WRESTLING WITH TWO THEORIES IN TEXT COMPREHENSION  
— A CRITICAL REVIEW OF HOSSEIN NASSAJI’S ARTICLE IN LANGUAGE LEARNING

Li Zonghong  
Hexi University

Abstract  
This paper critically reviews Hossein Nassaji’s Language Learning article which systematically overviews the recent language processing theories. It is especially pertinent to schema theory as well as Walter Kintsch’s construction-integration theory in reading comprehension. The article thoroughly investigates the unified theory as Kintsch defines, construction-integration theory in text comprehension which is mainly based upon the comparison with and analysis of the applications of schema theory from the perspective of language reading comprehension. The author tries to work out and illustrate this model as an alternative approach to the schema-oriented models previously used to solve reading comprehension problems in language teaching and learning.

Key words:  
schema theory; reading comprehension; alternative perspectives; representation; construction; integration model

Introduction  
The last several decades have witnessed a formidable amount of extensive research on the reading comprehension of language which enables more successful reading and better comprehension. Grabe (2004, 2003, 2002) and Cook (2003) claim that the reading of language is an extremely complex matter as with any other language skill. Obvious variables such as the reader’s linguistic proficiency, the age of readers, L1-L2 relations of distance, L1-L2 transfer, reading strategies, social psychological factors, reading behaviors, motivation, attitudes, cognitive processing factors, reading materials, and reading settings all impact success of reading comprehension. We could come easily to the conclusion that reading is too complex a process for connections between research theories and actual reading practices also see Norton & Tooney 2001; Schmidt 1983; Schumann 1975; 1978; 1986; Krashen 1982; 1985; Cummins 1980; Bialystok 1997; Johnson; Newport 1989; 1991; Johnson 1992; Long 1990; Odlin 1989; 2003; Ellis 1985; 1999; Selinker; Kim; Band; Rao 2004; Treiman 2001; Alderson 2000; Lee 2002; Kuhn; Stahl 2003; Perfetti 2003; 1985; Dörnyei 2003; Koda 2004; VanPatten 2004).

Nassaji’s review article of research on reading has two primary purposes. Firstly it extends and balances the two theories, schema theory and CI theory of language reading that have dominated the field of reading comprehension for such a long time. Secondly it focuses specifically on research that strongly supports and explains these two approaches to improving second language L2 reading
comprehension. It also highlights areas where constructive and instructive questions are needed inviting further research to solve those problems.

According to one view, human reading activities are based on our abstract prototype of a class of objects or events or situations for cognitive knowledge representations. Bartlett 1932 Rumelhart 1975 1977 1980 Schank 1977 Abelson 1977 Anderson 1977 1978 Howard 1987 Arbib 1987 Conklin 1987 Hill 1987 Under the umbrella name of “schema theory” a single mechanism approach to reading was developed by cognitive linguists recently Dabrowska 2004 Bybee 1985 Langacker 1991 Taylor 1995 The central premise of this approach is that people store large number of exemplars in complex units. Similar exemplars have partially overlapping representations which emerge as generalizations. These are reinforced and affirmed through repeated use Cook 1995 Jeffries 2001 resulting in the extraction of schemata by varying degrees of generality. Schema theory maintains that generalizations emerge as a by-product of the way information is stored in long-term memory Dabrowska 2004

Another approach is the construction integration CI model which has been refined and developed by the influential cognitive linguist Walter Kintsch and his colleagues stretching over 20 years. It has been referred to as the dual-way theory for the single unified model Kintsch 1988 1998 Van Dijk Kintsch 1983 Kintsch 1998 realized that not only discourse comprehension but also other cognitive processes may be viewed from the vantage point of the CI model. He became interested in just how far the domain of this comprehension paradigm extends. Comprehension is modeled as a process in the CI model.

11 Schematic theoretical perspective of reading comprehension

In the first part of this article Nassaji critically reviews and discusses the major assumptions underlying schematic theory as a theory of knowledge instead of offering the alternative approach of reading comprehension. The author gives us a global picture of schematic-based research evidence in language reading.

