

Cognitive Skills in Learning to Read in Chinese and English:

A Transfer of Learning Perspective

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Abstract

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This thesis sought to critique two recent empirical studies on transfer of cognitive skills between reading Chinese (L1) and English (L2). By a careful review of the major concepts and ideas on theories of transfer of learning, the author called for readers' attention to the conditions of learning events that encourage transfer to happen. Transfer is how we human being learn based on our past knowledge and experiences. Transfer is aspired to occur, but it usually does not. Without examining the conditions that promote transfer, one would be too bold to assume the occurrence of transfer. The two empirical studies showed a lack of interest to examining the conditions of transfer, thus presumed the occurrence of transfer and drew the wrong conclusions. This thesis posed questions regarding the transfer of cognitive reading skills between languages from two orthographical systems, in order to challenge the status quo of research. Questions that the field of reading education must address include how will we define transfer within the field of English language learning, what counts as evidence of transfer, and most importantly, how do we implement transfer into reading classroom contexts.

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DEDICATION

This thesis is dedicated to my mother. You are my inspiration, my joy and my greatest blessing. Thank you for being supportive all the time. I love you so much.

Transfer: What is it? Why does it matter in the field of education?

Educators believe that the aims of education should not stop in the realm of formal school setting; it should prepare people for their civic lives. Thus, it is teachers' job to teach students "knowledge-to-go" (Perkins & Salomon, 2012, p. 248), specifically, knowledge that can be retrieved and used anytime they need it, not merely on site. Educators all hope that students will be able to use the knowledge that they learn from one context to another: from one unit to the next; from one subject to another; from school to home; and from school to workplace.

And, indeed, transfer of learning is no longer a new topic for researchers in the field of cognitive psychology and education. In the beginning of the last century, Thorndike and Woodworth (1901) started research on transfer. Only two years later, Thorndike (1903) came to the conclusion that transfer was a rare occurrence because how the human mind organizes information determines that we learn things separately. However, this point was strongly challenged by later researchers. Bransford and Schwartz (1999), for instance, argued that Thorndike and Woodworth came up with the wrong conclusion because transfer was identified and measured in the wrong ways in their research.

It is not hard to come up with a definition of transfer even for the non-expert: it means to apply the knowledge one learns in one context to another similar or dissimilar context. In this way the performance in the later context would improve. But in reality, researchers diverge widely on their definitions of transfer, and these definitions all have their merits.

Perkins and Salomon define "transfer of learning" as " (it) occurs when learning in one context or with one set of materials impacts on performance in another context or with other related material" (Perkins and Salomon, 1992, p. 3). In this definition, transfer takes on an "inclusive meaning", which means that transfer is emphasized as "always part of the learning

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process and a matter of degree—how much later, how far elsewhere, and how different the conditions under which it is displayed” (Perkins and Salomon, 2012, p. 249). It emphasizes that transfer always takes part in every learning event. However, twelve years later, Perkins and Salomon pointed out that the “inclusive meaning” of transfer may not be accurate.

The inclusive meaning of transfer tends to treat learning as impacted by prior learning: one either sees concrete evidence of the “impacts” or determines that the learning was unsuccessful. This view is rather restricted because transfer is treated as some kind of one-directional process, much simplified than its complex nature in reality. However, recent researchers call for careful attention as to how broadly we should define transfer. For example, Perkins and Salomon contend that, the “contrastive meaning” of transfer denotes “successful initial learning positively influencing performance on a later occasion and with a different appearance (transfer) versus not influencing (failure to transfer)” (Perkins and Salomon, 2012, p. 249). That being said, when transfer occurs, we might find it hard to tell because transfer usually takes on a different appearance from the initial learning. The contrastive definition suggests that when transfer occurs at a later occasion, it could possess a different appearance, making it harder to discern whether transfer happened or what initial learning transfer was based on.

Subsequently, it would be natural to ask, what are the conditions under which transfer of learning can occur? Fundamentally, there are several aspects that are usually considered by experts in the field, including surface similarity, deep structure, concreteness versus abstraction, initial learning and prior knowledge, and some other factors that affecting transfer. These aspects will be discussed in the following part of this section.

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Surface Similarity

A large body of literature is devoted to the discussion of the concrete surface similarities between contexts. Facing the new context of learning, learners start with detecting any clues that will help the occurrence of transfer. Usually, these clues include surface similarities and structural similarities. Surface similarities refer to the easily discernable commonalities between contexts that help promote the occurrence of transfer. Contrary to surface similarities, (deep) structural similarities are hard to discern but critical to the appearance of transfer.

Two cognitive activities are usually tied with the condition of discerning surface similarities and making use of them for transfer: reminding and mapping. Reminding refers to the act of finding or seeing the similar components between a new case and a previously known case. Mapping means the act of analyzing and detecting possible connections and correspondences between the two cases, aiding the understanding of the new case.

Even though psychologists contend that structural similarities work as a critical component of productive and meaningful knowledge transfer, researchers in the field have repeatedly found that it is the surface similarities between two cases that works as the primary driving force indicating whether transfer has actually occurred. There is too much difficulty in simply discerning the structurally similar components between a new case and an already known case. In comparison, although with some obvious limitations, surface commonalities are easier to spot hence lead to frequent reminders. Ross found that high surface similarities actually tend to facilitate transfer, without reminding being a factor (Ross, 1987). Day and Goldstone also point out that the contextual similarity plays a bigger role in the process of transfer, for instance, the similarity between the kinds of cognitive processing used during learning and testing (2012, p. 155).

