

## CHAPTER 2

### REVIEW OF LITERATURE

#### **2.1 THEORIES AND STRATEGIES**

The review is centered upon three salient areas that are related to the study. They include language processing theories and models; cloze completion strategies; and think-aloud protocols as research data. In the first segment, a holistic approach towards second language processing theories and models is introduced. This is followed by the representation of an auto-strategic language processing model. The second segment defines and highlights the characteristics of cloze. The processes and strategies involved in reading, problem solving, language production, and cloze completion are also examined. Last but not least, the validity and reliability of think-aloud protocols as research data are discussed.

##### **2.1.1 A Cognitive Approach To Second Language Processing**

First of all it is important to define “language processing” so that the discussion that follows can be delineated within the context of the present study. The term, “language processing”, is inclusive of both the conventional terms “language acquisition” and “language learning”. The term “language acquisition” has been generally used by linguists and researchers to describe the subconscious phenomenon of successfully acquiring a language (which may be the first or the second language) through communication with native speakers in a second language speaking environment. On the other hand, “language learning” requires conscious thought and analysis which take place prevalently through formal instruction in a non-second language speaking environment generally. This dichotomy is central to Krashen’s Acquisition/Learning

Hypothesis which still remains highly controversial (Schulz 1991:21). However, within the context of the present study, a different view is proposed. Learning is the route to acquisition. In other words, it is through the learning process that acquisition is achieved. If acquisition holds similar meaning to attainment, accomplishment or achievement, then there is a need to establish the minimal threshold for the term "acquisition". The question is "When would a learner be considered to have acquired the second language?" One possible range of acquisition would be from intelligible processing of the second language to its near-native resemblance. This would imply that the ultimate goal of second language learning is acquisition. In informal learning environment, for example, immersion in the second language speaking community, acquisition of the speaking and listening skills are predominant. On the other hand, in formal learning situation, such as, following a second language learning programme with formal instruction in a non-second language speaking community, the predominant skill acquired by learners is reading. These observations are true even if the second language is the first language or mother tongue. Although language processing occurs perpetually, a difference may exist in the language processing process between the learning phase and the acquisition stage. This may be evidenced by the interlanguage produced during the learning process and the seemingly effortless near-native language phase when acquisition is attained. Researchers have put forward theories and models in their attempt to account for the highly complex language processing phenomenon.

Central to the cognitive theory (in relation to language learning) is the emphasis on the mental processes involved in language processing. This theory advocates information-processing models that highlight the "functional processing of language as the source of language learning" (Johnson & Johnson (eds) 1998:166). Advanced generally by



psychologists rather than by linguists, these models endeavour to integrate language with the other faculties of the mind and are supported by evidence based on certain psychological paradigms instead of linguistic paradigms (ibid). The discussion that follows is based on three prominent models, that is, McLaughlin's attention-processing model; Bialystok's Analysis/automaticity model; and Anderson's adaptive control of thought.

### **2.1.2 McLaughlin's Attention-Processing Model**

The term "information processing" was first associated with Barry McLaughlin's approach in the 1980's (McLaughlin 1987; McLaughlin, Rossman & McLeod 1983 cited in Johnson & Johnson (eds) 1998:166). This cognitive psychological approach posits language acquisition as the "building up of knowledge systems" through controlled processes that can eventually be called on "automatically for speaking and understanding" (Lightbrown & Spada 1993:25). Controlled processes are "capacity limited and temporary" as they demand attention (McLaughlin, Rossman & McLeod 1983:142 cited in Brown 1994:283). On the other hand, automatic processes refer to processing in a more "accomplished" skill and they are "relatively permanent" (ibid). As they require very little attention, these processes are quick and take up very little mental capacity (Johnson & Johnson (eds) 1998:166). Controlled processes which are carried out during the initial stages of language learning include analysis of the second language and structured practice may seem to reflect the behaviorist conditioning to a certain extent. However, in this case learning is not perceived as mere imitation of the input. Learning or the transition from controlled processes to automatic processes occurs as the learner "engages in a constant process of restructuring to integrate new structures with those previously learned" (Schulz 1991:20). Restructuring allows the old components of a task to be replaced by a more efficient procedure as the task

components are “coordinated, integrated, or reorganized into new units” (McLaughlin 1990:118 cited in Brown 1994:284). Restructuring can take place even without extensive practice. This occurs when new knowledge interacts with our schema, that is, the knowledge the learner already possesses, and “somehow ‘fits’ into an existing system and may in fact, ‘restructure’ this system” (Lightbrown & Spada 1993:25). Incidentally this concept of restructuring was also mentioned along similar lines by Selinker in 1972 (ibid) about a decade prior to this model. This again lends support to the convergence of underlying concepts from various theories. There is another dimension, that is, attention advocated in this model. Both controlled and automatic processing can occur with either focal (intentional) or peripheral (incidental) attention (Brown 1994:284). Unlike Krashen’s dichotomy of conscious and subconscious processes, both focal and peripheral attention may be quite conscious (Hulstijn 1990 cited in Brown 1994:284). Generally controlled processes require high focal attention. However they can be peripheral as in the case of a child learning the first language or skills without any formal instruction (Brown 1994:284). Conversely most automatic processes are peripheral although some can be focal; like an advanced learner taking a second language test (ibid). The ultimate goal for second language learners is peripheral, automatic attention-processing of the second language.

There are certain aspects of this cognitive theory that are contentious with other theories, namely, Krashen’s hypothesis, discourse theory and interlanguage theory. Firstly, this model asserts that “the normal course of acquisition is from material that is learnt consciously through practice to automatic unthinking knowledge” (Johnson & Johnson (eds) 1998:167). This is contradictory to Krashen’s refusal to allow learnt knowledge to be converted into acquired knowledge where learning is viewed as being distinct from acquisition. The prior proposition is more plausible because of the fact

that “as a controlled process is practised, it gradually becomes automatic” (ibid:166). Hence, learning is the route to acquisition. Secondly, while discourse theory posits that the analysis of language is only possible after it has been acquired or routinized, cognitive theory maintains that skills become automatic or routinized only after analytical processes (McLaughlin 1987:135 cited in Schulz 1991:20). It could be possible that the analysis of language can occur both before and after acquisition depending on the learning environment. A child learning his or her first language would acquire it prior to formal language learning in an institution where he or she is taught how to analyse the language components. On the other hand, a learner could acquire the second language after formal analysis of the language in an institution. This would imply that controlled analytical processes may not be the only means of language acquisition. As mentioned earlier, the restructuring of the learner’s linguistic system can take place with or without going through the controlled processing phase. Another implication would be the existence of two types of knowledge concerning the second language, namely, the child’s ‘unanalysed knowledge’ at the initial stages, and the learner’s ‘analysed knowledge’ of the language. These two terms would be defined in Bialystok’s analysis/automaticity model which would be discussed later. Thirdly, cognitive theory posits a hierarchy of complexity of cognitive subskills which lead from controlled practice to automatic processing of language instead of a hierarchical development of linguistic structures as suggested by interlanguage theory (Schulz 1991:20). From the holistic perspective, there could be a two-way link between the cognitive subskills or strategies and the development of linguistic structures. The development of cognitive subskills may influence the development of linguistic structures or the reverse may also be possible with the latter exerting its influence over the former. Regardless of whether the hierarchy consists of linguistic structures or cognitive subskills, the development is parallel, that is, the progress is from simple to

complex, as well as simultaneous perhaps. As a whole, McLaughlin's attention-processing model may represent an instance on how language processing may occur and depict another piece of the jigsaw puzzle.

### **2.1.3 Bialystok's Analysis/Automaticity Model**

This model incorporates learning processes and learning strategies to link three levels known as "input", "knowledge" and "output" (Bialystok 1978:70-80). Each of these levels is representative of certain unique stage in the second language process and use of the language. The input level refers to the undifferentiated context in which the learner experiences or encounters the second language as exposure to the language occurs. The knowledge level posits that the information gained may be stored or represented in three ways, namely other knowledge, explicit linguistic knowledge, and implicit linguistic knowledge. These hypothetical constructs refer to three types of information the learner brings to a language task. Explicit Linguistic knowledge consists of all the conscious facts the learner is able to articulate about the language, such as grammar rules, vocabulary items, pronunciation rules, and so on. This source is assigned three functions; Firstly, to act as a buffer for new linguistic information; secondly, as the store for information; and thirdly, as an "explicit articulatory system". On the other hand, implicit linguistic knowledge is the intuitive information about the second language necessary for most spontaneous comprehension and production tasks, that is, information that is automatic and is used spontaneously. For instance, a language learner may claim that a sentence "sounds" or "feels" right, although the learner could not cite any direct evidence for the correctness of the sentence. It is pertinent to note that these two knowledge sources is differentiated in terms of function rather than content as any information may possibly be represented in either source. Other knowledge, the third type of information, includes all other knowledge not

pertaining to the second language that the learner brings to the language task. For example, knowledge of other languages, such as, the native language, information about the culture associated with the second language, knowledge of the world, and so forth. The third level in the model, output, is defined as the product of language comprehension or production. There are two specialised responses, namely, Type I responses which are spontaneous and immediate, and Type II responses which are deliberate and occur after a delay, even though it may be brief. The relationship between these levels are described by the processes and strategies of language learning.

There are basically two processes relating the three levels, that is, firstly, the input processes which relate input to knowledge, and secondly, the output processes which relate knowledge to output. The input process takes the form of the second language exposure. The nature of this exposure will determine the extent to which of these knowledge sources is affected. For instance, the exposure to formal rules would probably enhance the explicit linguistic knowledge. The output process describes the way in which language is used for comprehension or production. Language use is assumed to proceed as a function of implicit linguistic knowledge. The 'explicit linguistic knowledge is only utilised when monitoring strategies are used for language comprehension or production. Both Type I and Type II responses can be continually modified or corrected.

The final feature of the model is language learning strategies. These are defined as "optional methods for exploiting available information to increase the proficiency of second [or second] language learning" (Bialystok 1978:76). Strategies are "conscious enterprise" employed to improve task performance by bringing relevant knowledge to the language task. The four language learning strategies identified are formal

practising, functional practising, inferencing practising and monitoring. Firstly, formal practice can be achieved by increasing one's explicit knowledge of the second knowledge and operating on information already in Explicit knowledge through language drills and exercises. The purpose of formal practice is to automatize this information so that it can be transferred to implicit knowledge. On the other hand, functional practice involves increasing exposure to the second language and using it for communication. The information attained becomes the implicit linguistic knowledge. Thirdly, the monitoring strategy brings information from explicit linguistic knowledge to the language task for the purpose of examining or correcting the response. Hence, it is a formal strategy and is essentially a production strategy. Fourthly, inferencing is a strategy that enables a language learner to "arrive at particular linguistic information which was previously unknown" (Bialystok 1978:78), that is, to discover new insights about the second language. The learner can draw from the three types of knowledge mentioned the information required to arrive at some explicit understanding of the forms and functions of the second language with certain conscious effort. It is primarily a comprehension strategy used to "derive meaning from language or to understand linguistic forms" (Bialystok 1978:79). The new information enhances the explicit knowledge source. Modification were made to this framework for conceptualising second language acquisition several years later (Bialystok 1982, 1985 and 1990 cited in Brown 1994:285). The knowledge level consisted of "unanalysed knowledge" (that is, the general form of knowledge without being aware of the structure of that knowledge) and "analysed knowledge" (that is, overt awareness of the structure of knowledge) (Bialystok 1982 cited in Brown 1994:286). At the output level, the types of responses were referred to as automatic and non-automatic processing; reflecting the relative access the learner has to the knowledge. Hence, automatic processing is quick and easy retrieval of knowledge whereas non-automatic processing requires time and effort to

retrieve the knowledge (ibid). Therefore this continuum is similar to the Type I and Type II responses. This processing was later referred to as a factor of control, that is, “the ability to intentionally focus attention on relevant parts of the problem to arrive at a solution” (Bialystok & Mitterer 1987:148 cited in Brown 1994:286).

This model provides a means of describing some processes that may occur during second language learning. An insight garnered is that the element of time taken to process linguistic data can also affect learners’ linguistic performance besides their ability to analyse language (Brown 1994:287). This model is more specific in pointing out the processes and strategies employed in information processing. This has made it possible to advocate certain learning strategies be taught and particular kinds of language exposure to be provided in order to enhance language learning.

#### **2.1.4 Anderson’s Adaptive Control Of Thought (ACT)**

The information processing model which has considerable influence in cognitive psychology seems to be that of John Anderson (1983 cited in Johnson & Johnson (eds) 1998:167), named ACT (adaptive control of thought). The model posits that knowledge is represented in memory via three types of knowledge, namely, (i) declarative knowledge which stores individual facts; (ii) procedural knowledge which stores processes; and (iii) working knowledge which brings the first two together in accomplishing a task (ibid).

