereading the text to improve comprehension, adjusting reading speed, and guessing at the meaning of unfamiliar words.

Likewise, Yau [26] looked into strategies employed by EFL adolescent readers in Taiwan. The results of quantitative data showed a positive relationship between rates of strategy use and reading performance. The proficient readers in the study reported higher rates on the applications of problem-solving and supportive strategies than did their less proficient counterparts. They also appeared to possess richer metacognitive knowledge about strategic reading and were much more capable of implementing higher cognitive strategies during reading [26]. These findings show the association of rates of strategy use with reading comprehension in L2/FL contexts. Nevertheless, there has been little direct empirical examination of the impact of both reading strategy use and text comprehension on causal attributions among adolescent L2/FL learners.

## Causal Attributions as Self-Reflection

Causal attributions can affect learners' expectation of accomplishment, accountability, and emotions, which, in turn, have an impact on motivation and academic performance [27]. Weiner [28] described causal attributions as the conceptions that an individual

develops of what causes the outcome of a learning-related task. They are feelings or convictions with which learners attempt to justify their accomplishment or feelings of disappointment over a learning-related task. Zimmerman [6] considers causal attributions a form of self-reflection in the self-regulated learning process.

A linkage between causal attributions and L2/FL proficiency has been reported (e.g., Dong, Stupnisky, & Berry, 2013; [29, 30]). Proficient EFL learners tended to attribute their success to the efforts they made (e.g., paying attention to class and reading extensively) and the application of learning strategies (e.g., looking up an unfamiliar word in a dictionary). On the other hand, less proficient EFL learners attributed their failures to a lack of ability [30] and effort [30, 31]. Ability is internal, stable, and uncontrollable, whereas effort and strategy use are also internal but unstable and controllable, according to Weiner's [27] classification. Rates of strategy use are associated with text comprehension, particularly among adolescent L2/FL readers, as suggested by previous research (e.g., [24, 26]). Thus, it is reasonable to anticipate a link between strategy attribution and strategy use. That is, strategy attribution developed by language learners can influence those learners' continued or discontinued use of strategies for carrying out a reading task. If L2 readers attribute their reading competence to their effective use of strategies, they are more likely to apply strategies in their future reading tasks. On the other hand, if they perceive strategy use as ineffective for comprehension, they will be more reluctant to employ strategies in their future reading tasks. In L1 reading contexts, Lau and Chan [12] found positive and significant links of reading strategy use with ability attribution, effort attribution, and strategy attribution. Nevertheless, a limited number of studies have examined the extent to which they are interrelated, particularly among L2/FL adolescent readers. Thus far, our knowledge remains incomplete, in particular, among L2/FL adolescent learners.

In response, this study examines the relationships among reading motivation, strategy use, L2 performance, and causal attributions in an FL reading context. Reading motivation, as the forethought phase that paves the way for a reader's effort to act, includes intrinsic and extrinsic motivations. The performance phase encompasses perceived use of reading strategies that contain cognitive and global strategies and an EFL test that is made up of reading and writing components. Both reading strategy use and EFL test performance involve the "processes that occur during motoric efforts and affect attention and action" ([6], p. 16). The last phase, as self-reflection, entails causal attributions comprising ability, effort, and strategy use. The processes of self-reflection occur after performance efforts and can impact an individual's response to that experience [6].

## Methods

### Participants

This study applied a purposive sampling method in the selection of participants. The researcher contacted two high schools located in the Taipei metropolis to invite twelfth-graders to participate in the study. Three hundred and ninety-six students, comprising 208 boys and 188 girls, participated in the current study. On average, they were 17.89 years old ( $SD = 0.52$ ), ranging from 17 to 20, and the length of EFL learning was 10.48 ( $SD = 1.85$ ).

## Measures

The instruments used for this study included three questionnaires and one EFL test. The three questionnaires were written and presented in Chinese, the first language of the participants. Before administration, they were piloted to ensure appropriateness for secondary students. The first questionnaire was designed to assess L2 learners' reading motivations; the second measured their rates of strategy use; and the third gauged their causal attributions for differing reading tasks. Additionally, the EFL test assessed the participants' reading and paragraph-writing skills.