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However, Lobato points out another realm to us as to the importance of structural and contextual similarity. She contends that the basis for transfer is the psychological similarity, rather than the similar features of physical or task environments (Lobato, 2012). To be exact, Lobato proposes a new definition of knowledge that emphasizes the interpretative nature of knowing. This means that “knowing and representing arise as a product of interpretive engagement with the experiential world, through an interaction of prior learning experiences, task and artifactual affordances, discursive interplay with others, and personal goals” (Lobato, 2012). In this case, transfer means improving one’s ability to interact in one situation based on a prior interaction in another situation. This idea, also known as “situated learning”, challenges the traditional cognitive perspective that is widely adopted in the research of transfer.

Deep Structure

Even though the surface similarity remains to be the center of researchers’ attention, the prospective findings are not promising as one may expect. Literature suggests that students, more often than not, fail to recognize the structural commonalities between new and known cases, making transfer a serious issue for researchers. It has been puzzling for teachers in classrooms, because even though transfer is aspired to occur, it usually does not. And due to the limitation on instruction time, amount of practice, examples given by teachers, and exposure to relevant materials, transfer remains even serious an issue for educators.

However, some valuable prospect arises when it comes to the discussion of deep structure, “the specific aspects of the mental representations that learners initially form may help/hinder their ability to generalize their knowledge in new contexts” (Day and Goldstone,

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2012, p. 156). Thus, it is crucial that we find ways to emphasize the structural aspects of the learned representations. Then Day and Goldstone propose three ways to do so:

Deemphasizing contextual features that are irrelevant to the structure;
emphasizing the relevant structural features by explicit labeling; and reducing
superficial context-specific features' presence (2012, p. 156-57).

It is not hard to see that irrelevant context-specific details impair learner's chance to transfer the generalizable knowledge, simply out of the reason that they take up learner's working memory. Explicit labeling that emphasizes structural relations proves to be effective to promote transfer between structurally similar situations. Lastly, the extraneous information to all kinds of learning situations, despite their intriguing function of capturing learners' attention, actually hinders the transfer to new similar situations.

Concreteness versus Abstraction

Concreteness and abstraction are two conflicting qualities of any learning situation. On the one hand, concreteness helps with the learner's mental ability to represent the information of a learned case; but on the other hand, concreteness without abstraction would seriously impair the learner's ability to formulate the generalizable knowledge that would benefit transfer of learning. The most classic example of abstraction versus concreteness for promoting transfer between structurally similar cases should be the Duncker's radiation problem.

Reed (1993) revisited Gick and Holyoak's (1980) findings consisting of the Duncker's radiation problem. The problem requires the students to use radiation to destroy a tumor without

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harming the healthy tissue surrounding it. The best solution is to divide the rays so they will only have a high intensity when converging on the tumor. Before trying to solve the radiation problem, students read a story about a general who captured a fortress by sending his army along different roads so it could converge on the fortress. It was because of the mines blocking the way to the fortress, so the army had to attack along different roads. As we can see, the fundamental principle underlying the two cases' solutions is structurally similar. But under an instruction without giving hints about the similar principle, most subjects failed to notice the analogy (1993, p. 57-58).

However, Gick and Holyoak (1983) found out that their students were more likely to form the general schema of noticing the structural similarity and making use of it, under the condition of reading and comparing the two analogous stories before trying to solve the problem. There are quite a few other experiments that had the same findings as the above one (Scheiter, Gerjets, and Shuh, 2010; Leowenstein, Thompson, and Gentner, 2003; Richland & McDonough, 2010; Quilici & Mayer, 2002). Research findings are consistent with the idea that “comparison and mapping between dissimilar cases facilitates structural processing” (Day & Goldstone, 2012, p. 158).

But this finding does not come without paradox: Catrambone and Holyoak (1989) found that even though comparison helps transfer in the short term, the benefits quickly fade away after short delays or other changes in the contexts. In this case, more intensive practice is required, as well as learner-directed comparison.

A more recent study conducted by Mayer, DeLeeuw, and Ayres (2007) shows that transfer is actually impaired after learners are exposed to multiple cases. Participants in this study learned about the design and function of hydraulic brake systems. A group of them also

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read descriptions of other brake systems: air and caliper brakes. The researchers found that on tests of retention and transfer, those who had learned about only one system performed better than those who had learned about multiple ones. Day and Goldstone (2012) suggest that it might be the case that the questions are only about specific information about hydraulic brakes themselves, instead of ones that need participants drawing inferences across different systems. Other than their suggestion, this study shows that it is difficult to attain both generalizable knowledge and specific kinds of knowledge at the same time.

After all, however, researchers still suggest that the comparison between multiple cases shows a promising prospect for developing the generalizable knowledge that fundamentally promotes transfer.

Initial Learning and Prior Knowledge

We all learn new things based on our prior knowledge; all new learning involves transfer. The prior knowledge that we have can help or hinder our understanding of the new knowledge. Successful initial learning provides the base for transfer, and without sufficient initial learning we cannot expect transfer to occur. However, this obvious point is often overlooked (Bransford, 2000).