Firstly, declarative knowledge, which is “static” information, is “maintained in long-term memory in terms of meaning instead of replicated external events” (Anderson 1985 cited in O’Malley & Chamot 1990:20). As far as the language analysis is concerned, the most significant mode of storing information in memory is through

“propositional representations” (patterned after Kintsch 1974 cited in O'Malley & Chamot 1990:20). Each proposition is denoted by a “relation” followed by an “ordered list of arguments” which can be represented schematically by a “propositional network” consisting of nodes (that is, ideas) connected by arrows (that is, links or associations) to its relations and arguments. This propositional network makes it possible for “spreading activation” to occur whereby a single concept may evoke the activation of additional concepts (O'Malley & Chamot 1990:21). A “schema” is required for larger units of meaning that can be represented by propositional networks. A schema is “a configuration of interrelated features that define a concept” (ibid:23). Schemata enable new information to be organized and understood which in turn facilitate making inferences about concepts (ibid:23&24).

Secondly, examples of “procedural knowledge” would include the ability to understand and generate language or apply one's knowledge of rules to solve a problem. This knowledge, such as, language acquisition, is acquired gradually and only with extensive opportunities for practice (Anderson 1983, 1985 cited in O'Malley & Chamot 1990:24).

Thirdly, all complex cognitive skills can be represented as “production systems” which are stored as working knowledge. The term “cognitive skill” refers to the ability to perform various mental procedures (ibid). The most basic form of a production system consists of a “condition” and an “action”. The condition contains “a clause or set of clauses preceded by IF”, and the action has “a clause or set of clauses preceded by THEN”. Each of the conditions for this production refers to “an internal goal” and as the goal changes, the “IF” clause will match different sets of stored conditions. consequently the learner will execute the corresponding sets of actions. Condition-



action pairs (or production systems) can initially be represented in “declarative form” (that is, the cognitive stage), and gradually, through practice, can be compiled into “production sets” (that is, the associative stage) and fine tuned to the point of “automatic execution” (that is, the autonomous stage). These three stages described the process of proceeding from the rule-bound declarative knowledge to the automatic proceduralized production, that is, the three stages of skill acquisition. During the cognitive stage, there is conscious effort in learning or memorising facts, rules or unanalysed chunk of language, and the acquired knowledge is typically declarative which can be described by the learner. During the associative stage, two main changes occur in order to develop proficiency in the skill. Firstly, there is a gradual process of detecting and eliminating errors that may exist in the declarative representation of the store information. Second, there is strengthening of the “connections among the various elements or components of the skill”. During the third, or autonomous stage, the execution or performance of the skill becomes effortless with much less demand on working memory/knowledge or consciousness and errors disappear (Anderson 1983, 1985 cited in O’Malley & Chamot 1990:24-26).

Theoretical developments in production systems enable this model to cover a wider range of behaviour as compared with other theories. It includes comprehension and production of oral and written texts as well as comprehension, problem solving, and verbal learning (O’Malley & Chamot 1990:19). Of relevance and interest to the present research is language comprehension and language production.

#### **2.1.4.1 Language comprehension**

From the cognitive perspective, language comprehension is generally viewed as “consisting of active and complex processes in which individuals construct meaning

from aural or written information” (O’Malley & Chamot 1990:33). Comprehending both aural (via listening) and written (via reading) texts could be considered as a common phenomenon that would require sufficiently similar mental processes (Anderson 1983, 1985 cited in O’Malley & Chamot 1990:34). Comprehension may be differentiated into three interrelated processes: perceptual processing, parsing, and utilisation (ibid). Firstly, perceptual processing involves the initial stage of analysing the language code and converting some of the text to meaningful representation. Secondly, in parsing, decoding of individual words or phrases occurs by matching the aural or visual pattern of the word or phrases with its representation in the declarative knowledge, resulting in lexical access. These words and phrases assist in constructing propositional or meaningful mental representations of the language input. Thirdly, utilisation consists of relating a mental representation of the text meaning to declarative knowledge in long-term memory. This knowledge is accessed by spreading activation process which activates nodes in long-term memory that have a meaningful connection with the newly parsed information. The possible interplay between information known and new information would assist in comprehension of the language input. Since utilisation determines and facilitates comprehension, it is considered as the key to comprehension (Anderson 1985 cited in O’Malley & Chamot 1990:34&35).

#### **2.1.4.2 Language production**

In the light of the cognitive theory, language production involves “an active process of meaning construction and expression” (O’Malley & Chamot 1990:37) which consists of three stages. These are identified as construction, transformation, and execution. They are recursive after the initial communication goal is established whereby the speaker or writer may go back and forth between these stages as the message is developed. Firstly, in construction, an individual decides what to say and then selects

the relevant facts. These two steps entail a search through declarative knowledge and identification of appropriate information. The third step in this stage is to decide how to structure the information selected. When structuring speech, linear discourse organization is the typical structure utilised. Secondly, in transformation, the information selected is converted into meaningful mental representations via language-generation systems which consist of goal-oriented IF-THEN statements. Language rules are also applied to transform meanings into the form of the message. Language is generated in phrases as well as being comprehended through parsing of such constituents. The reviewing or revising process (in writing) is also included in this stage. Thirdly, in execution, the mental representations are converted into sentences and sentence fragments in audible (speech) or observable form (writing) (Anderson 1985 cited in O'Malley & Chamot 1990:37-40).

This model distinguishes between language comprehension and language production by identifying the different stages involved. This results in a more specific theoretical framework that provides a more detailed process view of second language acquisition. This model also makes it possible to incorporate strategic processing as part of the description of how information is learned (O'Malley & Chamot 1990:19).

The illuminating journey through the labyrinth of language learning theories, models and frameworks bears witness to the contributions from various school of thoughts, namely, linguistics, psychology, cognitive psychology and psycholinguistics. Each offers a different level of explanation or description and adds a unique dimension to the picture as a whole. For instance, linguistic theories may provide interpretations of the language learning process at the surface level, that is, drawing inferences on how the mind works based on observable linguistic evidence. On the other hand, cognitive

theories seeks to present a deep structure of the workings of the mind by positing ostensible mental processes that are likely to occur during language learning. These theories may or may not be based upon available evidence or empirical data. It is perhaps also noteworthy to state that although terminologies differ, there exists a certain degree of similarity in terms of concepts. All these factors lend support to the holistic approach towards a more complete theory, model or framework of language processing that would account for “the biological/innate, the social/interactive, the cognitive, and the behaviorist aspects of language learning” (Schulz 1991:22).

## **2.2 AUTO-STRATEGIC LANGUAGE PROCESSING MODEL**

Linguistic theories may lack continuity as hypothesis or processes appear to be quite discrete. It is also quite vague as to how one hypothesis or process is related or linked to another. On the other hand, cognitive theories seem incline towards the abstract and may even be quite unobservable. Hence, such theories and models may have limited pedagogic applications. As an attempt to overcome these shortcomings, an auto-strategic model of language processing is proposed in the present study. Firstly, the terms *strategies*, *styles*, *processes* and *skills* are defined. Secondly, the assumptions underpinning the model are discussed. Thirdly, the model is presented and its features highlighted. Finally, the advantages and possible improvements on the model are suggested.

### **2.2.1 Definitions: Strategies, Styles, Processes And Skills**

The terms *strategies*, *styles*, *processes*, and *skills* have been assigned diverse definitions by different researchers who have presented their personal definitions within various

contexts. Although this conglomerate of definitions may appear confounding, insights can be drawn into the characteristics of these multi-faceted terms. These thought-provoking insights can provide a practical and useful guideline for researchers and instructors.

It would be appropriate to discuss the definitions of these four terms in order to crystallise their parameters in the context of the present study. A closer examination of their definitions may provide a more systematic view on their dispositions in relation to one another as well.

#### **2.2.1.1 Defining strategies**

With inferences drawn from the table of definitions on strategies (Table 2.1, pp. 203-206), an attempt is made at this juncture to arrive at a general consensus on the definition of strategies. This definition is based on what strategies are in relation to learning, language learning, reading, and language learners, as well as their functions, and characteristics.

As a general term by itself, strategies can be referred to as plans or means comprising methods or techniques that are realised by a set or series of tactics, procedures, operations, actions, behaviours or steps selected to achieve a certain goal. For example, in the context of language processing, selected strategies are employed to process language input (that is, receive, select, integrate, internalise, retain information and monitor comprehension) and/or produce language (that is, retrieve, utilise, and modulate/evaluate production). Language users also employ certain strategies to prepare themselves for the language processing tasks and assist them in their tasks.

Within the context of language processing, strategies occur along a continuum of focused (observable) to automatic (non-observable) information processing. These strategies are controllable by the learners. They vary with time and intraindividually since they are amenable to change. In other words, strategies can be modified, rejected and unfamiliar ones can also be learned.

Since the purpose of this study is to investigate the second language processing strategies employed by ESL learners in solving two types of cloze design, it is appropriate to also define the term, strategies, in relation to language processing. These strategies may be defined as means used by learners in assisting second language processing which encompasses both comprehension and production. In addition, they may be viewed as methods that involve the process of mastering practical skills. As for the term, operation, it illustrates how the strategies are operationalised.

#### **2.2.1.2 A proposed disposition of strategies, styles, processes, and skills**

With reference to the definitions on styles, processes, and skills (Table 2.2, pp. 207-212), an attempt is made to establish the relationship between strategies and these three terms. Unlike styles which are inherent or innate (biologically controlled), strategies exist as a matter of choice and can be acquired. Perhaps it is the ability or capacity to acquire these strategies that is innately controlled. It should be noted that strategies and styles are not distinct entities as each has a mutual influence on the other. Strategies may be modified and even to the extent of being dictated by styles. Likewise styles may have to be adapted to accommodate more efficient strategies.

To distinguish between strategies and skills, strategies may be viewed as the means to an end. This end refers to the skills that are to be acquired. To implement these

strategies, learners have to undergo certain processes in order to make the necessary changes that are pertinent for learning to occur which are the prerequisites of acquisition.

### **2.2.2 Underlying Assumptions**

The most fundamental assumption underpinning the auto-strategic language processing model is that it makes no distinctions between first or native language and second or foreign language learning because the basic processes are similar. Hence, the term “second language” encompasses both these categories of language learning. Learner variables and distinct learning environment may result in varying preferred learning strategies and styles without disrupting or altering the mental processes concerned. The justifications for this assumption have already been discussed in section 2.1. This assumption is also evident in Anderson’s adaptive control of thought (Johnson & Johnson 1998:167). Secondly, the strategies are assumed to be observable or can be inferred evidence of the obscure or covert mental processes. They are viewed as the surface level manifestations of diverse means of language processing as postulated by various theories, and models. Therefore the different schools of thoughts discussed in the earlier sections are reflected and subsumed within the various categories of strategies. Thirdly, language processing is seen as consisting of two phenomena, that is, comprehension and production with certain pertinent differences in terms of the underlying mental process. Although the stages of comprehension and production may appear to be analogous, important differences (in reverse order) exist (Anderson 1985 cited in O’Malley & Chamot 1990:37). For instance, a greater knowledge of syntax is required in production than in comprehension (Vollmer & Sang 1983 cited in O’Malley & Chamot 1990:37). This suggests that language reception and production are not mirror images of each other (O’Malley & Chamot 1990:38). This explains the rationale

for proposing two distinct sets of strategies, that is, integrative strategies for comprehension and generative strategies for production. They may appear to be similar on the surface level but differ in terms of certain details in the underlying mental processes. For example, monitoring strategies for comprehension may seem synonymous to modulating strategies for production due to likeness in their functions. Although both are means of checking, verification, and correction, they vary in their purpose. For comprehension, the purpose is to focus on understanding the input. On the other hand, for production, the focus is on language forms such as accuracy, appropriateness, and pronunciation or spelling. This difference in focus would alter the underlying mental processes. However, there are also core strategies which are applicable for both comprehension and production whereby the mental processes underpinning the strategies are parallel. An illustration would be the linguistic analysis strategies (for example, contrastive analysis between languages; lexical analysis in terms of morphology and semantics; and use of collocations). These strategies remain unaltered whether they are utilised for comprehension or production. Even though comprehension and production processes differ, these are examples of instances when comprehension strategies are the same as those of production strategies. This would not be surprising as both are basically language learning skills. Perhaps it would be appropriate to equate language learning to a complex cognitive skill learning consisting of core and specific strategies that assist in language acquisition.