**Reading Motivation** Grounded in self-determination theory [14], the motivation questionnaire applied in this study contained two categories of reading motivation—namely, intrinsic motivation and extrinsic motivation. There were 10 items on the survey—5 for intrinsic motivation and 5 for extrinsic motivation. The intrinsic motivation assessed a reader's interest, curiosity, and engagement in reading. The statements included the following: "If the teacher discusses something intriguing, I might read more about it," and "I read to learn new information about topics that arouse my curiosity." The extrinsic motivation measured a reader's extrinsic purpose for reading, such as receiving a better grade, receiving praise from peers or teachers, and gaining recognition from others. Examples include the following statements: "I like hearing the teacher say I read English well," and "I am happy when someone recognizes my English reading ability." The participants responded to each survey item on a four-point Likert scale: "1" representing "very different from me," "2" "a little different from me," "3" "a little like me," and "4" "a lot like me."

Cronbach's alpha coefficients ( $\alpha$ ) for intrinsic motivation and extrinsic motivation were 0.769 and 0.772, respectively, and 0.844 for the overall motivations. Moreover, confirmatory factor analysis (CFA) was performed to examine the validity of scale model. The result of CFA on the two motivational factors also showed an adequate fit with the data: Goodness of Fit Index (GFI) = 0.956 ( $>0.9$ ), Adjusted Goodness of Fit Index (AGFI) = 0.929 ( $>0.9$ ), and Root Mean Square Error of Approximation (RMSEA) = 0.065 ( $<0.08$ ). The standardized coefficients ( $\beta$ ) and squared multiple correlation ( $R^2$ ) of the motivational factors also reached a satisfactory level: intrinsic motivation ( $\beta = 0.776$ ,  $p < 0.001$ ,  $R^2 = 0.603$ ) and extrinsic motivation ( $\beta = 0.724$ ,  $p < 0.001$ ,  $R^2 = 0.525$ ).

**Strategy Use** Based upon information processing theory [32], the seventeen strategies examined in this study were categorized into two groups: cognitive strategies (or problem-solving strategies) and global strategies (or metacognitive strategies). Cognitive strategies, consisting of 10 items, are utilized to construct meaning from text to perform a given task. Examples included linking with one's prior knowledge or experience, the use of first language, making predictions, rereading, guessing unknown words or phrases, and identifying important information from text. On the other hand, global strategies, containing 7 items, were employed in assessment processes, including goal setting, planning, monitoring, and evaluation. Examples included posing and answering questions about the text read, thinking about whether the text's content fits one's reading purpose, and paying special attention to text characteristics, such as length and structure. The two categories of strategies were mostly adopted and

modified from Pressley's [20] list of strategies employed by good readers and MARSI (Metacognitive Awareness of Reading Strategies Inventory; [21]). Again, the participants responded to each item on a five-point Likert scale: "1" represented "never," "2" "seldom," "3" "sometimes," "4" "often," and "5" "always."

Cronbach's alpha coefficients ( $\alpha$ ) were computed for the two strategy factors: cognitive strategies ( $\alpha$ ) = 0.907, global strategies = 0.854, and the overall strategies = 0.924. The goodness-of-fit indices of the factor model (GFI = 0.942, AGFI = 0.924, RMSEA = 0.044) showed the upper-level latent variable (strategy use) explained the lower-level latent variables for two constructs. The standardized coefficients ( $\beta$ ) and squared multiple correlation ( $R^2$ ) of the strategy factors also reached a satisfactory level: cognitive strategies ( $\beta$  = 0.849,  $p$  < 0.001,  $R^2$  = 0.721) and global strategies ( $\beta$  = 0.777,  $p$  < 0.001,  $R^2$  = 0.604).

**Causal Attributions** In accordance with attribution theory [27, 33], causal attributions measured the participants' inclination to attribute their EFL reading performance to their ability possessed, efforts made, and strategy used, respectively. The questionnaire featured a total of 12 items—4 for ability attribution, effort attribution, and strategy attribution. These items were adopted and subsequently modified from Chan's [34] causal attribution scale. Each attribution prompted the same four outcomes: My \_\_\_\_\_ (i.e., ability, effort, strategy use) determines whether or not (1) "I receive a high mark in a reading comprehension test," (2) "I am able to identify the main idea/theme from the text read," (3) "I have most answers correct when doing a reading exercise," and (4) "I am able to compose a reading summary." As in the motivational survey, the participants also responded to each survey item on a four-point Likert scale: from "1" "very different from me" to "4" "a lot like me."