The cover term “schema” originally comes from the Gestalt psychology of the 1920s and was later revived in the Artificial Intelligence work of the 1970s and 1980s. It has since become firmly established and further developed in applied linguistics where schematic knowledge is seen as a crucial component of a language use competence. Widdowson 1983 and therefore also of central importance in language acquisition. Schematic knowledge is considered as an essential element in the development of text skills analysis and comprehension by the language learner. Carrell Wise 1998 Widdowson 1983 Cook 1989 McCarthy 1991 Hatch 1992 Wallace 1992 Stanovich 1990 Swales 1990 Christie 1999 and Derewianka 2003 also introduce the notion of genre known as text schema into reading comprehension. Schematic processing allows people to interpret new experiences quickly and economically enabling intelligent guesses even before explicit evidence Bartlett 1932 Howard 1987 Arbib Conklin Hill 1987 Schemata are highly organized abstract generic knowledge structures stored in one mind. In a broad sense, there are two types of schemata content schemata and formal schemata. Content schemata contain general or specific information on a given topic. Form or textual schemata contain information about how rhetoric is organized Carrell 1983a 1984a b 1988 Carrell Eisterhold 1983.

Two important means by which a person’s cognitive structures develop are assimilation and accommodation. Assimilation happens when incorporated into existing schemata. Input is changed to fit existing cognitive structures. Accommodation is the changing of existing schemata to fit the external world when such structures cannot handle various anomalies. These two processes operate throughout a person’s lifetime. Cognitive psychologists point out that children’s language development results from the interactions of the generic cognitive ability with objective experiences. These interactions are called “cognitive structures” or “schemata.” These schemata change and accommodate systematically as children grow up. Gui 1985 Howard 1987 Arbib Conklin Hill 1987 Cummins 1980 Cook 1995 Jeffries 2001 Czikó 1980 Schema theory explains how knowledge is represented learned and stored in the human mind.

For example, if I tell you that “I went to a restaurant last night” you are likely to assume that I

The importance of schematic knowledge is now widely acknowledged in language reading theory linked in particular to the importance of developing cultural knowledge in language learners. It should be remembered however that while schemas allow humans to process communication fast without paying attention to every minor detail they can often also be restrictive. Cook 1995 1989 Jeffries 2001. A negative stereotype for example is a schema which leads to a refusal to perceive new information or to change one's ideas. In unfamiliar situations attention to detail and a willingness to abandon and refresh our schemas are still the hallmarks of a flexible and open mind. Van Dijk Kintsch 1983 Kintsch 1998 1988 Cook 1995 1989.

As Kant claimed as long ago as 1781 that background knowledge plays a role in reading comprehension so that new information new concepts and new ideas only have meaning when they can be related to something the individual already knows. Kant 1781 1963. This applies as much to SLFL comprehension as it does to comprehension in one's native language. Recent empirical research in the field of schema theory has demonstrated the truth of Kant's original observation.

An influential figure Bartlett 1932 is usually acknowledged as the first Gestalt psychologist to use the term schema in the sense that it is used today. He developed schema theory to explain how background knowledge is used by a reader listener to understand and recall a text. Bartlett found that when participants read a story from an unfamiliar culture their memory of the story changed over time to fit schemata from their own culture. Yet it was not four decades later that wide interest in Bartlett's theories developed.

In the mid 1970s researchers began again looking at the influence of background knowledge and the organization of texts on reading comprehension. Bartlett's work 1932 is usually credited with being the seminal influence on recent comprehension and memory research. According to Bartlett in his classic work Remembering 1932 the term schema refers to an active organization of past reactions or past experience. However Bartlett was vague about how schemata work. For example he said several times that a central idea in his theory was turning around on one schema he could have meant deducting one past from one current schema but he never explicated the idea. Indeed he admitted I wish I knew exactly how it was done 1932 1906. Bartlett's ideas resembled those of Gestalt psychology.

A schema is a conceptual abstraction containing slots or variables to be instantiated in various ways. It was in the late 1970s that ambitious statements of schema theories began to emerge. Minsky 1975 Rumelhart 1980 Schank 1982 Schank and Abelson 1977 and to be applied to entities like stories Rumelhart 1975 and processes like reading Anderson 1977 1978. Concurrently the notion became the driving force behind empirical investigations of basic processes in reading Guthrie 2003.

There is some consensus concerning the manner in which schemata guide the comprehension process. The process of schema utilization has both data driven and conceptually driven elements. Norman Rumelhart 1975 Rumelhart 1980. An important aspect of top down and bottom up processing is that both should be occurring at all levels simultaneously Rumelhart 1980 1977 Alderson 1984 Carroll Devine Eskey 1988.