### **2.2.3 Description Of Model**

The proposed model (Fig. 2.1, p. 210), known as the “**auto-strategic language processing model**”, attempts to address language comprehension and production as central processes. Language comprehension refers to deriving meaning encoded by the linguistic medium in the oral or written mode, that is, listening and reading for meaning



respectively. On the other hand, language production refers to generating the linguistic medium through speech or writing, that is, constructing language that carries meaning. Hence, language comprehension involves decoding skills while language production involves encoding skills. The model differentiates between language comprehension and language production to a certain extent, that is, in terms of specific strategies peculiar to each type of language processing. Similarly, the four major language skills are further distinguished in relation to strategies that are characteristic of that particular skill.

The model posits two important time-based aspects manifested in language processing, namely, automatic processing and strategic or mediated processing. Incidentally, it is upon this dichotomy that it is named “**auto-strategic language processing model**”. It is a common notion to equate the automatic processing with processes which do not require the attention of the learner. On the contrary, attention is vital for comprehension and production even during automatic processing and to a greater extent, during mediating processing. Within the context of the proposed model, mediated processing is defined as utilising strategies to achieve comprehension of language input. Conversely, automatic processing refers to the immediate and smooth transition from input to comprehension as well as from knowledge or input to production. This could imply that these two types of processing are the two ends of a continuum.

### **2.2.3.1 Automatic language processing**

Automatic processing is manifested as spontaneous comprehension of input and instantaneous utilisation of knowledge or input for production. Evidence of such a phenomenon can be obtained from think-aloud protocols of learners completing a cloze text. The response is immediate without the learner pausing to verbalise any strategies

or means of solution. In the case of fully automatic processing, strategies are totally absent, that is, they are not employed at all. In partially automatic processing, strategies may be summoned, the processing is prompt and momentous. This appears to be one of the factors that leads to the automatic language processing. Another probable factor would be the consistent practice that converts strategic processing to automatic processing. From the perspective of cognitive psychology, language processing becomes automatic after synthesising and systematising. This would imply that synthesising and systematising do not occur at all for automatic processing.

In order for automatic language comprehension to take place, a pertinent factor would be the quality of the input in terms of the level of difficulty, complexity and familiarity. Logically, language comprehension becomes automatic if the difficulty or complexity level of the input is equal or less than the existing knowledge of the individual (Fig. 2.1.1, p. 211). The familiarity of the input would also activate automatic processing. Appropriate input that matches the level of existing knowledge would trigger the automatic language comprehension (decoding) process. Likewise for compatible language production after comprehension is achieved, the existing knowledge and the comprehensible input would trigger the automatic language production. In the case of self-initiated language production, the conceptualisation of ideas occurs within the existing knowledge and if encoding in the second language takes place simultaneously, then language production would most likely to be automatic. In other words, thinking in the second language is one of the contributing factors towards automatic language production.

All these external factors and internal conditions would act as a catalyst in recall and retrieval of relevant information accumulated in the long-term memory. Assisted by

linguistic and conceptual knowledge recalled or retrieved, language processing would most probably take place in the short term memory during which attention is focused on a particular aspect of the task at hand.

### **2.2.3.2 Strategic language processing**

Strategic or mediated language processing would logically occur when the second language input or the requirement for production is beyond the capacity of the existing knowledge of the second language (Fig. 2.1.2, p. 212). The learner can enhance this knowledge through preparatory or resourcing strategies. Strategies used for language comprehension may include core strategies and input oriented/integrative strategies. On the other hand language production would be assisted by core strategies and output oriented/generative strategies. When the input or language task is overly demanding, the non-participatory strategies (part of the core strategies) would be utilised. This is when failure to comprehend or produce language occurs. Consequently there would be a breakdown in communication as there would be no decoding or encoding of the intended message.

When comprehension is achieved, it can lead to non-production or production via productive strategies. Another potential lead is the stage of optional strategies (monitoring, and modulating) or processes (synthesis, and systematization). These are optional as they may or may not occur depending on external factors (such as task requirement, and time allocated) and learner variables (such as learning style, and motivation). When monitoring strategies are utilised, feedback is provided to enhance comprehension; to improve the use of integrative strategies; and to modify perception of the information presented in the input. At the completion of the language comprehension, retrospective strategies may be engaged to review the process as a

To gain a better understanding of the cloze completion process, the definition and characteristics of cloze are discussed. In order to establish what the cloze completion process entails, the processes of reading, problem solving and production are discussed individually. Likewise, the reading, problem-solving and production strategies are presented prior to identifying the strategies involved in cloze completion. Finally an attempt is made in drawing up a taxonomy of plausible strategies that concerns the cloze completion process.

### **2.3.1 Definitions And Characteristics Of Cloze**

The most general definition of the term, "cloze procedure", is the systematic deletion of words from a selected text (Alderson 1983:205) and replacing them with blanks of standard length (Oller 1973:106). The blanks which are substituted for deleted words are known as cloze items (Salup 1974:7). Respondents are required to attempt to replace the deleted words (Carton 1971:46). The deletions can be basically divided into two types of systems: either a random (or, better, pseudo-random) deletion of words, or a rational deletion (ibid). The first type of deletion, that is, random or pseudo-random deletion, refers to a specific deletion frequency of every  $n$ th word where  $n$  can range from the fifth to the twelfth word. A deletion ratio of less than one to five would render the exercise futile as it does not leave sufficient contextual information for intelligent guessing (Schulz 1983:131). The most common deletion rate lies between every seventh to tenth word (Wainman 1979:132). The numerical value of  $n$  remains constant throughout the text. The original mode also known as "strict cloze", developed by Taylor in 1953 comprises a text with random or  $n$ th word deletion (Ashley-Davis 1985:587). The selected text with a normal word count of 250, is altered by omitting words at regular  $n$ th intervals. The first and last sentences of the text remain intact without any deletions. Omissions are signalled by lines of equal length. This mutilated

to follow just one classification without prior adaptation. Hence another classification of strategies is proposed for the present study.

#### **2.2.4.1 Rationale for the proposed classification**

Firstly, existing classifications of learning strategies have focused on their nature (such as, metacognitive, cognitive and social-affective) and functions (for example, compensatory, communicative). These classifications may provide an insight into their psychological nature and pragmatic functions. However they tend to be less practical from the pedagogical point of view. This is because teachers and learners need to know **when** to utilise these strategies, particularly in relation to second language processing for comprehension and production. The classification employed in this research is designed to meet the need of creating such awareness among them. For example, they will need to refer to the **generative strategies** when producing the second language. This would be more helpful than providing them with information about the nature and functions of these strategies.

Secondly, the cutting edge of the proposed classification is the distinction between comprehension and production processes involved in language processing. Majority of the students in the polytechnic where this study was conducted, are capable of comprehending the second language input as evidenced by their ability to answer comprehension questions based on a given text or listening input. However when they are required to produce the second language, they are unable to produce grammatically correct sentences in either or both the oral or written mode. This phenomenon seems to imply that there may be a disparity between the strategies for comprehending and producing the second language. There may be various factors and causes underlying this unique result of formal language learning. This study seeks to propose that one of

these could be due to the difference in the type of strategies required for comprehending and producing the second language. This is the precise reason for the emphasis in distinguishing the comprehension strategies termed as **integrative strategies** and the production strategies known as **generative strategies**.

Thirdly, one of the foci of this research is to find out if different strategies are employed in solving a cloze text with options and one without options. Present classifications have categorised both comprehension and production strategies under the same strategy type. This may mean that the data analysis utilising any of these classifications would most probably be unable to present an accurate picture of the strategies used by the learners. Consequently these classifications would be rendered a less sensitive instrument in detecting the possible differences. On the other hand, the proposed classification is more specific as it takes into consideration the subtle yet distinctive differences among these strategies. For instance, the conventional classifications do not differentiate monitoring strategies into second language comprehension and production. In other words, monitoring strategies are used to monitor comprehension and production of the language. Under the proposed classification the term, **monitoring strategies**, is maintained as one of the **integrative strategies**. They function as a check on comprehension, and meaning seeking in relation to input. However a new term **modulating strategies** is used and classified as one of the **generative strategies** to differentiate their function from the monitoring strategies. The function of the modulating strategies is to check and alter decisions pertaining to second language production.

On the whole, the main purpose of the proposed classification is to provide a more systematic and practical approach to the teaching of the language comprehension and

production strategies. In addition it aims to be learner-friendly so that learners are able to know the appropriate instance in exercising suitable strategies. Furthermore the proposed classification, being more specific and detailed, would most probably be an effective instrument in categorising the types of strategies employed by subjects in solving the two cloze tasks in the present study.

#### 2.2.4.2 Description of classification

The proposed classification is basically a synthesis of learning strategies identified by a number of well-known researchers and authors such as, Hosenfeld (1984), Rubin (1987), Oxford (1989), O'Malley and Chamot (1990). These strategies are now reclassified under six different categories as follows:

- I. Preparatory strategies
- II. Core strategies
- III. Input oriented strategies
- IV. Output oriented strategies
- V. Retrospective strategies
- VI. Resourcing strategies

Each of the above categories may consist of metacognitive, cognitive, social-affective or communicative strategies. For instance, core strategies, such as, *deduction* and *induction* are cognitive strategies whereas *monitoring* which is within the same category is considered as metacognitive.

These six categories comprise various strategies that possess similar pertinent goals and functions. Each of these categories is further defined by major strategies followed by strategies, which are in turn illustrated by certain operations. The data analysis of this study will be based on this classification system with particular reference to the second,

third, and fourth categories since they are utilised in cloze completion. In addition, the subjects were not required or allowed by the researcher to employ the remaining three categories. Since the focus of the study is on the second, third, and fourth categories, these will be presented in the second section of this chapter.

## **I. PREPARATORY STRATEGIES**

These learner-initiated strategies (Table 2.3, p. 213) are normally carried out prior to interaction with input or production of output should the need arises. Their function is to prepare the learner for the language processing task to be implemented. To be more specific, these strategies prepare the learner for the integration or comprehension of the input and language production.

Preparatory strategies are usually metacognitive in nature. Since they are schema-dependent, they can be regarded as a bridging device between the learner's schema and the second task. The effectiveness of these strategies would depend on the learner's schema. These strategies can be classified into four major types. They include attention, goal setting, planning and task analysis. Although they may not usually involve any direct production of the second language, these strategies might also most probably be implemented prior to producing the second language if necessary.

## **V. RETROSPECTIVE STRATEGIES**

These strategies (Table 2.4, pp.214) are self-evaluative measures undertaken by the learner after the completion of a language task. This means that the learner makes no further attempt to change any aspects of the language comprehension or production during this retrospective phase. These strategies include checking the outcomes of one's own language performance against an internal measure of completeness and



accuracy or a standard after it has been completed. They also entail checking one's language repertoire, strategy use or ability to perform the task at hand.

As an outcome of utilising these strategies, the learner may restructure prior linguistic concepts pertaining to the second language. The second effect of employing these strategies is that they may also influence the learner's motivation, expectations, and performance in subsequent activities of similar nature.

## **VI. RESOURCING STRATEGIES**

These basically comprise social and affective strategies (Table 2.5, pp. 228-231). They are recategorised according to their specific sources of reference, namely, other second language (SL) users, self and SL materials. It is important for learners to be aware of the sources for their learning in order to be self-directed. Firstly, other SL users would include peers, teachers or other proficient users of the second language. Interaction with this group of people could assist SL learning. Hence, the term "interaction strategies" refer to strategies learners use to interact with another person in order to acquire the SL. For example, in the process of creating or confirming rules in the second language, learners may seek confirmation of their understanding of the language or clarify its communication rules with other SL users. Secondly, learners must recognise the fact that they themselves play a vital role in acquiring the SL. With this realisation comes the responsibility of managing one's learning and affective control through self-resourcing strategies.

Last but not least, learners need to gain exposure to the second language through various media and materials. These material-resourcing strategies will assist in raising consciousness among learners of the vast quantity of learning aids available at their

disposal. These strategies occur when self-initiated learners take upon themselves the responsibility of learning the second language. Thus these spontaneous or planned strategies actually take place in real-world situations. They do not exist as mere formulaic language drills since learners use them to meet real-life communication needs.

### **2.2.5 Advantages And Suggested Improvements**

The proposed **auto-strategic language processing model** highlights two modes of processing, that is, automatic and mediated. The appropriate input may be made comprehensible or assigned meaning when it interacts successfully with the existing knowledge or schemata by the automatic mode or the mediated/strategic mode. One possible means of this interaction is matching the new information with the existing knowledge. On the other hand, the language produced is the output of the integrated and synthesised knowledge retrieved by either automatic or strategic mode.

There is an attempt to account for automatic and strategic processing of the second language. In addition the restructuring process is seen as comprising two sequential processes, namely, analysis or synthesis and systematisation. The model also relates strategies to various stages of language processing. This allows systematic identification of strategic mental processing. This in turn has a pedagogic bearing on effective strategy-training for second language learners. Furthermore the strategies are viewed as the surface manifestation of the various underlying theories of language comprehension and production. The strategies employed also reveal the ‘procedural knowledge’ as defined by Anderson, (1994) as they illustrate how ‘declarative knowledge’ (ibid) is utilised in comprehending and producing language.