Cronbach's alpha coefficients ( $\alpha$ ) were 0.901 for ability attribution, 0.892 for effort attribution, 0.903 for strategy attribution, and 0.942 for the overall attributions. The result of CFA on causal attributions also showed a satisfactory fit with the data: GFI = 0.976, AGFI = 0.962, and RMSEA = 0.027. The estimates of the standardized factor loadings for the items are as follows: ability attribution ( $\beta$  = 0.776,  $p$  < 0.001,  $R^2$  = 0.602), effort attribution ( $\beta$  = 0.813,  $p$  < 0.001,  $R^2$  = 0.661), and strategy attribution ( $\beta$  = 0.849,  $p$  < 0.001,  $R^2$  = 0.721).

**EFL Proficiency** EFL proficiency was measured by the participants' performances on a literacy test initially designed by the College Entrance Examination Centre (CEEC) in Taiwan for high-school seniors or graduates. In this study, two sections of scores were used. The first section of the test assessed adolescent readers' knowledge of English words, phrases, and sentence structures, alongside their ability to understand English passages. There were 56 multiple-choice items (72 points) on the test, equaling 78% of the total score. Its internal reliability was 0.95, and the discrimination indices of the fifty-three items (95%) were either at or greater than 0.3 [35]. These suggest that this section of the test was appropriate to be administered to the participants in this study. The second part of the test was paragraph writing, which contained 22% of the total score. The participants were asked to write one paragraph based upon the pictures given. Their compositions were subsequently graded by three English instructors at local universities. The rationale of including the writing test was based upon the fact that the test-takers were also required to demonstrate their reading comprehension on

their own writing alongside their ability to express their ideas in English. There was a relatively high correlation between the two sections ( $r = 0.758$ ,  $p < 0.001$ ), and the composite reliability for the test was 0.869.

## Data Collection and Analysis

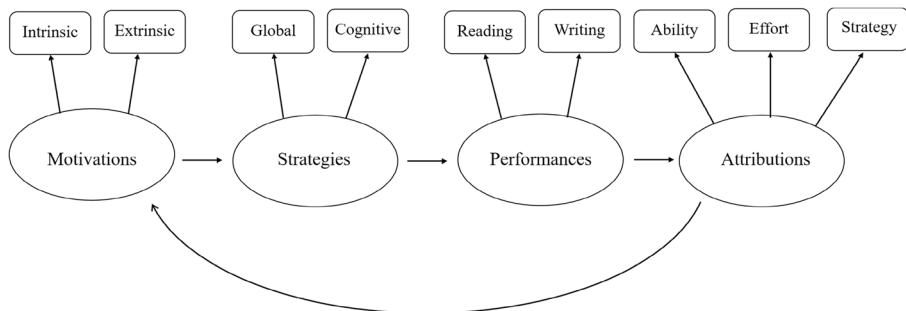
The surveys and test used for this study were administered to the participants by their teachers during regular class periods. Each survey took about 10–15 min for the participants to complete, whereas the EFL test took about 100 min. The student responses were sent back to the researcher within 2 months. Additionally, the background information of the participants was collected from the participating schools and the participants themselves.

This study applied structural equation modeling (SEM) to investigate the extent to which reading motivations, strategy use, L2 performances, and causal attributions are interconnected with each other (see Fig. 1). The following cutoff criteria were applied to assess a model fit: Goodness of Fit Index and Adjusted Goodness of Fit Index being greater than 0.90 and Root Mean Square Error of Approximation value of 0.05 or less indicating a close fit, between 0.05 and 0.08 indicating an acceptable fit (West, Taylor, & Wu, 2012).

## Results

### Relations Among Factors and Variables

On the whole, the relationships among the factors—reading motivations, strategy use, L2 performance, and causal attributions—were all positive and statistically significant ( $p < 0.001$ ), ranging from medium ( $r = 0.509$ ) to high ( $r = 0.881$ ). Strategy use had a relatively high correlation with reading motivations ( $r = 0.881$ ,  $p < 0.001$ ) and a highly moderate relationship with causal attributions ( $r = 0.683$ ,  $p < 0.001$ ), respectively. Similarly, L2 performance was moderately correlated with reading motivations ( $r = 0.509$ ,  $p < 0.001$ ), strategy use ( $r = 0.515$ ,  $p < 0.001$ ), and causal attributions ( $r = 0.540$ ,  $p < 0.001$ ), respectively.