Anderson Pearson 1984 1988 argued that a schema is an abstract knowledge structure. A schema is abstract in the sense that it summarizes what is known about a variety of cases that differ in many particulars. The idea expressed by the above quote is certainly not new but it is worth refreshing in researching comprehension in a second or foreign language especially reading comprehension in EFL ESL. Furthermore some research with native adult speakers of English has shown that the individual prior experience of the reader spontaneously influences which background knowledge structures or schemata he will activate when interpreting a text that is vague or ambiguous in context. Anderson...
However, some recent studies of EFL/ESL readers demonstrate the effects of background knowledge on EFL/ESL reading comprehension. Most of these studies show that EFL/ESL readers read and understand texts better that deal with their own familiar culture. Materials for which they have well-developed background knowledge than they do with texts that deal with a less or unfamiliar culture for which they lack the appropriate schemata. Steffen & Devine 1979; Carrell 1981; 1983; 1984; Johnson 1981; 1982; Alderson 1984; 1985; 1987; 1988.

Carrell & Wise 1988; Carrell & Esterhold 1983; Floyd & Carrell 1987; Carrell & Pharis 1989; Carrell & Wallace 1987; Devine & Carrell 1991; Wang 1992; Qiu 1992; Qiu 1992; Wang 1988; Lee 2003; Bernhardt 2000; 1991; and Johnson 1981; 1992; 1986. As many others theorists and scholars have done a rich bulk of research in the schema-oriented realm of ESL/EFL reading. Research on schema theory in general and its application to ESL/EFL reading in particular has significant implications for the ESL/EFL classroom. Nearly all the studies mentioned above show that reading a text with an unfamiliar background makes it more difficult to understand the text. However, as Carrell & 1987 and Grabe 2004; 2003; 1991 point out, most of the research which has been done in the area of the schema theory and L2 learning has not taken place in classroom settings and has not been applied to a variety of settings. Therefore caution is necessary when applying conclusions to classroom settings. Hudson 1982; 1988; Carrell 1985; and Wilson 1987). And some other researchers have found that students at beginning and intermediate levels who participated in pre-reading activities specially intended to activate a schema outperformed students who did other pre-reading activities see also Ajideh 2003. Recent interest in reading and schema theory among L1 reading specialists has attracted the attention of L2 reading teachers and researchers. L2 reading theorists are beginning to recognize that what the reader knows is as important as what is on the page.

Though some L2 reading teachers have long recognized that their students were better able to deal with culturally familiar material. Carrell 1983a; It was not until the 1980 that this was empirically tested. When Johnson 1981 investigated the effects of text complexity and cultural background on comprehension, she found that for L2 readers cultural background had a greater effect on ability to understand the text than did semantic and syntactic complexity or language complexity.

Carrell 1983a looked at the effects of three components of background knowledge prior knowledge, prior cues in the content of the text and the degree to which lexical items reveal the content area. She used the variables of context transparency and familiarity also see Sasaki 2000. Carrell concluded that native speakers make use of contextual cues to do top-down processing and lexical cues to do bottom-up processing. The nonnative speakers in her study on the other hand were not efficient about making use of contextual or textual cues. They were also not proficient at either top-down or bottom-up processing Carrell & Devine 1998.

Previous voluminous studies have also shown differences in results for readers of different levels of linguistic proficiency. Chen 2004; Horiba 2000; 1996; Wang Qi 1992; Qi 1992; Wang 1988; Carrell 1983a; 1991; Uijt 1984; Hudson 1982; 1998; Cziklo 1980; Riley Lee 1996; Devine Carrell Eskey 1987; Carrell & Pharis 1989; Liberto 1989; Droop 2003; and Johnson 1981; 1986 found that familiarity of the cultural background of a text had a greater influence on comprehension than did language complexity. So future researchers should measure the reading proficiency of participants and use it as variable in the analysis. Carrell 1985; 1992; Jung 2003 found that students could be taught to identify the textual schema for a text and that this helped them comprehend the text better. Possibly a similar technique would work for content and formal schemata. In schema theory research this type of formal semantic knowledge is usually contrasted with content schemata knowledge which is claimed to be background knowledge about the content area of a text. Carrell & Esterhold 1983; Carrell & Wise 1998; Li 2003. Readers do need a good knowledge of formal schemata formal discourse structure. There is considerable evidence that knowing how a text is organized influences the comprehesion of the text. For example Carrell 1984a; Meyer 1975; 1977; 1981; 1982; Meyer & Rice 1982; Meyer and Freedle.
1984] and Jung [2003] have shown that more specific logical patterns of organization such as cause-effect, compare-contrast, and problem-solution improve recall compared to texts organized loosely around a collection of facts. Content schemata content and background knowledge also have a major influence on reading comprehension. Cultural knowledge has been shown to influence comprehension.