Even though it's been established that "all learning is transfer from previous experiences", Bransford warns that, educators should never take transfer for granted for this principle has some implications that are worth pondering on. Firstly, learners all bring their unique experiences to their new learning, and it is often the case that their prior knowledge that relates to the new case is not activated. So it is the teacher's responsibility to activate their prior knowledge and build on their strengths. Second, sometimes, prior knowledge misguides students, which leads to

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misinterpretation when students are constructing new understandings. Lastly, when school practices are in conflict with the practices in their community, students may have difficulty with the situation (Bransford, 2000, p. 53).

Other lines of research also established that a learner's prior knowledge of certain field works as a great advantage in his or her ability to recognize the deep structural content (Chi, Feltovich, & Glaser, 1981; Weiser & Shertz, 1983; Wolpert, 1990; Suzuki, Ohnishi, & Shigemasa, 1992; Schoenfeld & Hermann, 1982). It is also how we distinguish "expert" versus "novice" in almost every field of study. Experts usually have significant advantage for transfer, and several factors may contribute to this fact. Experts might simply have more experiences with the abstraction pattern in the field thus become more sufficient in detecting the structural commonalities between cases. Simply put, experts find it easier during mapping and reminding. Their expertise in this helps with their mental representation of the two problems, thus contributes to the transfer of learning. Day and Goldstone (2012) also suggest that, experts' rich prior knowledge also reduces their cognitive load. For instance, the working memory will reduce if the learner is an expert in certain field, which helps with overcoming the limitations of cognitive load and promoting the transfer.

Other Factors That Affect Transfer

Continuing with the strand of cognitive load, evidence has shown that proficiency in a subject domain (expertise) is not associated with the human mind's larger storage or better processing; instead, learners are able to become much more efficient at processing information due to their "acquisition of long-term knowledge structure" (Day & Goldstone, 2012, p. 162). Knowledge that has been processed and grouped into meaningful chunks proves to be more

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active in retention and retrieval; usually it also comes with specific procedures and strategies that will become active too, in different kinds of complex situations.

Brown (1975) and Flavell (1973) both point out that metacognition can help improve students' awareness of themselves as learners who actively monitor their learning strategies and resources and assess their readiness for particular tests and performances. Thus metacognitive approaches of instruction have been shown to increase the degree to which students will transfer to new situations without the need for explicit prompting (Bransford, 2000).

The amount of time that is spent to learn something and is spent beyond "time on task" also matters greatly in respect to the quality and quantity of transfer (Bransford, 2000). Researchers made an estimation that "world-class chess masters require from 50,000 to 100,000 hours of practice to reach that level of expertise; they rely on a knowledge base of some 50,000 familiar chess patterns to guide their selection of moves" (Chase & Simon, 1973, p. 67).

Beyond the "time on task", individuals can also learn to know where, when, and why to use the new knowledge by accumulating experiences with "contrasting cases", experiences that are associated with well-differentiated knowledge that is usually possessed by experts in any given content domain (Bransford & Schwartz, 1999, p. 75). And researches show that the well-differentiated knowledge that comes with contrasting cases usually promotes transfer, for it helps with deep understanding that benefits mapping and reminding.

As Perkins and Salomon (2012) point out, laboratory and academic settings for transfer always obscure the importance of motivations and dispositions of the learners. Emphasis has always been put on learners' ability to make the desired connections rather than their motivation or disposition to do so. Motivation largely affects how much time a learner is willing to spend on learning. Humans are intrinsically motivated to solve problems through developing competence,

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but challenges can pose hardship according to their levels of difficulty. Theoretically, a task can be neither too easy nor too difficult, for easiness brings boredom and difficulty brings frustration. “Desirable difficulties” (Bjork, 1994) are “aspects of a learning situation that make immediate learning and encoding more difficult but that also enhance long-term retention and retrieval” (Day & Goldstone, 2012, p. 162).

According to Schwartz et al. (1999), motivation is also affected by social opportunities. It appears to be extremely motivating when an individual feels that he or she is contributing to others. Also, learners of all ages are more motivated when they see that what they learn is useful and can impact others in their community (Bransford, 2000). This point is naturally related to the idea of “situated learning”,

[l]earning that is considered to be essentially situated, an adaptation of a person or group to features of the situation in which learning occurs. Knowledge—perhaps better called *knowing*—is not an invariant property of an individual, something that he or she has in any situation. Instead, knowing is a property that is relative to situations, an ability to interact with things and other people in various ways (Greeno, Moore, & Smith, 1993, p. 99).

This new concept of learning also brings changes to the definition of transfer. Under this circumstance, transfer means “to understand how learning to participate in an activity in one situation can influence (positively or negatively) one’s ability to participate in another activity in a different situation” (Greeno, Moore, & Smith, 1993, p. 100). Lave (1988), founder of situated learning theory, noted that there exists a “two-problem” design; the most common experimental design of assessing transfer involves training with a single artificially constructed example, followed by measurement of that example’s influence on a single subsequent case. This paradigm severely restricts the scope of what prior knowledge a participant can meaningfully bring to bear on a new situation (Day & Goldstone, 2012, p. 164).