As the main focus of the research is on strategies, there is only a superficial account of the cognitive aspects involved in automatic processing. Since this is the status quo of the model, further elaboration in greater depth, particularly from the psychological perspective, could make it more comprehensive. Research could also be conducted in this area to enhance the credibility of the model. There are still indeterminable factors, such as, the organization of the knowledge system, and the specific strategies for specific language skills that need to be addressed. Last but not least, with sufficient empirical data, the assumptions may be justified and verified.

It is hoped that the proposed model and its underlying principles can contribute towards the theoretical and pedagogic aspects of language processing from the learning stage to the acquisition stage.

### **2.3 THE INTER-RELATIONSHIPS BETWEEN THE PROCESSES AND STRATEGIES FOR CLOZE COMPLETION, READING, PROBLEM SOLVING, AND LANGUAGE PRODUCTION**

Cloze completion can be deemed as a complex mental activity. As second language learners complete a cloze text, they can be initially perceived as reading the text. Then they may advance to the problem solving phase before producing the answers. If the blank to be filled (that is, the missing word) does not pose a problem to the learners, as in the case of automatic response, it can be postulated that they could have progressed directly to the production phase without necessarily going through the problem solving phase. For cloze texts with options provided, also known as MCQ-cloze, the production phase may or may not occur. Even if it does, it may not be obvious due to the fact that the answer is provided as one of the options.

To gain a better understanding of the cloze completion process, the definition and characteristics of cloze are discussed. In order to establish what the cloze completion process entails, the processes of reading, problem solving and production are discussed individually. Likewise, the reading, problem-solving and production strategies are presented prior to identifying the strategies involved in cloze completion. Finally an attempt is made in drawing up a taxonomy of plausible strategies that concerns the cloze completion process.

### **2.3.1 Definitions And Characteristics Of Cloze**

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text without any other hints is then given to the respondent as the basis for filling in blanks. Only exact replications of the author's words are counted as acceptable for scoring (ibid). At this juncture, it should be pointed out that all other variations of cloze other than the above, are referred to as modified cloze. Examples include the rational cloze, the multiple-choice cloze (M-C cloze), the cloze-elide, and the c-test. The second system of deletion, that is, rational deletion, involves the removal of words from a text based on a certain rationale without maintaining a fixed deletion ratio. The nature of the deleted items can be controlled by selecting specific types of words to be deleted, such as content words or functional words. It seems particularly important to distinguish between the types of deletion systems due to accumulating evidence that a different deletion procedure results in a measure of a different aspect of language skills (Alderson 1980:60).

Another type of modified cloze that limits the choice of answers in completing the random cloze or rational cloze is accomplished by providing four possible responses (one correct response, that is, the key and three distractors for each blank). This cloze procedure is known as the M-C cloze (that is, multiple-choice cloze). It was first introduced when an open-ended cloze procedure was modified by item-analytical and error-analytical techniques (Jonz 1976:255) in order to generate the multiple-choices. With the M-C cloze, respondents are presented with a limited range of choices with which to compare the responses they themselves generate (ibid: 256). Hence M-C cloze procedure is applicable to both systems of cloze but narrows the respondents' focus to a selection of multiple-choice solutions. Incidentally it also introduces a new degree of objectivity in scoring (ibid: 257). In the current study, the open-ended cloze is termed as "cloze without options" while the M-C cloze is known as "cloze with options". Options refer to the multiple-choice solutions provided.

Besides this dichotomous classification of the cloze procedure based on deletion systems, there are other variations, such as, cloze-elide technique (Manning 1986 cited in Fotos 1991:315) and the c-test. The former technique involves inserting incorrect words into a text and the task is to identify these words. The latter procedure involves deleting the last part of every second word beginning from the second sentence.

The choice of cloze procedure plays an important role in determining the characteristics and functions of the cloze designed. In fact the effectiveness in achieving the purpose of the cloze is fine-tuned by the cloze design. Since the focus of the study is to compare two cloze procedures, namely, rational cloze with options (that is, multiple-choice cloze), and rational cloze without options (that is, open-ended cloze), the discussion on the characteristics and functions of cloze will be confined to these two cloze procedures.

#### **2.3.1.1 Rational cloze without options**

The rational cloze without options differs from the strict random cloze in only one aspect, that is, the deletion of words from the text. In rational cloze there is “control over the types of words deleted, and thus the language traits measured” (Chapelle & Abraham 1990:122). Since items are not the root of cloze performance, this explicit selection of words to be deleted is considered as an advantage over the random cloze procedure. Furthermore, research has shown that the rational cloze procedure produced a significantly more reliable test as compared to the random cloze procedure (Salup 1974:16).

Depending on the purpose of the cloze design, the deletion can be based on the linguistic (for example, grammar and vocabulary) and discourse structures (for

example, cohesion and coherence) of the language. At the linguistic structural level, the deletion of certain grammatical categories identified on a non-random basis renders the function of the cloze produced as a diagnostic device. In this unique linguistic setting of a text, the "discrete point" approach is combined with the "integrative" approach whereby the textual environment provides additional cues to the respondent. This advantage is also applicable when selected content words are deleted from the text and the respondent is required to replace the semantic networks established by grammatical and cohesion with the text (Carter 1988:162). At the discourse level, studies conducted by Bachman (1982 & 1985) have been supportive of the claim that cloze test can be used to measure higher order skills, such as, cohesion and coherence (that is, textual relationships beyond clause boundaries) if a rational deletion procedure is followed (Bachman 1982:66). This can be achieved by rationally selecting three types of deletions: 1) syntactic deletions, which depend only on clause-level context, 2) cohesive deletions, which depend upon the interclausal or intersentential cohesive context, and 3) strategic deletions, which depended on parallel patterns of coherence (ibid:63).

One drawback in rational cloze design is that the deleted words may cease to yield a representative, objective sample of all possible words in the text (Markham 1988:47). Furthermore, should all the function words be omitted from the text, it will be substantially more difficult to complete (ibid). These two setbacks can be overcome by deleting more than one type of word classes within the text so that a balanced representative of the words in the text can be obtained. For example, the deletions can be content words (for example, nouns, verbs, modifiers) and function words (for example, prepositions, noun determiners, pronouns, and discourse markers). Hence with the prerogative of greater precision in fixing the types of items, it is important to

make sure that they focus on the different levels of text information processing as required (Black 1993:421), such as, from discrete grammatical point to collocations and phrases until the macro-level of the text. Items should be fine-tuned to ensure that they involve higher-order processing strategies (Storey 1997:215). For example, items that function at least at the sentence level or above, and those which require the recognition of cohesive relations and textual patterning should be selected (ibid: 216). Hence, the rational cloze can be designed to measure a range of integrative language abilities or skills from basic to advanced.

There are two more aspects pertaining to rational cloze that need to be addressed, namely, reliability and validity. In a study that compared the performance on cloze tests with fixed-ratio (that is, random) and rational deletions, it was found that both tests were equally reliable and had equal validity (Bachman 1985:535). However research has also provided evidence that both content validity and the equivalence of items across different cloze procedures appear to be better handled by the rational deletion procedure (Bachman 1982, 1985; MacLean 1984 cited in Fotos 1991:317). Furthermore studies on cloze test criterion-related validity and its two components, concurrent validity and predictive validity of different rational and random deletion cloze procedures have found strong positive results when the respective results were correlated with standardised proficiency tests administered at the same time (Bachman 1982; Brown 1983, 1988, 1989 cited in Fotos 1991:317). Hence the balance of evidence favours a positive view of the cloze procedure which can be an effective testing instrument (Fotos 1991:313).



### **2.3.1.2 Rational cloze with options**

The rational cloze with options is constructed by altering the mode of expected response with the provision of options consisting of one key (the originally deleted word) and three distractors for each word deleted. The selection of the distractors is such that they conform to the range level of the deletion and the difficulty level of the text and usually fine semantic distinctions are avoided (Mauranen 1988:340-41 cited in Storey 1997:216). On the other hand if the intention is for respondents to distinguish the appropriateness or the register of lexis, the distractors vary according to the degree of being how “general, intensive, emotive, professional, literary, colloquial, or dialectal” (Carter & McCarthy 1988:28). Distractors can also be designed to play a “similar function” in the text, or logical cohesive function played by the correct option” (Storey 1997:225).

The earlier versions of the multiple-choice cloze combined the random cloze and the multiple-choice test (Gallant 1965, Green 1965, Cranney 1968, Kinston & Weaver 1970, Balyeat & Norman 1975, all cited in Jonz 1976:257). With the advent of the rational cloze, the multiple-choice procedure found another partnership resulting in rational cloze with options. consequently it shares similar virtues of the rational cloze, except that it possesses the drawbacks and virtues of the multiple-choice test. Firstly, it requires a considerable amount of effort in constructing a valid and reliable cloze with options, particularly in devising a multiple-choice test, under any conditions, is limited by the test writer’s ability to create highly plausible but yet decisively false distractors (Markham 1987:309 & 310). This is crucial because the smart respondent may find the correct answer based on perceiving a pattern or a certain flaw in the options instead of comprehending the text.

Precaution should also be taken to avoid providing distractors that would produce some very peculiar English when inserted into the sentence (Klein-Braley 1997:61). However the difficulty in construction is compensated by the ease and objectivity in marking. Secondly, the respondent may become confused by the alternatives presented and would result in selecting the inappropriate response (Markham 1987:310). This problem occurs because the key must not be too obvious, otherwise the respondent will obtain the correct answer regardless of the level of understanding (ibid). On the other hand, the options would serve as a lead to the correct response as the respondent might not have been able to give the answer if the suggestions had not been made (Porter 1976:153 & 154). Hence with the available options, the task is less intimidating than the free response rational cloze as it does not necessitate language production. Thirdly, this cloze procedure emphasises on the selection of the correct respond instead of generating it. This gives rise to the opportunity of guessing what the answer is. Therefore the correct response may not always be the result of comprehension. However a similar occurrence may also be true of the rational cloze without options. The respondent can resort to guessing when unsure of what the deleted word is. Nevertheless, there is a possibility that the respondent may recognise the appropriate word upon sighting it and such recognition still depends on the respondent having understood the text (Porter 1976:153 & 154). With the awareness of these shortcomings, the necessary precautions must be taken to minimise them when devising the rational cloze with options.

From a more positive perspective, research on the correlation of the multiple-choice cloze with other forms of tests has yielded evidence to support that this cloze procedure is as adequate as other means of testing. For instance, substantial correlation was found between the multiple-choice cloze and the sub-tests of the placement examination at a

large university in the eastern United States (Jonz 1976:255). In another study, the multiple-choice cloze with a correlation of 0.82 with five other tests (that is, an open ended cloze, two listening tests, a reading test and a structure test) could be considered a good predictor of the tests (Ilyin, Spurling, & Seymour 1987:154). Furthermore, in examining the multiple-choice cloze in relation to subsections of the TOEFL, it was found that "the relatively high correlation between total multiple-choice cloze score and total TOEFL score attests to the concurrent validity of the method" (Hale et al. 1989:65). This implies that "the multiple-choice cloze procedure appears to provide assessment that is as reliable as the TOEFL" (ibid). On the whole these results reveal substantial reliability and validity for the multiple-choice cloze procedure. However these two studies utilised the random deletion and not the rational deletion as in the present study. Nevertheless these positive findings have been highlighted as there is scarcity of research literature regarding rational cloze with options. In addition, as it has been established earlier, the correlation between the random cloze performance and that of the rational cloze is substantially high, the findings discussed may reflect the performance of the rational cloze with options to a significant extent.

### **2.3.1.3 Relationship between rational cloze with options and without options**

Studies have revealed that there is substantial correlation (ranging from .70 to .89) between these two cloze procedures (Pike 1973, Wijnstra & van Wageningen 1974, Cranney 1973 cited in Jonz 1976:257 & 263; Pike 1979 cited in Hale et al. 1989:49; Ilyin, Spurling & Seymour 1987). These studies suggest a similarity in the aspects of language proficiency measured by these two cloze procedures. It does not necessary indicate that these procedures tap similar mental processes. A lower-than-expected correlation of .54 between cloze with options and cloze without options (using exact word scoring for the latter) and .59 using acceptable word scoring (Hinofotis and Snow

1978 cited in Hale et al. 1989:49). This has been attributed to a smaller number of subjects leading to lower reliability or restricted variance (Hale et al. 1989:49). Another study also reported a lower-than-expected correlation (.43) between these two procedures (Bensoussan & Ramraz 1984 cited in Chapelle & Abraham 1990). However it is difficult to interpret the strength of that relationship due to the lack of reliabilities estimated for that sample (Chapelle & Abraham 1990:125). On the other hand these lower-than-expected correlations may provide an insight into other aspects of language processing that await illumination.