Carrel 1984b Pitchard 1990 Steffensen Joao 1984 Stanovich 1990 Green 2004 Efforts to explore the interaction of formal and content knowledge as they influence comprehension have been studied by Carrel 1987 Carrel et al. 1988 and Rollet 1990 In both L1 and L2 contexts formal and content knowledge play important different roles in reading comprehension.

Carrel 1984b 1987 as well as Carrel and Eisterhold 1983 have investigated the usefulness of the notion of schema theory for L2 reading. This research has focused on whether activating content information plays a major role in students' comprehension of a text and information recall. Carrel 1987 Barnett 1985 and Landry 2002 have also investigated the importance of formal schema structures of knowledge about language and textual organization finding it to be a significant contributor to reading ability. Carrel 1988b has strongly argued that a lack of schema activation is one major source of processing difficulty with L2 readers. This has been verified not only through culture-specific text comparisons but also in discipline-specific comparisons of readers with familiar and less familiar background knowledge. Alderson 1988 Struthers Uijin 1987 Kobayashi 2002 Chen 2004 Schema theory has provided a strong rationale for both preprocessing activities and comprehension strategy training. Carrel 1985 1988a Floyd 1987 Carrel 1987 Ajideh 2003.

Carrel 1992 1984a b 1984 Carrel and Wise Carrel Pharis Libert 1989 Brown 1978 1980 and Meyer Poon 2001 research has shown that the effects of implicit and explicit awareness of text structure as well as semantic mapping on the written recall protocols of high intermediate ESL learners. Carrel found that the reader's implicit awareness of text structure had a significant effect on recall performance however she did not find a similar effect for explicit awareness of text structure.

Other research has documented the general effects of content schemata on ESL/EFL reading comprehension. Johnson 1982 1986 has shown that a text on a familiar topic is better recalled by ESL readers than a similar text on an unfamiliar topic. Hudson 1982 1998 reports a study showing an interaction between overall linguistic proficiency in ESL and content-induced schematic effects in ESL reading comprehension.

Finally we can arrive at the conclusion that Carrel made influential contributions to the development and enrichment of schema theory in reading comprehension during the 1980s and early 1990s. Rumelhart 1977 and Collins Quillian 1972 used the following two odd, quoted mini-texts to show schema affirmation accommodation and operation of schemata also see Jeffries 2001 Cook 1995 Bransford Johnson 1972 Semino 1997 Piaget 1929 1960 Arbib Conklin Hill 1987 Howard 1987.

Text A

The policeman held up his hand and stopped the car. Rumelhart 1977 267.

Text B

Part One Mary heard the ice cream man coming down the street. She remembered her birthday money and rushed into the house. Rumelhart 1977 265.

Part Two and locked the door.

III. Construction Integration and Theoretical Perspective of Reading Comprehension

In the second section of Nassaji's article, the author aims at considering an alternative perspective on the role of knowledge in comprehension and seeing how this perspective particularly when supplemented with ideas from memory research and when applied to L2 reading comprehension can offer a fundamentally different and more comprehensive account of the role of knowledge and knowledge-based processes which L2 researcher had previously focused on explaining within schema.
The alternative is construction[integration model]

Now I set out to have a quick brainstorm to sketch the development of CI model. The process model to be described here was first described in Kintsch 1988 [see also Kintsch Welsch, 1991] Kintsch 1992a, 1992b]. It continues [extends] and further elaborates the earlier model of Kintsch and van Dijk 1978 [see also van Dijk Kintsch 1983]. Van Dijk and Kintsch 1978] provided and developed the basic process model [but did not deal with knowledge use in comprehension]. Kintsch 1988 [1998] added this feature of creating the construction [integration model as an alternative]; [with a less rigid] fixed knowledge view of the role of knowledge than the one suggested by schema theory [culminating in a considerably detailed version of the same model in Kintsch 1998 book]. Kintsch and his colleagues discourse comprehension models particularly Kintsch 1998 [1998] construction [integration model have been well researched in recent years by L1 reading researchers]. It seems that the "full potential application" of the CI model in L2 reading needs to be explored further in this realm.