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Some other extreme findings even label transfer of learning as a theory that is “incompatible with existing empirical findings”, thus should be abandoned (Carreher & Schliemann, 2002). After all, I agree with Perkins and Salomon (2012) that, the ultimate goal of researching transfer is to promote effective instruction that contributes to knowledge-to-go (or generalizable knowledge, or knowing in the case of situated learning). But to reach that goal, we have to shift our mind-set about the nature of knowledge and learning first.

Overview of Perkins and Salomon’s transfer of learning theory

Perkins and Salomon (1992) argued that transfer of learning occurs when learning in one context or with a set of materials impacts the learning in another context or with other materials. “Positive transfer” occurs when learning in one context improves the learning in another context, while “negative transfer” hinders the performance in another context. Since negative transfer usually happens at the early stages of learning and could be eliminated at a later stage, the major concern of this theory will focus on the “positive transfer”. Two categories of transfer are introduced then. “Near transfer” happens between very similar contexts, while “far transfer” happens between contexts that seem remote and distant. Transfer of learning is expected in educational practices, however it does not often occur. Thus, to see whether transfer, near or far, happens, one needs to see the conditions that are required for transfer to occur. Perkins and Salomon indicated that, without looking at the conditions, it would be too bold to assume that transfer happens, since it can, but does not always, occur (Perkins & Salomon, 1992, p. 3).

Then Perkins and Salomon proposed five conditions that one could examine, and justified their claim by providing the psychological mechanism of transfer, specifically, “abstraction” (highly abstract identical elements may appear in very different contexts which require learner’

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abstraction); “transfer by affordances” (from the initial learning, learner acquires an action schema responsive to the affordances —the action opportunities—of the learning situation; if the potential transfer situation presents similar affordances and the person recognizes them, the person may apply the same or a somewhat adapted action schema there); “high road transfer” (mindful abstraction from the context of learning or application and a deliberate search for connections); and “low road transfer” (when stimulus conditions in the transfer context are sufficiently similar to those in a prior context of learning to trigger well-developed semi-automatic responses) (Perkins & Salomon, 1992, p. 6).

And the five conditions of transfer are: a) “thorough and diverse practice”, which refers to a set of skills that are flexible and easy to access in new situations, and the underlying mechanism of this condition could be “transfer of affordances”; b) “explicit abstraction”, which refers to the explicit abstractions of principles from a situation that can foster the transfer to a similar new situation, and its underlying mechanism should be “abstraction”; c) “active self-monitoring”, which refers to the metacognitive reflection on the learner’s own thinking processes that will help them recognize the new situation of applying their prior knowledge or skills, and the mechanism of this condition could involve “transfer by affordances” and “high road transfer”; d) “arousing mindfulness”, which refers to the learner’s state of alertness to the activities he or she is engaged in and to the surroundings, and the concerning mechanism could be “high road transfer”; and e) “using a metaphor or an analogy”, which refers to the learning in new transfer is facilitated by using the old material as a metaphor or an analogy, and its mechanism seems to be “abstraction” and “high road transfer” (Perkins & Salomon, 1992, p. 5-6).

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Twenty years later, Perkins and Salomon (2012) revisited the topic of transfer and, this time, they provide a new model to us: detect-elect-connect model—detecting a potential relationship with prior learning, electing to pursue it, and working out a fruitful connection. Compared to their earlier findings, high and low road transfer seems to be two forms in which this model works in reality. These three bridges could build in various ways: memory retrieval by similarity, pattern recognition, the acquisition of routines, surface and deep coding, consequent formation of schemas, analogizing, etc. (p. 250).

Detecting primarily involves reminding (automatic recollections of previous specific episodes of learning in a new situation) and mapping in cognitive activity. Perkins and Salomon (2012) also warned us about “inert knowledge”, as Bransford (2000) suggested above, knowledge that stays inactivated even though it is related to new learning situations. Also, problems with detection (thinking) could not be attributed to the limitations in intelligence, thinking abilities, or learning styles (Perkins & Salomon, 2012). Detecting is always described as “seeing” deep structural similarities in situations, with a distinction between high-road (deliberate) and low-road (automatic) processing.

Electing refers to the activity of choosing to pursue a possible connection. It is a pivotal point where the learner either moves forward or turns away. Perkins and Salomon (2012) warned us of “practice makes imperfect”, for overlearned routines would lead to mindlessly treating new problems as familiar ones (p. 255).

Connecting means activating the schemas (or deep understanding) built in previous cases that could be utilized in the current case. Straightforward instruction paradigms easily fall short of building a basic understanding. Perkins and Salomon (2012) called for readers’ attention to

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frequent cases of failure to connect, leaving us the question of whether this is called failure to transfer or simply superficial initial learning.

Situate the current analysis in the field of second language education

It has been an exciting territory for researchers of education to explore the cognitive mechanism of reading involved in different languages. It was expected that certain cognitive activities, reading strategies, and vocabulary knowledge can be shared across different languages, and indeed, it is true, as plenty of studies have suggested that the reading ability can be transferred through languages that share the same orthographical system (Durgunoglu, Nagy, & Hancin-Bhatt, 1993; Geva, Wade-Woolley, & Shany, 1997; Gottardo, 2002).