Comparative studies aside, findings from a study on the correlation of both cloze procedures with other test types, revealed that the multiple-choice cloze had higher correlation (0.64-0.81) than the open cloze (0.58-0.72), and the former also did significantly better in predicting two other batteries (Listening and structure: 0.82; Listening and reading: 0.82) than the open cloze (Listening: 0.74; Listening and reading: 0.73) (Ilyin, Spurling & Seymour 1987:154). These results show that the cloze with options is capable of a higher performing than the cloze without options.

There are two observable differences between these two cloze procedures. Firstly, in the absence of distinctive possible answers to be selected, text dependency is enhanced as no other information is available as in the case of the cloze without options. consequently this cloze procedure require greater reading comprehension skills than the cloze with options. Secondly, cloze without options requires self-generated answers instead of mere selection. This may imply that the language processing strategies involved in completing the two cloze procedures could be different. It is the main aim of the study to investigate if such a difference exists and what it may consist of.

In completing rational cloze with options, the respondent is not required to construct an answer to fill in a blank but select the response that best fills each blank from among several alternatives provided. This results in a purer, non-productive means of focusing only on the recognition and decoding (that is, the receptive skills) of reading (Sim & Bensoussau 1979:37 & Storey 1997:216). Thus cloze with options has been hypothesised to correlate strongly with reading tests as it is suggested that this manner of cloze is similar to tests of reading comprehension, requiring selected rather than constructed responses (Porter 1976 & Ozete 1977 cited in Chapelle & Abraham 1990:126). However research results appear to relate multiple-choice cloze performance to tests of written competence followed by structural or grammatical competence more clearly than has research on the fill-in cloze (that is, cloze without options) (ibid). On the other hand, results in a study conducted by Chapelle and Abraham (1990) on how variations in the cloze procedure affect measurement, revealed that rational cloze with options related strongly to the reading test, but not to the other language tests, including the vocabulary test (ibid: 140). This rather illusive nature of the rational cloze with options requires further research. Hence it is the aim of the current research to attempt a different approach via the analysis of think-aloud protocols in order to identify whether integrative or generative strategies are used to complete the rational cloze with options. The types of strategies identified would serve as an indication of the type of language processing involved.

### **2.3.2 Reading Process And Strategies**

Basically "reading is the process of understanding written language" (Rumelhart 1994:864). More specific views on reading are generally associated with respective models and theories of reading. For instance, the interactive model of reading considers reading as an interactive process whereas the cognitive model conceptualizes it as a

cognitive process. The following is a critical analysis of several views on the reading process and an attempt to apprehend what the reading process entails in a holistic manner.

Firstly, reading is generally recognised as a constructive process as illustrated in the following definition:

Reading is indeed a meaning-construction process  
that enables us to create carefully reasoned as well  
as imaginary worlds filled with new concepts, creatures,  
and characters.  
(Ruddell & Unrau 1994:1996)

Closely related to the construction of meaning in reading is the reconstruction of the "message which has been encoded by a writer as a graphic display" (Goodman 1973:22), that is, the reader must reconstruct the meaning of what is being read (Goodman 1967:130 & 131). Whether it is constructing or reconstructing meaning, it is proposed that "deriving" meaning from the text would be a more accurate description of the reading process. The reader is required to obtain or develop meaning from the text, that is, the written form of the language, which comprises the writer's message. This implies that the meaning has been constructed by the writer. If the reader constructs or reconstructs the meaning of the text, an inaccurate or a deviant meaning may result due to misinterpretation or failure to comprehend. Therefore the reader is encouraged to objectively derive meaning from the written code that approximates as precisely as possible to the writer's original meaning.

Secondly, the nature of reading is viewed as "a cognitive activity to be described by component processes in interaction" (Perfetti & Curtis 1986:14). These processes are classified as "lexical access" and "comprehension". Lexical access can be defined as "an interacting process in which letters, phonemes, and words are represented as

interacting levels of information" that results in word recognition without necessarily involving meaning or pronunciation. Comprehension can be understood as a complex of overlapping processes, beginning with "semantic encoding of words" (that is, "the activation of a word's meaning attributes as a consequence of lexical access") and "assembly and integration of propositions" (that is, "the elementary meaning unit of a text" whose "essential property is predication"); "activation of schemata" ("the organized knowledge a reader has about concepts, word meanings, and everyday events and actions"); and "inference making" (ibid:14 & 33). In other words, "reading involves word identification and comprehension" (Smith & Barrett 1974). Hence, reading as a meaning-seeking process is more complex than decoding, that is, "the process of converting a printed language form into a speech form" (Perfetti & Curtis 1986:15). Reading should entail comprehension because failure to understand what one is reading becomes a futile and meaningless activity that does not benefit the reader. This "perceptual and cognitive process" of reading also involves "the interaction of various sources of information" (such as "sensory, syntactic, semantic, and pragmatic information") "in many complex ways" (Rumelhart 1994:864).

Thirdly, reading is not merely an active process of extracting meaning from the printed page. It is also interactive in another sense. The reader interacts with the text by responding affectively and assessing the "explicit assertions" in the text and "logical implications about these assertions" based on the reader's point of view (Swaffar 1988:2). In other words, the reader's perspectives and schema will influence how the individual concerned comprehends the text (ibid). Although the meaning of a text is inherent in the print, and invited by the author, the meaning derived is still imputed to the text from the reader's perspective. As such objective agreement about textual content and meaning is, therefore, necessarily limited to explicit statements and the

reasonable inferences made about any text (Adams 1982 cited in Swaffar 1988:2).

To summarize the views discussed up to this point, reading can be considered as deriving meaning from a written text. It is a perceptual and cognitive process that involves lexical access and comprehension. It is also an active and interactive process that works with knowledge of language, discourse, topic, and the world (Grabe 1999:1) as well as reader variables, such as, affective factors.

In addition the reader quite frequently engages in activities that involves interaction between thought and language (Smith & Barrett, 1974:98 & 99). These activities include predicting, evaluating, analysing, and synthesizing. All these require higher cognitive skills than mere comprehension. As such they can be considered as advanced reading skills. Hence, it would be inappropriate to include them when defining the word reading. Nevertheless, they can be used to describe reading comprehension and what it entails. Fluent reading comprehension is defined as a rapid, purposeful, strategic, flexible, comprehending, learning and an efficient, interactive, and evaluating process (Grabe 1999:1). The fluent reading comprehension process begins with "very rapid and automatic of letter and word forms" which results in "rapid and automatic word recognition (lexical access)". This leads to "efficient computation and storage from multiple simultaneous operations in working memory" and "rapid mental parsing of grammar structure and creation of clausal meaning". Then two types of models would be created. Firstly, the 'text model' of comprehension is created by "hooking most recent clausal-meaning unit into the growing network of main ideas of the text being read". Secondly, the 'situation model' of reading comprehension emerges with the combination of text information and appropriate background knowledge. The process also includes "a number of types of inferencing, depending on the type of text



being read" (ibid:1). Similarly the Barrett taxonomy (cited in Clymer 1972:56-60) on "cognitive and affective dimensions of reading comprehension" begins with "literal comprehension" which includes recognition and recall of ideas and information that are explicitly stated in the text, such as, details, main ideas, a sequence, comparison, cause and effect relationships and character traits. This is followed by "reorganization" that involves analysis, synthesis or organization of ideas or information explicitly stated in the text. Thirdly, "inferential comprehension" is demonstrated by the combination of the explicit ideas and information in the text with the reader's intuition, and personal experience or knowledge as a basis for conjectures and hypotheses. Fourthly, "evaluation deals with judgement and focuses on qualities of accuracy, acceptability, desirability, worth, or probability of occurrence". Lastly, reading comprehension may also involve "emotional response to the content". In other words, "it is concerned with the emotional impact of the total work on the reader" (ibid).

From the discussion on what reading and reading comprehension entail, it seems possible to distinguish the two. From the perspective of this bottom-up approach, reading starts from the decoding stage and terminates when comprehension is achieved, that is, "reading the lines" (Strang 1972a:75). On the other hand, reading comprehension commences from the comprehension phase and advances to higher cognitive skills such as reorganization (analysing and synthesizing), inferencing, predicting, and evaluating, that is, "reading between the lines" and "reading beyond the lines" (Strang 1972a:75). There seems to be an overlapping area between reading and reading comprehension, that is, the comprehension phase. The reader can proceed back and forth from reading to reading comprehension domains while reading the same text depending on a variety of factors, such as, language proficiency, maturity in thinking, schema of the reader as well as the reading purpose or task requirement, and familiarity

of the text in terms of topic, genre, content, lexis and syntax. For simplicity, the word 'reading' in the study encompasses both domains of reading and reading comprehension.

Reading is a composite of mentalistic processes, aided by appropriate use of strategies. It may be assumed that similar mental processes and majority of the strategies can be applied for reading in both native and second language. Reading strategies consist of "mental processes that readers consciously choose to use in accomplishing reading tasks" (Cohen 1990:83). Perhaps it can be suggested that strategies are incorporated in processes. For instance, inferencing strategies are employed to enhance the inferencing process and evaluation strategies for the evaluation process. Various research has been conducted which attempt to identify diverse strategies employed by readers in their native language or second language. For example, Sarig (1985 cited in Cohen 1990:91 & 165) identified 126 strategies utilised by a group of ten high school students in reading Hebrew as a native language and English as a foreign language.

### **2.3.2.1 Classifying reading strategies**

A conglomeration of terms has been used to classify reading strategies. At times, even similar strategies are also given different labels by individual researchers. Dichotomous classifications (as cited in Barnett 1988:150) include the following:

- 1) Deep and surface strategies (Kirby 1988:259)
- 2) Text-level and word-level strategies (Barnett 1988:150)
- 3) General comprehension and local linguistic strategies (Block 1992)
- 4) Global and local strategies (Barnard 1980)
- 5) Main meaning line-and word-solving strategies (Hosenfeld 1977)
- 6) Clause-related and word-related strategies (Olshavsky 1976-77)

## 7) Text processing and word processing strategies (Fisher and Smith 1977)

With reference to the first set of dichotomous classification, deep strategies enable the reader to "attain deeper levels of interpretation" of the text whereas surface strategies assist in processing meaning at the micropropositional level, that is, the surface level of the text (Kirby 1988:259). The remaining binary divisions bear significant similarities that they may be considered as parallel classifications (Barnett 1988:150). The preceding part of the dichotomy (for example, text-level strategies) refers to strategies related to the reading passage as a whole or to large parts of the passage (that is, at a macro-level of the text). They include considering background knowledge, predicting, using titles and illustrations to understand, reading with a purpose, skimming, and scanning (Barnett 1988:150) as well as text gist, and textual organization (Carrell 1989:126). The latter half (such as, word-level strategies) involves strategies such as guessing word meanings by using context, identifying the grammatical category of words, following reference words and recognizing meanings through word families and formation (ibid).

Besides these dichotomous classifications, reading strategies are also classified according to the types of functions they perform. For instance, the 126 strategies identified by Sarig were organized into four types, namely: technical-aid moves; clarification and simplification moves; coherence-detecting moves; and monitoring moves (Sarig 1985, 1987, 1990 cited in Cohen 1990:165). They were later referred to in more lay terms, such as, support strategies, paraphrase strategies, strategies for establishing coherence in text, and strategies for supervising strategy use respectively (Cohen 1990:165). The contents of each category are illustrated below:

1. *Support strategies*: Types of reading acts undertaken to facilitate high-level strategies. For example, skimming, scanning, skipping, marking the text, and using

a glossary.

2. *Paraphrase strategies*: Decoding strategies to clarify meaning by simplifying syntax, finding synonyms for words and phrases, looking for propositions or basic ideas, and identifying the function of portions of the text.
3. *Strategies for establishing coherence in text*: The use of world knowledge or clues in the text, intelligible as a piece of connected discourse. For example, looking for organization, using context, and distinguishing the discourse functions in the text (such as introduction, definition, exemplification, and conclusion).
4. *Strategies for supervising strategy use*: Conscious strategy for checking on the reading process as it takes place. For example, planning, ongoing self-evaluation, changing the planning and executing of tasks, identifying misunderstandings, and remediating when reading problems are found.