**Fig. 1** Structural equation model exploring the relationships among reading motivations, strategies, performances, and causal attributions in an L2 context



**Table 1** Means, standard deviations, and zero-order correlations among variables

Variable	1	2	3	4	5	6	7	8	9
1. Intrinsic motivation	--								
2. Extrinsic motivation	0.571	--							
3. Ability attribution	0.464	0.447	--						
4. Effort attribution	0.457	0.438	0.634	--					
5. Strategy attribution	0.470	0.473	0.648	0.699	--				
6. Cognitive strategies	0.602	0.504	0.465	0.469	0.507	--			
7. Global strategies	0.500	0.515	0.406	0.412	0.487	0.665	--		
8. EFL reading scores	0.422	0.397	0.424	0.403	0.446	0.399	0.378	--	
9. EFL writing scores	0.395	0.361	0.321	0.302	0.324	0.361	0.306	0.758	--
<i>M</i>	2.762	2.328	2.482	2.641	2.576	3.376	2.687	40.792	7.775
<i>SD</i>	0.659	0.689	0.853	0.812	0.814	0.839	0.825	14.715	4.625

Note. All relationships were significant at the level of  $p < 0.001$ . Effect sizes: small  $> 0.10$ , medium  $> 0.30$ , and large  $> 0.50$

Similarly, the variables investigated in this study were also positively and significantly correlated. Table 1 displays means, standard deviations, and zero-order correlations between variables. Both intrinsic and extrinsic motivations were positively and moderately associated with cognitive and global strategies ( $0.5 < r < 0.602$ ). Equally important, there was a moderate relationship each between cognitive strategies and strategy attribution ( $r = 0.507$ ,  $p < 0.001$ ) and between global strategies and strategy attribution ( $r = 0.487$ ,  $p < 0.001$ ).

### A Cyclical Process of Self-Regulated Reading

Furthermore, the designated relationships among the variables were further examined. Overall, the model resulted in a good fit: GFI = 0.981, AGFI = 0.963, and RMSEA = 0.035 [90% CI = 0 – 0.058]. GFI and AGFI had values greater than the cutoff criterion (i.e., 0.9), while RMSEA had a value smaller than 0.05. These results indicate an overall fit of the model to the data, that is, higher values on goodness-of-fit indices and lower values on badness-of-fit index [36]. It is important to note that the specified paths were all statistically significant ( $p < 0.001$ ). Reading motivations ( $\beta = 0.860$ ,  $p < 0.001$ ) had a direct effect on strategy use and so did strategy use ( $\beta = 0.317$ ,  $p < 0.001$ ) on L2 performance. Equally important, L2 performance ( $\beta = 0.387$ ,  $p < 0.001$ ) also had a significantly direct effect on causal attributions, and causal attributions ( $\beta = 0.710$ ,  $p < 0.001$ ), in turn, had a significant effect on reading motivations. Table 2 shows the direct effects, indirect effects, and total effects on the paths examined.

### Discussion and Implications

The primary aim of this study was to investigate the extent to which reading motivations, strategy use, L2 performance, and causal attributions were associated with each

**Table 2** Direct, indirect, and total effects on the paths

Paths	Direct	Indirect	Total
Reading motivations → strategy use	0.860	0.070	0.930
Strategy use → L2 performance	0.317	0.026	0.343
L2 performance → causal attributions	0.387	0.031	0.418
Causal attributions → reading motivations	0.710	0.058	0.768

Note. All the paths were significant ( $p < 0.001$ )

other in an L2 reading context. Overall, the results support the model of self-regulated learning proposed by Zimmerman [6]. The circular relationship supports the contention that a reader's comprehension involves a coordination of motivational processes with cognitive and metacognitive operations [1, 2]. Moreover, the positive and significant associations of L2 performance with reading motivations, strategy applications, and causal attributions underscore the notion that readers with higher language proficiencies are motivated, strategic, and reflective [37].

This study observed a strong relationship between reading motivation and strategy use. More importantly, reading motivation made a significant contribution to strategy use. These findings are not only in line with those reported in previous research (e.g., [13, 38]), but they also support Guthrie and Wigfield's [9] contention that readers' motivational processes are the cornerstone for synchronizing their reading strategies. Likewise, the positive relationship between intrinsic motivation and extrinsic motivation implies that L2 readers need both intrinsic and extrinsic motivations to use strategies, particularly in an academic setting. In this study, extrinsic reading motivation was also found to have positively moderate relationships with reading strategy use, causal attributions, and L2 performance, respectively (see Table 1). It is likely that receiving acceptable marks and/or acceptance by peers and teachers was important for those high-school seniors who had prepared themselves for higher education. As suggested, extrinsic motivation can influence L2/FL learning as well.