However, in recent years, some researchers started to examine the transfer of reading ability between languages of different orthographical systems, for example, between Chinese/Japanese/Korean and English. Studies show that transfer is possible, especially in cognitive skills in reading. But a close examination of two specific studies (Chuang, Joshi & Dixon, 2012; Keung & Ho, 2009) demonstrates these researches to be flawed. While these two studies clearly established a case for transfer of cognitive skills in reading development, they did not examine it from the conditions under which transfer could happen. Due to the researchers' lack of knowledge on theory of transfer of learning, they presumed the possibility of transfer in their particular contexts, which leads to erroneous methodologies and conclusions.

Transfer of cognitive reading skills between Chinese and English is certainly aspired to by educators, but it is only safe to conclude that transfer happens when we first look at the conditions that encourage transfer of learning. The following part of the thesis situates the two studies' (Chuang, Joshi & Dixon, 2012; Keung & Ho, 2009) use of transfer of cognitive reading

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skills between Chinese and English from the perspective of Perkins and Salomon's transfer of learning theory. It points out the loophole, that these two studies presumed the presence of transfer between the readings of the two languages without examining the conditions of transfer. The researchers' misunderstanding about transfer leads to unfair theoretical stand and methodologies of the studies. If only they could deepen their understanding on transfer in light of Perkin and Salomon's transfer of learning theory, their studies could be improved. At last, it provides some illuminations to the future studies in this particular field.

The two chosen studies (Chuang, Joshi & Dixon, 2012; Keung & Ho, 2009) concerning the transfer of cognitive reading skills between Chinese (L1) and English (L2) alleged the occurrence of transfer using Cummins' Linguistic Interdependence Hypothesis (LIH) as a theoretical base. Cummins' (1979) hypothesis involves how L1 competence positively predicts L2 competence and how bilingualism positively influences cognitive functioning for bilingual children. However, this theoretical foundation of the two researches seems inappropriate, for the subjects in their studies were not qualified as "bilingual children" in the first place. A thorough examination of the applicability of Cummins' theory is in need in their cases. As a matter of fact, Perkins and Salomon's theory would be a better fit for those two studies, for it has a concentration on the cognitive mechanism of transfer that could easily be applied to any given domain of the studies.

Descriptions of the studies and their major findings

In Chuang, Joshi and Dixon's study, Cross-Language Transfer of Reading Ability: Evidence from Taiwanese Nine-Grade Adolescents (Chuang, Joshi & Dixon, 2012), the authors explore how proficiency in reading in Chinese as L1 influences proficiency in English as L2, and

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how much proficiency in reading in L1 is needed to take advantage of a transfer effect in L2 reading. They use the reading score in Mandarin Chinese and in English for 30,000 Taiwanese ninth-grade students randomly selected from all who took the national Basic Competency Test during a six-year period in Taiwan.

Chuang et al. examined the significant differences between Chinese and English orthographical systems. Based on past literature, they then proposed that reading of cross-language transfer between Chinese and English shows less reliability compared to that between two languages from the same orthographical system. However, by using the data that they collected, specifically making the Chinese reading scores as an independent variable and English reading scores as the dependent variable, they constructed a linear regression line predicting that Mandarin Chinese reading scores positively and significantly accounted for 62.8% of the variation in performance on the English reading tests. They also constructed three other regression lines that showed the following results: participants' gender, school district, and length of time in learning L2 were not statistically significant to predict L2 reading performance (these factors all accounted for less than 5% of the outcome).

In Keung and Ho's study, *Transfer of Reading-Related Cognitive Skills in Learning to Read Chinese (L1) and English (L2) among Chinese Elementary School Children* (Keung & Ho, 2009), the researchers investigated transfer of reading-related cognitive skills between learning to read Chinese (L1) and English (L2) among Chinese children in Hong Kong. Fifty-three grade-two students were tested on word reading, phonological, orthographic and rapid naming skills both in L1 and L2.

Keung and Ho (2009) argued that phonological awareness, orthographic skills, and rapid automatized naming are basic reading-related cognitive skills for learning to read both English

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and Chinese. Thus, they conducted a total of nine tasks to the participant children in the research: an intelligence test, two phonological tasks, and two orthographic tasks in the group session, and a reading task, a phonological task, and two naming speed tasks in the individual session. By constructing multiple regression analyses, they reached the following conclusions:

- Significant correlations between Chinese and English measures in phonological awareness and rapid naming (with a correlation of $r = .67$), but not in orthographic skills (negative transfer between orthographic skills in reading Chinese and reading English);
- Significant unique contribution of Chinese and English rapid naming skills and English rhyme awareness for predicting Chinese word reading after controlling for all the Chinese and English cognitive measures;
- Significant unique contribution of English phonological skills and Chinese orthographic skills (a negative one) for predicting English word reading after controlling for all the English and Chinese cognitive measures;
- Significant unique contribution of Chinese rhyme awareness for predicting English phonemic awareness (p. 107-09).

Analysis through Perkins and Salomon's transfer of learning theory

“Transfer” defined:

Both of the studies made a strong case that they were searching for the transfer of certain cognitive skills in reading Chinese and English, making transfer the key concept in these two studies. Thus, it is justifiable for me to look at the definition of transfer in each study, how their

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definitions of transfer fit into Perkins and Salomon's theory, and how their understandings of transfer shape their methodologies.