(Cohen 1990:165)

The following four types of strategy categories were adapted by Anderson (1991:463):

### **I. Supervising strategies**

The reader:

1. Refers to the experimental task
2. Recognizes loss of concentration
3. States failure in understanding a portion of the text
4. States success in understanding a portion of the text
5. Adjusts reading rate in order to increase comprehension
6. Formulates a question
7. Makes a prediction about the meaning of a word or about text content
8. Refers to lexical items that impede comprehension
9. Confirms/disconfirms an inference
10. Refers to the previous passage
11. Responds affectively to text content

### **II. Support strategies**

The reader:

1. Skips unknown words
2. Expresses a need for a dictionary
3. Skims reading material for a general understanding
4. Scans reading material for a specific word or phrase
5. Visualizes

### **III. Paraphrase strategies**

The reader:

1. Uses cognates between L1 and L2 to comprehend
2. Breaks lexical items into parts
3. Paraphrases
4. Translates a word or a phrase into the L1
5. Extrapolates from information presented in the text
6. Speculates beyond the information presented in the text

### **IV. Strategies for establishing coherence in text.**

The reader:

1. Rereads
2. Uses context clues to interpret a word or phrase
3. Reacts to author's style or text's surface structure
4. Reads ahead
5. Uses background knowledge
6. Acknowledges lack of background knowledge
7. Relates the stimulus sentence to personal experiences

### **V. Test-taking strategies.**

The reader:

1. Guesses without any particular consideration
  2. Looks for the answer in chronological order in the passage
  3. Selects an answer not because it is thought to be correct, but because the others do not seem reasonable, similar, or are not understandable
  4. Selects an alternative through deductive reasoning
  5. Matches the stem and/or alternatives to a previous portion of the text
  6. Selects a response because it is stated in the text
  7. Selects a response based on understanding the material read
  8. Makes reference about time allocation
  9. Reads the questions and options after reading the passage
  10. Reads the question and options before reading the passage
  11. Changes an answer after having marked one
  12. Receives clues from answering one question that are helpful in answering another
  13. Stops reading the options when they reach the answer
  14. Expresses uncertainty at correctness of an answer chosen
  15. Skips a question and returns to it later
  16. Skips a question that is not understood and leaves the response blank
  17. Marks answers without reading in order to fill the space
  18. Recognizes during the think-aloud protocol that an answer marked is incorrect.
- (Anderson 1991:463)

#### **2.3.2.2 The relationship between reading and cloze**

Since the essence of the cloze procedure is the embedding of cloze items in meaningful and coherent textual contexts (Chavez-Oller et al. 1985:187), reading ability becomes an integral prerequisite in cloze completion. Reading comprehension skills (for example,

searching for contextual clues) are employed in predicting the omitted words.

However there are research findings that are contrary to the underlying assumption of this statement. Results from research conducted by Alderson (1983) appear to lend support to the thesis that the random cloze is essentially "sentence-bound" or indeed "clause-bound" (that is, "the cloze is largely confined to the immediate environment of a blank") and thus suggesting that cloze completion involves much lower-order reading skills. On the other hand, "the rational selection of deletions, based upon a theory of the nature of language and language processing" can enhance the sensitivity of this procedure in relation to "long-range contextual constraint" (that is, beyond the sentence boundaries) (Alderson 1983:211). This is due to the fact that deleted items can be selected primarily for their "cohesive or situational connections" beyond the immediate sentences in which they appear (Meyer & Tetrault 1986:414). It is with such contextual focus that the cloze respondent can proceed from word-processing to text-processing. Findings have revealed that some cloze items are certainly sensitive to constraints ranging beyond sentence boundaries (Chavez-Oller et al. 1985:201). evidently there are similarities between reading and cloze. However differences do exist as well.

#### 2.3.2.2 (a) Similarities

Firstly, cloze completion commensurates with the view that "reading is an interactive process between author and reader" (De Santi et al. 1986:vii). This interaction of the communication is assumed to occur when the respondent fills in the deletions in the author's message (ibid: 1). Secondly, total comprehension when reading encompasses the understanding of lexical items and the grammatical items obtained between the structure and the lexis (Porter 1976:152). Likewise the integrated cloze completion that requires "efficient clue-gathering" from the context also draws on all of these (ibid).

Thirdly, similar strategies may be applied for guessing “the total or partial meaning of the unknown word” or “words in context”, such as, examining the first sentence and using the last sentence of text, intersentence meanings, and intrasentence meanings (Ashby-Davis 1985:588). In fact the cloze procedure has become a research instrument in the area of reading as it provides a means of “examining comprehension during silent reading” (Goodman 1994:1118).

#### 2.3.2.2 (b) Differences

However there are conflicting views on the issue of utilising a cloze text, especially cloze without options, as a test of reading comprehension or an investigation of the reading process. This is because cloze distorts the text to be read to some extent (Goodman 1994:1118), that is, the unknown words are present in ordinary reading but not in a cloze text whereby they are deleted. Hence this suggests that the cloze completion involves more than reading comprehension. It encompasses a set of thinking processes (such as, problem solving) related to reading and language production in the written mode. In order to produce the missing word, the respondent employs recall from long-term memory (Ashby-Davis 1985:588). If more than one synonym exists in the long-term memory, the respondent must try to “match the words with the overall meaning, intrasentence or intersentence meanings, style, language level, rhetorical conventions, literary conventions, story schema, logic, purpose, tone, etc., of the cloze author” (ibid). These differences become critical, particularly in the case of the cloze completion that is without options when the respondent ceases acting as a reader and instead becomes a composer. At this juncture the respondent is performing the additional task of an encoder and not merely a decoder. Thus while reading comprehension can be partial goal of the cloze respondent, the actual goal is “accuracy of encoding, or the action of composing” (ibid: 589). This would imply that

the cloze without options requires both reading and composing skills. The respondent could have understood the message in the text and may have the answer in another language. However he or she may not be able to produce an appropriate word in the second language due to deficient proficiency level. This has to be taken into consideration when investigating the language skills and components measured using the cloze without options. The findings would most probably point towards a general proficiency of the second language rather than specific language skills like reading or writing per se. This is due to the fact that in comprehending a text, information in the form of cues must be taken from the three levels of language described by Halliday (1975 cited in Goodman 1994:1119), namely, orthography (the graphophonic system of the language); syntax (the lexico-grammatical/structural system); and concepts (the semantic-pragmatic system). In other words, "the schemata for orthography, syntax, and concepts presupposed by the writer" must be available in order to "select, use, and supply the cues appropriate to a particular text (ibid). These language cue systems are selected interchangeably and their use is simultaneous and integrated (ibid). Secondly, writing is reduced to the minimum as the respondent is only required to produce single-word answers which could hardly be considered as an act of composing. On the other hand, the test of writing skills can be enhanced by deleting certain phrases, clauses or even whole paragraphs.

In the case of rational cloze with options, the respondent utilises "recognition memory skills" in guessing the meaning of each alternative provided. Similar to the cloze without options, the choice of words to fill the blank requires the respondent to search for contextual clues and to consider the overall meaning of the message decoded. Ordinary readers do not use these skills.



In the light of the existence of differences between reading and cloze completion, it is rational to conclude that the task of cloze completion certainly involves more than reading comprehension.

### **2.3.3 Problem Solving Process And Strategies**

From the cognitive psychology perspective, theoretical knowledge of problem solving is closely associated with information processing framework which was initially developed by Newell and Simon 1972 (Polson and Jeffries 1985:418-425). This is because “the human problem solver can be characterized as an information-processing system” and “problem solving can be characterized as both a search process and a process of understanding” which interact intimately (ibid). In the light of this information-processing paradigm, problem solving is perceived as the interaction between the problem solver and the task environment. This interaction consists of two separable sets of processes as mentioned.

The first set of processes is a collection of understanding processes that generates a “problem space”. The problem space is the “solver’s representation of the task” and this representation is “constructed” by the understanding processes. These processes make use of both “general comprehension mechanisms” and the solver’s “knowledge of the specific domain”. For efficient solution, the representation of the problem must “correctly describe the actual underlying structure of the task;” “be coherent” and “well integrated with the remainder of the solver’s world knowledge” (Greeno 1977 cited in Polson & Jeffries 1985:423). Research in understanding of texts and computer programs that have contributed to the knowledge of language understanding have also influenced the analysis and study of understanding processes in problem solving (Polson & Jeffries 1985:421). In fact current theories of the psychological processes

involved in language comprehension has provided a useful framework for examining similar processes utilised in problem solving (ibid). One such example is the general theoretical structure proposed by Kintsch and van Dijk 1978, with extensions of this framework by Miller and Kintsch 1980 (cited in Polson & Jeffries 1985:421 & 422). The Kintsch and van Dijk framework assumes that there are three main elements of the comprehension process, namely, the control schema, comprehension processes and text structure. The control schema is a collection of high-level domain-specific knowledge structures that coordinates problem-solving mechanisms, that is, the knowledge structures possessed by the reader or the solver. The second component consists of a generalized set of comprehension processes which control the parsing of the input into a low-level semantic representation and the subsequent integration of this information into an organized, coherent memory structure representing the comprehender's understanding of the input. This integration involves organizing or incorporating the atomic elements of the semantic representation into higher level knowledge structure. If this structure does not exist, semantic units can be organized on the basis of their internal structure or text structure which is the third component. Thus text comprehension involves the interaction of these three elements, that is, text structure, the reading strategies used by the reader, and the knowledge structures possessed. In other words, the comprehensibility of a text is not an inherent property of the text itself.

The second set of processes, the search processes, can be characterised as "transitions between knowledge states" (factual and procedural) in the problem space constructed. Search processes can result in the discovery of important new information about a problem. This in turn alters the solver's understanding of the problem and leads to restructuring of the problem space. Hence, search and understanding processes alternate in complex ways in efforts to solve the problem. Two common search strategies are

“generate and test”, and “means-ends analysis”. The first strategy involves generating solutions one at a time and evaluating each solution for its acceptability. The sophistication of this strategy ranges from a “trial-and-error fashion” (Restle 1970 cited in Polson and Jeffries 1985:420) to a “complex process that enumerates all possible solutions’ of carrying out the task successfully. The second strategy has a more global perspective as it guides search by the isolation of certain goals to be achieved (ends) followed by the selection of the best methods (means) to achieve the specified goal. The notion of search is further extended to include the concept of “search for information” as well as “direct search to reach a well-specified goal (Heller & Greeno 1979; Simon 1978 cited in Polson & Jeffries 1985:421).

Since then the phenomena of problem solving has become the focus of research and discussion in cognitive psychology with particular reference to information processing (Caroll 1986:102). From this perspective, problem solving encompasses the entire set of processes by which needs are felt, goals are set, tasks defined, options searched for, decisions made, and solutions evaluated” (Martin (n.d.) cited in Miles 1985:486). Models of problem solving account for how the working memory is utilised to “perceive a problem and its elements” as well as “how it draws on the long-term memory store” in order to “combine, transform, and supplement problem elements to arrive at a solution that may be either acceptable or unacceptable according to a given criterion” (Carroll 1986:103). It has been observed by Gestaltist researchers that the process of problem solving occurs in a discontinuous fashion consisting of “a number of false starts and blind alleys” until “a moment of insight” surfaces with the emergence of the solution (McDonough 1981:26). The terms ‘recentring’ or ‘cognitive restructuring’ are coined by the Gestaltists to describe this ‘aha’ experience which involves a ‘translation’ or ‘transformation’ of the original view of the situation into a

new one (ibid). Although the terms differ, this concept of the problem-solving process is similar to the former concept of generating a representation of the problem whereby search strategies modify or transform and improve the representation. As a result, an accurate understanding of the problem is achieved which may or may not lead to the appropriate solution. Feedback and observation from Whimbey and Lochhead's (1980) short course in "Problem solving and comprehension" (cited in Bransford et al. 1985:140) revealed several possible reasons for problem-solving failure. Firstly, it may be due to a non-systematic approach with leaps in logic or jumping to conclusions without checking them. Secondly, the inability to observe and utilise all the relevant facts of a problem or identify relationships fully could attribute to this failure. Other factors include inaccuracy in collecting information and carrying out mental activities such as reading, thinking, and problem analysis (ibid).

In order to overcome these shortcomings in problem solving, various strategies are employed. For instance, general techniques involving both understanding and search utilise "search" to construct an adequate "understanding" of the problem to be solved (Polson & Jeffries 1985:423). They can be conceived as "forms of planning", where the search is through a space of possible solution plans. The solver's understanding of the task is represented by the resulting plan. To implement this plan, a variety of search strategies can be carried out, namely, "planning by abstraction" and "decomposition" (Heller & Greeno 1979; Polya 1957; Simon 1973 cited in Polson & Jeffries 1985:423). The former strategy requires the solver to generate and solve a "simplified version" of the problem, that is, an abstract representation with certain details omitted). This simplified version is then solved by suitable specialised techniques or by a general technique such as means-ends analysis. The solution is utilised as a plan for solving the

original problem. The latter is a problem-solving strategy in which the problem is reduced to a collection of simpler sub-problems (ibid).