Not only did reading strategy use have a positive relationship with L2 performance, but it also had a direct effect on L2 performance. In a similar vein, strategy use and L2 performance had a positive and moderate relationship with strategy attributions, respectively. The linkages among them suggest that L2 readers with higher language proficiencies show greater awareness and control of reading strategies [39, 40]. On the contrary, L2 readers with lower language proficiencies may suffer from cognitive deficiency in their reading process, as has been reported from previous studies on L2 readers in Asia (e.g., [24, 26]). It is suggested that weakness at decoding and word recognition, exacerbated by lack of interest and enthusiasm, could interrupt L2 learners' reading processes and subsequently hamper their application of strategies. L2 readers would find reading enjoyable and be willing to apply strategies in reading when the texts provided are intriguing and apt at their current levels of language proficiency, as proposed by Kung [16] and Wan-a-rom [41]. Moreover, explicit instructions on reading strategies, activation of background knowledge (schema), as well as the Think-Pair-Share approach to reading (i.e., thinking of a given topic, pairing with a peer, and sharing with others) are all relevant to developing strategic reading and enhancing reading motivation among L2/FL readers [15, 17].

Likewise, strategy attribution had a positive relation with cognitive strategy use and global strategy use, respectively (see Table 1). Strategy use, L2 performance, and strategy attribution were all positively and moderately correlated. The findings suggest that the more the adolescent language learners apply reading strategies in their L2 tasks, the higher marks they would receive, and, in turn, the more they would attribute their performances to their application of reading strategies. In a similar vein, the more the L2 learners ascribe their reading success to strategy use, the more they will be willing to apply strategies to their future reading tasks. Strategy attribution could play an important role in arousing language learners to the employment of reading strategies in their future reading tasks. The findings support the claim that metacognition is associated with reading strategies [42] that, in turn, facilitate comprehension. Equally important, the correlations between ability attribution, effort attribution, cognitive strategy use, and global strategy use were positive and moderate (see Table 1). The findings are consistent with Schunk's [43] assertion that learners' causal attributions could be a salient motivator for regulating their learning process.

The current study has some limitations, however. First, the strategies examined were mainly for general reading comprehension (reading for academic purposes). Strategies for reading specific texts (e.g., digital prints, graphs, or scientific texts), text difficulty, and time available for the task might have generated different results. Secondly, the measurements of reading motivations, strategy use, and causal attributions were from self-reported data. Qualitative approaches including think-aloud, observations, or interviews can be incorporated in future studies in order to gain deeper insights of the interaction among motivation, strategy application, causal attribution, and reading comprehension in L2/FL contexts.

The positive links among the factors investigated in this study indicate that practices that support L2/FL reading comprehension can also support self-regulation and vice versa. Alongside the practices of reading-specific skills, instructions should also create nurturing classroom environments, foster positive teacher-student relationships, and provide language learners with opportunities to implement self-regulatory strategies through structured tasks. For example, teachers can assist L2 learners to self-regulate their comprehension by means of encouraging the learners to establish specific goals for reading tasks, monitoring progress toward those goals, detecting potential obstacles in the process of meaning construction, implementing optimal strategies to reach those goals, and revising reading goals as needed. As well, motivational supports can be designed and delivered in an explicit manner. For instance, language teachers can demonstrate literate behavior and provide scaffolding for those learners who need it; they can also provide learners with autonomous support and/or reasonable and bounded choices during literacy instruction. As Grabe [11] argues, motivations for reading can give language learners a sense of direction in terms of selecting ways to develop their reading skills, encouraging them to persist, and making strong efforts in a continuous manner to overcome their difficulties or limitations.

In conclusion, this study provides evidence to support the social-cognitive perspective of self-regulation in an Asian context of learning to read a second/foreign language. Further studies across different age and language groups are needed in order to validate the claim. Additional research is equally necessary to determine optimal ways to construct and implement relatively comprehensive interventions designed to train and promote language learners to self-regulate.