Two groups of researchers all agreed that reading is a complex information-processing system that involves many related but separate cognitive operations. Study 1 provided no formal definition of transfer at all, rather it simply assumed that transfer does exist and "the relationship between L1 proficiency and L2 reading has certain linguistic elements, such as phonological awareness and morphological awareness, that strongly affect the transfer of L1 reading ability to L2 reading" (Chuang, Joshi & Dixon, 2012, p. 98). Based on past research studies, it claimed, without any theoretical support, that higher proficiency in L1 promotes the positive transfer to reading in L2, while lower L2 background or vocabulary knowledge impedes/promotes the negative transfer between L1 to L2.

Study 2, however, offered a clear definition of transfer: "transfer of cognitive skills in learning to read L1 and L2 refers to cognitive skills acquired in L1 reading development that can be leveraged on to promoting or facilitating L2 reading development, and vice versa. This is also commonly known as positive transfer" (Keung & Ho, 2009, p. 104). Then, definition of negative is also given which refers to the interference between L1 reading development and the learning to read L2.

The two studies also argue that since the reading comprehension relies on the meaning-making process with written texts, and the two languages that have completely different orthographical systems, Perkins and Salomon are mostly likely to define the transfer between the reading of the two, if there was any, to be far transfer instead of near transfer. And the underlying mechanism of such a transfer would be high road transfer, which depends on mindful

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abstraction from the context of learning or application and a deliberate search for connections (Perkins & Salomon, 1992).

General lack of attention to the “conditions of transfer”:

Here comes the biggest loophole of most of the research studies in this field: due to their general lack of interest and attention to examining the conditions of transfer, they automatically assume that transfer does exist between reading in Chinese (L1) and English (L2) based on the past literature. Admittedly, after constructing a regression equation line between Chinese and English reading test scores, it is fair to draw the conclusion that Chinese reading proficiency is a predictor of English reading performance. But it is also possible that the students in the sample are simply good at both Chinese and English without ever making connections between the cognitive reading skills involved in reading such drastically different orthographical systems. Researchers in the two studies seem to reach the bold conclusion of claiming transfer of reading these two languages exists, if Perkins and Salomon are asked to shed their understanding of transfer onto the two studies, because they fail to examine the conditions that are required for transfer to occur.

Primarily, the two studies fail to either present important information about the specific skills that are tested in both L1 and L2, or show the connections between the tested skills so the authors could argue that these skills could work flexibly in new situations. Thus, we cannot reach the conclusion that “thorough and diverse practice” occurs, because the performance in question is not practiced extensively in a variety of contexts, and the researchers provide no information about whether the practices yield a set of easily evoked skills that can be used in new contexts. In study 1, the Chinese and English tests scores of 30,000 Taiwanese middle school students were

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randomly selected to build regression equation lines, but no specific information of the content of the tests is offered. We have no way to find out whether certain cognitive skills were tested both in the Chinese and English exams. In study 2, however, the researchers provided their rationalization of choosing the test items, phonological awareness, orthographic skills, rapid automatized naming, and the procedures and test materials were also provided. But they offered no information of the connections of the test items, for example, they could have shown us that English rhyme detection skills are connected to the Chinese rhyme detection, and the way these connections could be found in their designed tests.

In addition, neither of these two studies adopted any measurements to check on participants' metacognitive activities while doing the tests. Thus, we have no way to find out whether "explicit abstraction", "active self-monitoring", and "arousing mindfulness" occurs during the tests, leaving us wondering how transfer could occur if none of these conditions arise.

Lastly, no information is provided in either of the studies as to the way English is learned or taught. We do not know "using a metaphor or analogy" ever happens to the participants' learning in these two tests: English could be learned while having Chinese reading cognitive skills working as a metaphor or analogy; or students may never have this frame of reference, treating these two languages as completely unrelated subjects. If information is offered that certain cognitive skill in reading English is learned by comparison and contrast to the way it is used in reading Chinese, we would feel more confident to conclude that if the participant gets the right answers to both of the questions concerning the same skill in both contexts, it could result in the transfer of his or her cognitive reading skills between the languages.

Some other factors affecting transfer

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Looking back at the literature review in the beginning of this thesis, I think it would be beneficial to mention some other factors that are not from Perkins and Salomon but still got neglected by the two studies. To start with, these two studies could have mentioned contexts involved in the two learning situations. I suppose Keung, Ho, Chuang, Joshi & Dixon would all agree with me that reading Chinese and reading English do not have any surface similarity, given that the orthographical systems are remotely disparate. But, are there any deep structural similarities? I would argue that there are. According to Ken Goodman (2012), “in reading with an alphabet, English readers develop intuitive knowledge about the working of the spelling system; readers of character-based writing show similar knowledge of the system of character formation”. Thus human brains develop the similar deep and intuitive knowledge/understanding of the working of different orthographical languages (p. 32).

The two groups of researchers could have done some work in the participants’ classroom, looking for any information related to the concreteness or abstraction of the instruction of reading in two languages. Do teachers of reading give students hints about any similarities between the reading of Chinese and English? Is any comparison and mapping between reading Chinese and English given to students? Those are good questions that are worth asking when talking about transfer of reading ability in two languages.

Chuang, Joshi and Dixon (2012) touched upon the English learning context in Taiwan, but failed to connect it with the motivation of participants when they are learning English in the their study’s context. They mentioned that English is a major prerequisite to be admitted to senior high, college, and graduate school, and it is obviously participants’ extrinsic motivation for learning English in the context. From the perspective of situated learning, they pointed out that globalization works as a primary force to promote English learning in Taiwan. Students are

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motivated to learn English because they feel the need to communicate in English with others inside or outside of their community.