Problem-solving strategies can be categorised as “algorithms” and “heuristics” (Klien 1996:381). An algorithm is a precise set of rules to solve a particular type of problem (ibid: 372). A heuristic is a “best guess” or “rule of thumb” solution to a problem (ibid: 373). Some heuristics are “systematic problem-solving methods”. These are “working-backward strategy” which begins at the end point and works back to the starting point, and “means-end strategy” which breaks the problem down into a series of subproblems. Other heuristics are “cognitive shortcuts” which are usually effective but can lead to extreme errors (ibid: 381). These include “representativeness” and “availability”. Representativeness is a strategy that makes judgements or finds a solution based on the obvious facts stated or characteristics of the problem (ibid: 374). “Availability” is selecting solutions based only on information that can be readily brought to mind (Levi & Pryor 1987 cited in Klein 1996:376).

Besides these general strategies, problem solving strategies can be quite task-specific. For example, problems may be encountered when decoding input or message before rendering it into comprehensible intake, that is, when attempting to derive meaning from the message. Research shows that “skilled reading” by experts in their respective fields “shares many similarities with problem solving by these domain experts” (Pressley & McCormick 1995:351). This would imply that “abstracting meaning from complicated text is a form of problem solving” (ibid). Readers can be expected to encounter some form of difficulties when reading authentic or unadapted text in the second language, such as, failure to comprehend the text as a result of unfamiliar language and cultural references (Block 1992:320). Overcoming these difficulties is a

specific instance of problem solving. Both involving “strategies, metacognition, knowledge, motivation, capacity, and constructive social interactions” (Presley & McCormick 1995:377). To solve problems of such nature, problem-solving strategies that are similar to reading strategies are employed to access meaning. These problem-solving strategies specific to reading include “guessing word meanings from context and evaluating those guesses, recognising cognates and word families, skimming, scanning, reading for meaning, predicting, activating general knowledge, making inferences, following references, and separating main ideas from supporting details” (Barnett 1988:150). Readers are able to read effectively upon developing strategies that are exceptionally well matched to the particular demands of reading (ibid). These strategies are also particularly effective in solving a cloze text.

#### **2.3.4 Language Production Process And Strategies**

From the cognitive theory perspective, language generation or production is viewed as “an active and meaning-based process that applies to both speaking and writing” (O’Malley & Chamot 1990:42). The initial stage of language production involves the formation of thoughts that the language user wishes to express. In a transformational view, “a deep language structure” is created to represent the meaning of the message (Goodman 1973a:23). Then by applying a set of compulsory and optional transformational rules, a surface structure is generated in the oral or written mode (ibid).

Language production at the word level requires careful, detailed lexical knowledge which includes register, collocations, derivations, denotations, connotations and syntactic constraints (Crow 1986:242 & 243). Further elaboration for each type of lexical knowledge is as follows:

Register: Appropriate words, phrases, and grammatical constructions for various social situations

e.g. formal or informal context as well as the social distance.

Collocations: Well-defined co-occurrence restrictions on words

e.g. "commit a crime" is the usual phrase instead of "do a crime".

Derivations: Change of the word form according to word class

e.g. from a verb to a noun or an adverb to an adjective in relation to the syntactic environment.

Denotations: Web of associations inherent in each word

e.g. correct use of "assassinate" or "massacre" instead of "kill".

Connotations: Positive or negative meaning assigned to words by the speech community

e.g. "spinster" carries quite a negative connotation whereas "single" is more likely to carry a positive connotation.

Syntactic constraints: Knowledge of the proper syntactic environment for a word

e.g. "want" requires the infinitive "to", that is, "want" is marked with "to"

The above list is certainly not exhaustive as the body of information that is necessary for productive control of vocabulary items is vast (ibid). To optimize production, it is pertinent to possess an accurately programmed lexical associations before lexical choices can be made to faithfully reflect intended meaning (Channell 1988:90).

Language production at the sentence level is conceived as creating a grammatical frame for an intended meaning (Fay and Cutler 1977 cited in Channell 1988:85). This frame is marked with the syntactic categories of words found in the mental lexicon. Appropriate words are then selected on the basis of the meaning to be conveyed and placed in the grammatical frame for processing prior to production.

The process of language production may be represented by a three-stage model proposed by Clark and Clark (1977 cited in O'Malley & Chamot 1990:41). Firstly, the planning stage consists of establishing a communicative goal and developing plans at the discourse, sentence, and constituent levels. Secondly, the articulation of the

language components according to the plan takes the form of meaning selection for each constituent, specification of its basic syntactic structure, content selection prior to function words and affixes, and finally the identification of the phonetic realisation of the constituent to be communicated. At this junction, the third stage, that is, the "motor program", or physical production of the utterance, occurs. The individual moves back and forth between planning what to say and articulating how to say it. Hence the first two stages, also known as "construction" and "transformation" respectively, are recursive. For the second language learner who cannot develop all aspects of these two stages simultaneously, there is selective use of only those aspects that have already been proceduralized. This results in two basic planning strategies, semantic simplification and linguistic simplification (Ellis 1986 cited in O'Malley & Chamot 1990:41). In semantic simplification, those constituents that can be expected to convey the basic meaning are selected while certain semantic elements (for example, verbs and nouns) are replaced by paralinguistic cues such as gestures. In linguistic simplification, omissions are syntactic rather than semantic. These omissions include verb and noun endings and function words. Besides these two strategies, correcting strategies which involve monitoring, are utilised upon error detection and correction. This may occur during the second stage in which the individual monitors output either during any of the phases of the articulatory stage or after the articulation program has been completed (ibid: 42).

The fundamental aim of production strategies is to accomplish communication goals. They assist the individual in using the second language system efficiently and clearly without excessive effort. Examples of these strategies include prefabricated patterns and discourse planning (Tarone 1981 cited in O'Malley and Chamot 1990:43). When failure to realise a language production goal occurs, communication strategies emerge



to serve an important role in negotiating meaning between individuals (ibid). For example, communication strategies might entail approximations, mime, circumlocution, or paraphrasing.

Although it is plausible to distinguish between production and communication strategies in this manner, communication strategies are subsumed within the broader term of production strategies for the purpose of the study. This is because communication and production strategies share the same communication goals. In addition the verbal form of the language in the oral or written modes would still be considered as language production regardless of the type of strategies employed prior to its production. Since cloze completion, particularly without options or alternatives provided, requires minimal language production at the word level, the strategies highlighted could render significant assistance to second language learners as they undertake the task concerned.

### **2.3.5 Cloze Completion Process And Strategies**

The concept of “cloze” originated from Gestalt psychology. One of its principles or laws that seems to govern how people assign meanings to visual stimuli is the law of closure (Max Wertheimer, Kurt Koffka (1933) and Wolfgang Köhler (1929) cited in Bruning et al. 1995:31). It states that incomplete figures tend to be seen as complete. This human tendency to complete mentally familiar yet incomplete patterns (Schulz 1981:45) is utilised in a cloze exercise. In like manner a listener or a reader in a particular language will rely on his knowledge of that language to supply meaning from familiar surrounding context if he is listening under conditions of noise, either code (interruptions, false starts, repetitions, hesitations, etc.) or channel noise (background noise, other voices, etc.), or if a word is not understood in print. (Wainman 1979:127).

### 2.3.5.1 Cloze completion process

In a general sense the cloze procedure involves deleting from a text some information which respondents are required to attempt to replace. This possibility is due to the fact that during comprehension, language users are able to furnish the missing information on the basis of their general or contextual knowledge of the facts (Kintsch & van Dijk 1987:365). In addition, the principle of redundancy used in Information Theory is thought to be involved, because the cloze procedure reduces natural linguistic redundancies and requires the respondent to rely upon organizational constraints to fill in the blanks and infer meaning (Fotos 1991:315). Hence, the cloze procedure subscribed both to the Gestalt psychology concept of the ability to complete and incomplete pattern (closure), and also to the concept of redundancy provided by Information Theory. The incomplete pattern is constructed by deleting words from a running text. The redundancy provided by natural language and its over determination of content make it possible to restore the missing words in order to reconstruct textual coherence (Klien-Braley 1983:218 & 219).

From a theoretical perspective, solving a cloze text involves both passive language and active language processing (Weaver 1965 cited in Klein-Braley 1997:62). There is a plan for interpreting language input, that is, decoding the verbal language “passively” when the respondent is reading. There is also another plan for generating language, that is, encoding “actively” when the respondent is producing a word to fit a certain context as in the case of the cloze without options. Consequently there seems to be a constant shift from some kind of matching or recognition process to that of search procedure. These two processes may share many similarities, but there should also be basic differences (ibid).

From another similar perspective, the respondent to a cloze text draws on the sum of his “knowledge of a language” (linguistic knowledge) in interaction with his “knowledge of the world” (schema) in comprehending the text and generating the response (Porter 1983:63). These two processes call forth both “receptive and productive language processing” that involves “sampling, predicting, testing, and confirming meaning based on one’s internalised language system” (Goodman 1971, Aitken 1977 cited in Stansfield & Hansen 1983:31). Theoretically, the ability to predict accurately what word most appropriately fits into each blank, requires the respondent to employ a large number of the interrelated skills that comprises a language system (for example, lexical, grammatical, contextual) (Stansfield & Hansen 1983:31) as well as semantic and syntactic cues to process the cloze text. This prediction may take place through a hypothesis-testing process based on one’s internalised competence (ibid: 32). It begins with the respondent inferring or projecting a word on the basis of having comprehended a whole or complete message (Oller 1973:114). As the respondent notices the details and samples from the information available, hypotheses are formulated about the information that is to follow. These hypotheses would be confirmed or challenged as the respondent further samples subsequent information. If they are repudiated, the respondent revises the first expectations by restructuring information to form a new hypothesis (ibid). Theories on cloze completion have repeatedly emphasised that it taps both receptive and productive processes, and that the behaviour elicited must be viewed as complex language processing (Klein-Braley 1997:62).

### **2.3.5.2 Cloze completion strategies**

Cloze completion is an active process that requires the respondent to “pay very close attention to detail, word association, and context” (Phillips 1973:9). In fact it is a rather

complex integration of a host of strategies related to reading (that is, language comprehension), language production and problem solving.

In an attempt to establish the strategies employed in completing a rational cloze without options, a study involving six female university students enrolled in the second semester of the First Year French programme at the Memorial University of Newfoundland was conducted (Black 1993). Basically it was a comparative study of the learning and reception strategies used by successful and less successful students of French. Reception strategies are defined as strategies that are “used by learners in order to solve problems they encounter in receiving a message” (Black 1993:420). In an effort to derive meaning from the message, reception strategies are implemented in order to decode input and render it into comprehensible intake (Manghubai 1987 cited in Black 1993:420). Data was gathered via the think-aloud technique and retrospective reporting. The strategies identified were classified as follows:

Learning/Reception Strategies in a study conducted by Black 1993.

**A. Clarification/Verification**

- A1 Translates to L1 words around the blank
  - A2 Seeks overall schema by skimming a number of blanks
  - A3 Reads through single blank to establish context
- 

**B. Monitoring/Evaluating**

- B1 Monitors vocabulary
  - B2 Monitors grammar/morphology
  - B3 Monitors sound of possible answer
  - B4 Monitors meaning by translation to L1
  - B5 Monitors overall comprehension
- 

**C. Inductive Inferencing**

- C1 Infers L1 solution to blank and translates it to L2
  - C2 Infers meaning from cognate in L1 to L2
  - C3 Infers meaning of unknown word from context/other clues
  - C4 Infers answer on the basis of its sound
- 

**D. Deductive Inferencing**

- D1 Uses syntactic/morphological knowledge

**E. Repetition for Retrieval**

E1 Repeats unknown word(s) in L2 in search of meaning

E2 Repeats L1 translation of words around the blank

E3 Repeats in L2 known words around the blank

(Black 1993:426)

A number of strategies listed appear to be quite repetitive. For instance, the strategy of translation into the first language is repeated three times with each occurrence assigned a different function, namely, clarification or verification, monitoring and retrieval. Since the strategy is the same, it would be quite a delicate task to identify which function is called into play or perhaps there could be more than just one function occurring simultaneously. Another example is another two repetitive strategies, that is, "repeats unknown word(s) in the second language in search of meaning" and "repeats in the second language known words around the blank". In order to distinguish between the two strategies, the researcher should be able to determine which words are known or unknown to the respondent. This is another dubious task as repeating words in the second language does not necessarily signify a lack of knowledge of the meaning of those words. Overall the strategies comprise surface observations of the actions taken by respondents in completing the cloze. consequently strategies listed may tend to overlap and be repetitive. Therefore distinguishing them could be problematic. The list could be improved by omitting redundant strategies and making the strategies less function-based.