## Declarations

**Conflict of Interest** The author declares no competing interests.

## References

- Allen, K. D., & Hancock, T. E. (2008). Reading comprehension improvement with individualized cognitive profiles and metacognition. *Literacy Research and Instruction*, 47, 124–139. <https://doi.org/10.1080/19388070801938320>.
- Schunk, D. H. (1989). Social cognitive theory and self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 83–110). Springer-Verlag.
- Hanno, E. C., Jones, S. M., & McCoy, D. C. (2020). The joint development of literacy and self-regulation in early children: Implications for research and practice. In E. B. Moje, P. P. Afflerbach, P. Enciso, & N. K. Lesaux (Eds.), *Handbook of reading research: Vol. V* (pp. 279 – 306). Routledge.
- Zimmerman, B. J., & Schunk, D. H. (Eds.). (1989). *Self-regulated learning and academic achievement: Theory, research, and practice*. Springer-Verlag.
- Schunk, D. H., & Zimmerman, B. J. (1998). *Self-regulated learning: From teaching to self-reflective practice*. Guilford.
- Zimmerman, B. J. (2005). Attaining self-regulation: A social cognitive perspective. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 13–39). Elsevier Academic.
- Minguela, M., Solé, I., & Pieschl, S. (2015). Flexible self-regulated reading as a cue for deep comprehension: Evidence from online and offline measures. *Reading and Writing*, 28(5), 721–744. <https://doi.org/10.1007/s11145-015-9547-2>.
- Zimmerman, B. J. (1989). Models of self-regulated learning and academic achievement. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theory, research, and practice* (pp. 1–25). Springer-Verlag.
- Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, P. B. Mosenthal, P. D. Pearson, & R. Barr (Eds.), *Handbook of reading research: Vol. III* (pp. 403–422). Erlbaum.
- Dörnyei, Z., & Ryan, S. (2015). *The psychology of the language learner revisited*. Routledge.
- Grabe, W. (2009). *Reading in a second language: Moving from theory to practice*. Cambridge.
- Lau, K., & Chan, D. W. (2003). Reading strategy use and motivation among Chinese good and poor readers in Hong Kong. *Journal of Research in Reading*, 26, 177–190. <https://doi.org/10.1111/1467-9817.00195>.
- Wang, X., Jia, L., & Jin, Y. (2020). Reading amount and reading strategy as mediators of the effects of intrinsic and extrinsic reading motivation on reading achievement. *Frontiers in Psychology*. <https://doi.org/10.3389/fpsyg.2020.586346>.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum.
- Cho, Y. A., & Ma, J. H. (2020). The effects of schema activation and reading strategy use on L2 reading comprehension. *English Teaching*, 75(3), 49–68. <https://doi.org/10.15858/engtea.75.3.202009.49>.
- Kung, F.-W. (2019). Teaching second language reading comprehension: The effects of classroom materials and reading strategy use. *Innovation in Language Learning and Teaching*, 13(1), 93–104. <https://doi.org/10.1080/17501229.2017.1364252>.
- Shih, Y.-C., & Reynolds, B. L. (2015). Teaching adolescents EFL by integrating Think-Pair-Share and reading strategy instruction: A quasi-experimental study. *RELC Journal*, 46(3), 221–235. <https://doi.org/10.1177/0033688215589886>.
- Grabe, W., & Stoller, F. L. (2002). *Teaching and researching reading*. Pearson.
- Paris, S. G., Wasik, B. A., & Turner, J. C. (1991). The development of strategic readers. In M. L. Kamil, P. Mosenthal, & P. D. Pearson (Eds.), *Handbook of reading research: Vol. II* (pp. 609–640). Erlbaum.
- Pressley, M. (2002). Metacognition and self-regulated comprehension. In A. Farstrup & S. Samuels (Eds.), *What research has to say about reading instruction* (pp. 291–309). International Reading Association.

21. Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology, 94*, 249–259. <https://doi.org/10.1037/0022-0663.94.2.249>.
22. Mokhtari, K., & Sheorey, R. (2002). Measuring ESL students' awareness of reading strategies. *Journal of Developmental Education, 25*(3), 2–10.
23. Mokhtari, K., Dimitrov, D. M., & Reichard, C. A. (2018). Revising the metacognitive awareness of reading strategies inventory (MARSII) and testing for factorial invariance. *Studies in Second Language Learning and Teaching, 8*, 219–246. <https://doi.org/10.14746/ssl.2018.8.2.3>.
24. Zhang, L. J., & Wu, A. (2009). Chinese senior high school EFL students' metacognitive awareness and reading-strategy use. *Reading in a Foreign Language, 21*, 37–59.
25. Mokhtari, K., Sheorey, R., & Reichard, C. A. (2008). Measuring the reading strategies of first and second language readers. In K. Mokhtari & R. Sheorey (Eds.), *Reading strategies of first- and second-language learners: See how they read* (pp. 43–65). Christopher-Gordon.
26. Yau, J. C. (2009). Reading characteristics of Chinese-English adolescents: Knowledge and application of strategic reading. *Metacognition and Learning, 4*, 217–235.
27. Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92*, 548–573.
28. Weiner, B. (1994). Integrating social and personal theories of achievement striving. *Review of Educational Research, 64*, 557–573. <https://doi.org/10.2307/1170587>.
29. Hsieh, P. P., & Kang, H. (2010). Attribution and self-efficacy and their interrelationship in the Korean EFL context. *Language Learning, 60*, 606–627. <https://doi.org/10.1111/j.1467-9922.2010.00570.x>.
30. Peacock, M. (2010). Attribution and learning English as a foreign language. *ELT Journal, 62*(2), 184–193. <https://doi.org/10.1093/elt/ccp031>.
31. Dong, Y., Stupnisky, R. H., & Berry, J. C. (2013). Multiple causal attributions: An investigation of college students learning a foreign language. *European Journal of Psychology Education, 28*, 1587–1602.
32. Gagné, E. D., Yekovich, C. W., & Yekovich, F. R. (1993). *The cognitive psychology of school learning*. HarperCollins.
33. Heider, F. (1958). *The psychology of interpersonal relations*. Wiley.
34. Chan, L. K. S. (1994). Relationship of motivation, strategic learning and reading achievement in Grades 5, 7, and 9. *Journal of Experimental Education, 62*(4), 319–340 <http://www.jstor.org/stable/20152425>.
35. College Entrance Examination Center. (2014). *Item analysis of GSAT English 2014*. College Entrance Examination Center Retrieved from [http://ceec.edu.tw/Research2/doc\\_031028/C%E5%AD%B8103-2.pdf](http://ceec.edu.tw/Research2/doc_031028/C%E5%AD%B8103-2.pdf).
36. West, S. G., Taylor, A. B., & Wu, W. (2012). Model fit and model selection in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 209–231). The Guilford Press.
37. Pressley, M., Borkowski, J. G., & Schneider, W. (1989). Good information processing: What it is and how education can promote it. *International Journal of Educational Research, 13*, 857–867. [https://doi.org/10.1016/0883-0355\(89\)90069-4](https://doi.org/10.1016/0883-0355(89)90069-4).
38. Matsumoto, H., Hiromori, T., & Nakayama, A. (2013). Toward a tripartite model of L2 reading strategy use, motivations, and learner beliefs. *System, 41*, 38–49. <https://doi.org/10.1016/j.system.2013.01.006>.
39. Bialystok, E. (2001). Metalinguistic aspects of bilingual processing. *Annual Review of Applied Linguistics, 21*, 169–181. <https://doi.org/10.1017/S0267190501000101>.
40. Bialystok, E. (2002). Acquisition of literacy in bilingual children: A framework for research. *Language Learning, 52*, 159–199. <https://doi.org/10.1111/j.1467-9922.2007.00412.x>.
41. Wan-a-rom, U. (2012). The effects of control for ability level on EFL reading of graded readers. *English Language Teaching, 5*(1), 49–60. <https://doi.org/10.5539/elt.v5n1p49>.
42. Duffy, G. G. (2005). Developing metacognitive teachers: Visioning and the expert's changing role in teacher education and professional development. In S. E. Israel, C. C. Block, K. L. Bauseman, & K. Kinnucan-Welsch (Eds.), *Metacognition in literacy learning: Theory, assessment, instruction, and professional development* (pp. 299–314). Erlbaum.
43. Schunk, D. H. (2008). Attributions as motivators of self-regulated learning. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 245–266). Routledge.

## Affiliations

Jia-ling Charlene Yau<sup>1</sup>

<sup>1</sup> Department of English, College of Foreign Languages, Tamkang University, 151, Yingzhuan Rd., Tamsui District, New Taipei City 25137, Taiwan (R.O.C.)