The initial learning and prior knowledge of participants are left unexamined. Besides, the time participants spent on/beyond task are unexamined either. A careful monitoring of participants cognitive load and strategic repertoire is also needed.

Conclusion

Summary and illuminations on future studies

This thesis helps to situate two empirical studies which claim transfer of reading ability concerning certain cognitive skills existing between Chinese (L1) and English (L2) into the context of Perkins and Salomon's theory of transfer of learning. By careful examination of the definition of transfer and conditions of transfer in light of the proposed theory, the studies are argued to have huge loopholes in their line of reasoning and inadequate methodologies. No attention is given to the conditions that are required for transfer to occur, thus the researchers reached a hasty conclusion that was not well supported, using the predictability as evidence to show the existence of transfer. In reality, transfer is aspired to in education, but does not always occur. So Perkins and Salomon propose that we should not take transfer for granted, and that careful attention should be paid to prospects and conditions of transfer (Perkins & Salomon, 1992). They do not touch upon the question as to whether these five conditions have to occur all together or some of them occur that we could be able to conclude that transfer happens, but my personal understanding is that only one of them occurring would be suffice.

For future studies in this field, I would recommend conducting interviews and a longitudinal research, and reasons are as follows: interviews with the participants during the tests

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will tell us the information about their metacognitive activities, and will also help us determine whether conditions like “explicit abstraction”, “active self-monitoring”, and “arousing mindfulness” occur during the learning events; longitudinal studies will capture more information about the conditions of transfer, and language learning as a dynamic and changing process. Plus, researchers should also look at how students learn to read in English, and whether they use cognitive reading skills in Chinese as references. If only it could be constructed in this way, future studies could be in a better position to tell us whether transfer of reading skills in Chinese and English exists, and hopefully offer illuminations to the teaching practices too.

Ken Goodman, a distinguished figure in the field of literacy, points out that despite the visible dissimilarities between written Chinese and English, we can rely more on the cognitive capacity that our human brain has, which is remarkably suited for making sense of language in all its many forms (Ken Goodman et al., 2012). Thus I believe there exists the possibility that certain cognitive skills involved in reading Chinese and English can transfer, but we are yet to find the right way to identify them.

Are we ready to teach for transfer in second language learning setting?

A rich body of research findings on transfer in the field of cognitive and educational psychology opens a door for teachers in the classroom. Indeed, the ultimate goal for the researches is improving the quality of classroom teaching, in the hope that what students learn in schools could transfer to other facets of their lives. The research findings in the first part of this thesis all encompass an array of teaching implications—some might even conflict with one another—but I believe they all have values considering their specific contexts.

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However, what lacks in the picture is a comprehensive integration of the research findings and the second-language-teaching context. Much has done in respect of exploring the effective teaching contents or methods for teaching English in Chinese classrooms, but more work needs to be done on this topic from the lens of transfer of learning. Questions that the field of reading education must address include: (a) how will we define transfer within the field of English language learning, (b) what counts as evidence of transfer, (c) how do we evaluate transfer, and most importantly, (c) how do we implement transfer into reading classroom contexts.

So, finally, are we ready to teach for transfer in the field of teaching-reading-across-languages-from-different-orthographical-systems? If “we” means researchers, the research base is, as is mentioned above, in need of exploration. Haskell (2001) makes the accurate observation: transfer as a schema research in the field of cognitive psychology is well researched; but as an instructional process, it is only a new arena. Thus, is the rest of the world ready? I believe it will be ready; but only if more research studies could be done that treat transfer as an important instructional process. And till that day, we would be better equipped in our instruction that promotes transfer between reading Chinese (L1) and reading English (L2).

References

- Bjork, R. A. (1994). Memory and metamemory considerations in the training of human beings. In J. Metcalfe & A. Shimamura (Eds.), *Metacognition: Knowing about knowing* (pp. 185-205). Cambridge, MA: MIT Press.
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (Eds.), Committee on Developments in the Science of Learning, & National Research Council (2000). Learning and Transfer. In *How people learn: Brain, mind, experience, and school* (pp.39-66). Washington, DC: National Academy Press.
- Bransford, J. D. & Schwartz, D. L. (1999). Rethinking transfer: A simple proposal with interesting implications. In A. Iran-Nejad & P. D. Pearson (Eds.), *Review of research in education* (Vol. 24, pp. 61-101). Washington, DC: American Educational Research Association.
- Brown, A. L. (1975). The development of memory: Knowing, knowing about knowing, and knowing how to know. In *Advances in Child Development and Behavior* (Vol. 10), H. W. Reese, ed. New York: Academic Press.
- Carraher, D., & Schliemann, A. (2002). The transfer dilemma. *The Journal of the Learning Sciences*, 11, 1-24.
- Catrambone, R., & Holyoak, K. J. (1989). Overcoming contextual limitations on problem-solving transfer. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 15, 1147-1156.
- Chase, W. G., & Simon, H. A. (1973). Perception in chess. *Cognitive Psychology*, 4, 55-81.
- Chi, M. T. H., Feltovich, P. J., & Glaser, R. (1981). Categorization and representation of physics problems by experts and novices. *Cognitive Science*, 5, 121-152.