The construction [integration model distinguishes between two major processes; a construction process [whereby a textbase containing the propositional meaning of the text is constructed from the textual input] and an integration process. [whereby the constructed textbase becomes integrated into the reader’s global knowledge]. The latter process forms a coherent mental representation of what the text is about [for a situational model]. Kintsch’s construction process of the textbase occurs in several steps. First the micropropositions of text to the actual semantics are constructed directly at the lexical levels of the text. Second; the micropropositions activate other propositions and their associates at the semantic level which include both coherent and incoherent representations of knowledge. Third; the meaning generated from the micropropositions is processed and revised by making elaborations and inferences. Then the local meaning relationship or microstructure of the text will be connected and confirmed to its global meaning relationship or macrostructure at higher levels. Kintsch 1998 [1988] van Dijk Kintsch 1983 Chu Swaffar Charney 2002 Gelderen Schoonen Glopper Hulstijn Simis Snellings Stevenson 2004 Guthrie 2003.

Finally the integration processing stage takes place right after the meaning construction of microlevel and macrolevel has been established. This stage of text processing includes both lexical and discoursal levels which go on until any mismatches inconsistencies and inappropriateness are resolved and eradicated. Then coherent comprehension and interpretation is established.

IV. Comparative perspective of schematic and CI models of reading comprehension

There is a sizable and still growing body of research concentrating upon language reading comprehension from a variety of theoretical models. We comprehend a text, and understand something by building a mental model of knowledge representations of the world. A schema in this view serves as a control structure that regulates comprehension processes in a top-down fashion. It also works as a perceptual filter in that it admits material consistent with itself but blocks irrelevant materials. On the other hand, it serves as an inference machine since it fills in the gaps or slots that are inevitably found in the actual stimulus material. Howard 1987 Arbib Conklin Hill 1987 Kintsch 1998 1998. It appears that schematic processing tries to avoid a more bottom-up loosely structured process and that it is difficult for human comprehension to be controlled and directed only by one fixed modellike schema. Kintsch 1988 argued that if schematic notions are "powerful enough" they are too inflexible and if they are general enough they fail in their constraining function. [p. 164]. As for this enterprise Kintsch 1998 claims that it is worth exploring an alternative.

Out of this came the construction [integration model]; a unifying overarching and coherent theoretical framework. Kintsch 1998. This model "does not have to be the result of forcing comprehension into a crab's shell schema. One can conceive of comprehension as a loosely structured bottom-up process that is highly sensitive to context and that flexibly adjusts to shifts in the environment." Kintsch 1998 [44 Cook 1995 [2003] Jeffries 2001 Semino 1997 Piaget 1928 1960 Arbib Conklin Hill 1987 Bransford Johnson 1972 With regard to the relationship between L1 reading and CI model Kintsch’s theory of text comprehension was developed in conjunction with research on knowledge activation in psychology and the suggestion that the idea of schema as posited in artificial
Opposite to schema-oriented model the CI model starts with bottom-up processing which is called construction processing whereby mental representations are formed by weak production rules that yield disorderly redundant and even contradictory output. However, the CI model ends with integrated processing whereby this constructed output undergoes a process of integration resulting in a well-structured mental representation. Thus the end result is the same both according to schema theory and the present CI proposal but the way this structure is achieved is quite different. Kintsch 1998 The two virtually indistinguishable viewpoints can be regarded as just two sides of one coin.

It now seems that there is no clear binary cutoff point between schema theory and construction integration theory. As a matter of fact they need to work together to account for the whole story in which human language is processed and comprehended. Schema-based versus CI-based model divide may be an oversimplification.

V Conclusion
In the concluding section of Nassaji’s article the author summarizes with care that neither schema theory nor construction integration theory can provide solutions to all the problems with respect to human reading comprehension. The author still holds that “unfortunately at present no comprehension theory exists that can take account of the whole range of issues discussed” while reading activities are taking place.

Perhaps the most fascinating of our linguistic capacities is the creative ability to process and understand an indefinite number of novel expressions of language we have never heard or read before. Grabe 2004 2002 1991 Grabe Stoller 2002 and Perfetti 2003 think that both reading research and practice have already undergone and still continue to undergo numerous changes since they first sprouted. The past few decades in particular have been a remarkable time in L1 and L2 research resulting in many new insights for reading instruction and comprehension. However, reading comprehension is a combination of identification and interpretation skills. What more reading research in a L2 context must take into account the many differences between L1 and L2 research. It is evident that these differences demand much further second language reading research to find and build up more efficient models. These differences leave us with questions that can lead to further study with L2 reading comprehension in other disciplines.

From my point of view however the best model needs to be a perfect marriage or a multiple interaction of all the models if we do have all of them to all at the appropriate time or place for the individual reader. It is beyond dispute that any single or unified model or theory does not work well enough by itself when applied to complicated and considerably unpredictable text comprehension. It is also not surprising that the whole complex multifaceted issue demands being considered in more depth.

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