Transfer of Cognitive Reading Skills

- Chuang, H., Joshi, R. M., & Dixon, L. Q. (2012). Cross-Language Transfer of Reading Ability: Evidence From Taiwanese Nine-Grade Adolescents. *Journal of Literacy Research*, 44(1) 97-119.
- Cummins, J. (1979). Linguistic independence and the educational development of bilingual children. *Review of Educational Research*, 49:2, 222-251.
- Day, S. B., & Goldstone, R. L. (2012) The import of knowledge export: connecting findings and theories of transfer of learning. *Educational Psychologist*, 47:3, 153-176.
- Durgunoglu, A. Y., Nagy, W. W., & Hancin-Bhatt, B. J. (1993) Cross-language transfer of phonemic awareness. *Journal of Educational Psychology*, 85, 453-465.
- Flavell, J. H. (1973). Metacognitive aspects of problem-solving. In *The Nature of Intelligence*, L. B. Resnick, ed. Hillsdale, NJ: Erlbaum.
- Geva, E., Wade-Woolley, L. & Shany, M. (1997). Then development of reading efficiency in a first and second language. *Scientific Studies of Reading*, 1, 119-144.
- Gick, M., & Holyoak, K. J. (1980) Analogical problem solving. *Cognitive Psychology*, 12,306-355.
- Gick, M., & Holyoak, K. J. (1980). Schema induction and analogical transfer. *Cognitive Psychology*, 15, 1-38
- Goodman, K. (2012). *Reading in Asian Languages: Making Sense of Written Texts in Chinese, Japanese, and Korean*. K. Goodman (Ed.). New York: Routledge.
- Gottardo, A. (2002). The relationship between language and reading skills in bilingual Spanish-English speakers. *Topics in Language Disorders*, 22, 46-70.

Transfer of Cognitive Reading Skills

- Greeno, J. G., Moore, J. L., & Smith, D. R. (1993). Transfer of Situated Learning. In D. K. Detterman & R. J. Sternberg (Eds.), *Transfer on Trail: Intelligence, Cognition, and Instruction* (99). Norwood, New Jersey: Ablex Publishing Corporation.
- Haskell, R. E. (2001). *Transfer of Learning: Cognition, Instruction, and Reasoning*. San Diego, Calif.: Academic Press.
- Keung, Y., & Ho, C. (2009). Transfer of reading-related cognitive skills in learning to read Chinese (L1) and English (L2) among Chinese elementary school children. *Contemporary Educational Psychology, 34*(2009), 103-112.
- Lave, J. (1988). *Cognition in practice: Mind, mathematics, and culture in everyday life*. New York, NY: Cambridge University Press.
- Lobato, J. (2012). The actor-oriented transfer perspective and its contributions to educational research and practice. *Educational Psychologist, 47*:3, 232-247.
- Loewenstein, J., Thompson, L., & Gentner, D. (2003). Analogical learning in negotiation teams: Comparing cases promotes learning and transfer. *Academy of Management Learning & Education, 2*, 119-127.
- Perkins, D., & Salomon, G. (1992). Transfer of learning. In *International encyclopedia of education, 2nd ed.* Oxford: Pergamon Press. Retrieved from <http://learnweb.harvard.edu/alps/thinking/docs/traencyn.htm>.
- Perkins, D., & Salomon, G. (2012). Knowledge to go: A motivational and dispositional view of transfer. *Educational Psychologist, 47*:3, 248-258.
- Quilici, J. L., & Mayer, R. E. (2002). Teaching students to recognize structural similarities between statistics word problems. *Applied Cognitive Psychology, 16*, 325-342.
- Reed, S. K. (1993). A Schema-based Theory of Transfer. . In D. K. Detterman & R. J. Sternberg

Transfer of Cognitive Reading Skills

- (Eds.), *Transfer on Trail: Intelligence, Cognition, and Instruction* (99). Norwood, New Jersey: Ablex Publishing Corporation.
- Richland, L. E., & McDonough, I. M. (2010). Learning by analogy: Discriminating between potential analogs. *Contemporary Educational Psychology, 35*, 28-43.
- Ross, B. H. (1987). This is like that: The use of earlier problems and the separation of similarity effects. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 13*, 629-639.
- Scheiter, K., Gerjets, P., & Schuh, J. (2010). The acquisition of problem-solving skills in mathematics: How animations can aid understanding of structural problem features and solution procedure. *Instructional Science, 38*, 484-494.
- Schoenfeld, A. H., & Herrmann, D. J. (1982). Problem perception and knowledge structure in expert and novice mathematical problem solvers. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 8*, 484-494.
- Suzuki, H., Ohnishi, H., & Shigemasu, K. (1992). Goal-directed processes in similarity judgment. In *Proceedings of the Fourteenth Annual Conference of the Cognitive science Society* (pp. 343-348). Hillsdale, NJ: Erlbaum.
- Thorndike, E. L., & Woodworth, R. S. (1901). The influence of improvement in one mental function upon the efficiency of other functions. *Psychological Review, 8*, 247-261.
- Weiser, M., & Shertz, J. (1983). Programming problem representation in novice and expert programmers. *International Journal of Man-Machine Studies, 19*, 391-398.
- Wolpert, R. S. (1990). Recognition of melody, harmonic accompaniment, and instrumentation: Musicians vs. nonmusicians. *Music Perception, 8*, 95-105.