Cloze completion involves reading comprehension (utilising integrative strategies), logical language production (generative strategies), the ability to deal with the grammatical structures of printed language (deductive strategies), as well as word recognition and identification (linguistic analysis and recall strategies). There is another set of strategies related to choice making which plays a predominant role in completing

cloze with options. Being presented with four alternatives for each blank, the respondent's task is to select a suitable answer that best fits the blank. Choice making may encompass "problem solving, decision making, cognition, critical thinking, logic, and creativity" (Miles 1985:471). The following choice-making strategies are adapted from Miles 1985:488 for the purpose of the study.

1. Identifying the real problem: awareness of underlying problem
2. Analysing the components of an option into their linguistic constituents
3. Synthesising complex bodies of facts: recognising the patterns and consistencies embedded in the text
4. Testing alternatives provided
5. Engaging in questioning techniques
6. Analysing linguistic information and context both inductively and deductively

These strategies are essential in guiding the respondent to arrive at the most suitable answer. Hence, the study aims to verify their use by research subjects as they undertake the cloze task.

In the study, strategies utilised in rational cloze completion with and without options will be categorised as **core strategies, input oriented strategies, and output oriented strategies**. The rationale for the focus on these three categories is that the task of cloze completion comprises both language processing which utilises input oriented strategies as well as language production whereby output oriented strategies are employed. The core strategies can be utilised in both types of language processing. There is an attempt to provide a comprehensive list of strategies that are plausible in cloze completion by the selection of related strategies identified by various researchers in the areas of reading, problem solving, language processing strategies. Nevertheless it is not an exhaustive list as future studies may discover more strategies. Since the study on the strategies involved is from a psycholinguistic perspective, cognitive, metacognitive, and linguistic strategies are incorporated in the list. Details of each category are presented in the following discussion.

The following is a list of the proposed cloze completion strategies for the study. References are sourced for strategies that can be identified with certain linguists and psycholinguists.

## **CATEGORY II: CORE STRATEGIES**

### **CLASS 1: PARTICIPATORY STRATEGIES**

#### **A. Language Oriented**

1. **Deduction** (Chamot & Kupper 1989)
2. **Linguistic analysis**
  - 2.1 Expression
  - 2.2 Collocation
  - 2.3 Lexical (Anderson 1991)
    - 2.3.1 Morphology
    - 2.3.2 Phonology
    - 2.3.3 Semantics
    - 2.3.4 Grouping
  - 2.4 Syntax
3. **Linguistic knowledge**
  - 3.1 Language transfer
  - 3.2 Equivalent
  - 3.3 Contrastive (Naiman 1978 cited in O'Malley & Chamot 1990)

#### **B. Memory Oriented**

1. **Schema**
  - 1.1 Association

#### **C. Problem Identification** (Chamot & Kupper 1989)

1. **Focusing**
2. **Analysis** (Naiman 1978 cited in O'Malley & Chamot 1990)

#### **D. Task Oriented**

1. **Guessing** (Anderson 1991)
2. **Linking answers** (ibid)
3. **Selection**
  - 3.1 Elimination (Anderson 1991)
  - 3.2 Reasoning (ibid)
  - 3.3 Stated (ibid)
  - 3.4 Understanding (ibid)
4. **Testing**

### **CLASS 2: REGULATORY STRATEGIES**

#### **A. Refinement Oriented**

1. **Monitoring**
  - 1.1 Auditory (Chamot & Kupper 1989)
  - 1.2 Plan (ibid)
  - 1.3 Strategy (ibid)
  - 1.4 Visual (ibid)

### CLASS 3: NON-PARTICIPATORY STRATEGIES

#### A. Refrain Oriented

1. **Abandonment** (Tarone & Yule 1989)
2. **Avoidance** (ibid)
3. **Delayed response** (O'Malley & Chamot 1990)

### CATEGORY III: INPUT ORIENTED STRATEGIES

#### CLASS 1: INTEGRATIVE STRATEGIES

##### A. Language Oriented

1. Induction

##### B. Text Oriented

1. **Contextualization** (O'Malley & Chamot 1990)
  - 1.1 Inferencing (ibid)
  - 1.2 Interpreting
  - 1.3 Referencing
  - 1.4 Retracking (Pre-deletion and Post-deletion)
2. **Structuring**
  - 2.1 Marking text (Cohen 1990)
  - 2.2 Note taking (Chamot & Kupper 1989)
  - 2.3 Text organization
3. **Facilitative reading**
  - 3.1 Scanning (Anderson 1991)
  - 3.2 Skimming (ibid)

##### C. Task Response

1. **Chronological search** (Anderson 1991)
2. **Matching** (ibid)
3. **Substitution** (Chamot & Kupper 1989:16)

#### CLASS 2: REGULATORY STRATEGIES

##### A. Refinement Oriented

1. **Monitoring**
  - 1.1 Comprehension (Chamot & Kupper 1989)
  - 1.2 Response

### CATEGORY IV: OUTPUT ORIENTED STRATEGIES

#### CLASS 1: GENERATIVE STRATEGIES

##### A. Language Oriented

1. **Approximation** (Tarone & Yule 1989)
  - 1.1 Cognate (Anderson 1991)
  - 1.2 Synonym (ibid)
  - 1.3 Word coinage (ibid)
2. **Circumlocution** (ibid)
3. **Language switch** (ibid)

##### B. Memory Oriented

1. **Search and retrieval**
  - 1.1 Auditory (O'Malley & Chamot 1990)
  - 1.2 Group (ibid)
  - 1.3 Imagery (O'Malley et al. 1985)
  - 1.4 Keyword/Word (ibid)



- 1.5 Mnemonics
2. **Synthesis** (with production)
3. **Elaboration** (O'Malley et al. 1985)
  - 3.1 Creative elaboration (Chamot & Kupper 1989)
  - 3.2 Response elaboration
  - 3.3 Alternative response
4. **Recombination** (O'Malley et al. 1985)

**C. Text Oriented** (with production)

1. **Personal response** (Chamot & Kupper 1989)
2. **Predicting** (Anderson 1991)

**CLASS 2: REGULATORY STRATEGIES**

**A. Refinement Oriented**

1. **Modulating**
  - 1.1 Production (Chamot & Kupper 1989)
  - 1.2 Style (ibid)

**CATEGORY II: CORE STRATEGIES**

The underlying assumption of core strategies is that they are performed via similar mental processes during language processing whether comprehension or production. Consequently they possess dual characteristics and functions of integrative and generative strategies. They are further classified as participatory, regulatory, and non-participatory strategies. Each category consists of several major strategies which may be sub-divided further into strategies. Hence, strategies are the finer specifications of a major strategy. Further details of these strategies, such as definitions and examples of use, are made available in Tables 2.6, 2.6.1, and 2.6.2, pp. 219-224.

**Class 1: Participatory strategies**

These strategies are employed to assist language processing for both comprehension and production. These are further divided into four types. They include **language oriented, memory oriented, problem identification, and task oriented strategies**.

The language users are willing to participant and take up an active role in processing the second language. Refer to Table 2.6, pp. 219-222.

### **Class 2: Regulatory strategies**

The main function of these strategies is to modify existing plan or strategy when it is unsuccessful in meeting the demand of the second language task, that is, in solving the language problem. They are also exercised to refine the comprehension or production of the second language. These strategies occur when the need arises until the task is completed or the problem is solved. They encompass **monitoring strategies**, namely, *auditory, plan, strategy, and visual tracking*. Refer to Table 2.6.1, p. 223.

### **Class 3: Non-participatory strategies**

These strategies are utilised when the language users refrain from interacting with the input or communicating ideas to others. Sometimes they have no intentions to resume communication within the time frame of a single speech event or task at all. Then they would employ *abandonment* and *avoidance*. There are also language users who are uncertain of the message encoded in the second language, its appropriate production or the selection of the language choices available. They would prefer to delay the comprehension process or their response until they are certain or are compelled to do so. Hence they resort to *delayed response*. Refer to Table 2.6.2, p.224.

## **III INPUT ORIENTED STRATEGIES**

These strategies generally relate to input since they are normally utilised to comprehend the input. They are looked upon as being responsible for effective transfer of input into intake. Hence they assume the role of direct analysis, transformation or/and synthesis of the input. The main goal of these strategies is meaning seeking, that is, decoding the message. In other words, language users may make use of these strategies to process information encoded in the second language. They comprise two broad classes of

strategies, namely, **integrative strategies** and **monitoring strategies**. The former is basically cognitive in nature whereas the latter is metacognitive.

### **Class 1: Integrative strategies**

The term “integrative” is used because the product of information processing eventually leads to the combination of the new information with the learners’ prior knowledge. In other words, interaction with input would result in the input being integrated with the learners’ schema. These strategies can be activated when the input renders itself incomprehensible to the receiver of the message. These processing strategies are **language oriented**, **text oriented**, and **task response** strategies. Refer to Table 2.7, pp. 225-227.

### **Class 2: Regulatory strategies**

Within the limits of input oriented strategies, monitoring strategies are confined to checking **comprehension** and structured **response**. Language users monitor their understanding of the input by tracking back and forth to ensure they have not overlooked some information that is crucial to their understanding. Alterations may be made to their interpretation of the input so that the message is decoded accurately. Refer to Table 2.7.1, p.228.

## **IV OUTPUT ORIENTED STRATEGIES**

These strategies are mainly concerned with non-automatic language production. They aid the language users in overcoming difficulties in verbal expression and also monitor the language output so that the communication goal is achieved. They comprise **generative strategies** and **modulating strategies**. These output-related strategies can be cognitive, metacognitive, and communicative in nature.

### **Class 1: Generative strategies**

These strategies facilitate the production of the second language. Language users may utilise these strategies to express or encode meaning (that is, the communication intent) when delivering a message to others. When learners realise that language is a means of communication and interaction, they would most probably emphasise fluency over accuracy and would not hesitate to produce the second language. However most learners would need to employ certain production strategies to overcome limitations in their own competence or to meet task demands. The stimulus for these strategies can be input based or non-input based. The input may take the form of verbal (written text and oral speech) as well as non-verbal (visual, tactile, olfactory, auditory, etc.). The non-input stimulus refers to self-initiated effort in expressing one's thoughts by means of language production. Examples of such instances would be taking the initiative to write a letter or start a conversation. These strategies consist of solution seeking, and solution presentation strategies. Refer to Table 2.8, pp.229-232.

### **Class 2: Regulatory strategies**

These are basically modulating strategies to enhance fluency or/and accuracy as well as appropriacy in producing verbal response. In relation to output oriented strategies, these strategies comprise the modulating of *production*, and *style*. Refer to Table 2.8.1, p. 233.

All of these probable cloze completion strategies are selected, classified, and defined specifically so that redundancy of strategies could be reduced to the minimum. This list should not serve as blinkers for the researcher. Hence, other strategies which may be identified during the process of data analysis will be accepted as additions to the original list.

## **2.4 VALIDITY AND RELIABILITY OF THINK-ALOUD PROTOCOLS AS RESEARCH DATA**

The act of verbalising one's thinking processes may be a natural occurrence that one experiences under certain circumstances "to guide thinking or, more accurately, to be thinking" (Cox 1994:735). This phenomenon might be more prominent in particular individuals and perhaps at a certain age range. For instance, very young children may use audible language to guide and strategically self-regulate their actions when attempting to find a solution to problematic situations by understanding it correctly; focusing on appropriate, strategic steps, and using productive, strategic thinking patterns (Wertsch 1980 cited in Cox 1994:735). Researchers have observed that this regulatory language was adopted from adults' intuitive speech as they helped the children to complete certain tasks (Wertsch 1980 cited in Cox 1994:735). However this regulatory speech appeared to be internalised as the children began to complete their tasks with increased competence. Hence, with an individual's growing familiarity and expertise in a domain, regulatory speech seems to disappear in that it becomes inaudible, but it is believed that it continues to function internally and mentally (Cox 1994: 735). Vygotsky's theory and research (cited in Cox 1994:735) suggest that whether this regulatory speech is used audibly or internally, consciously or automatically, it is related largely to task variables. For example, elevating task difficulty can lead an individual (child or adult) to return to a level of processing in which internalised, self-regulatory inner speech again becomes audible self-regulatory language (perhaps consciously so) that will assist him or her through the task (Cox 1994:735). It is this audible self-regulatory speech that is tapped as primary data and it is known as think-aloud protocol in the study. Thus, think-aloud protocol can be described as that data produced when the subject "externalises the contents of the mind

while doing something" (Mann 1982 cited in Wenden & Rubin 1987:39). Within the context of the study, think-aloud protocol is defined as the data produced in the form of audible self-regulatory speech when the subjects externalised or verbalised their mental (thinking) strategies while completing the cloze texts. The research technique that is used to obtain this type of data consists of asking subjects to perform certain tasks (such as, problem solving) and to verbalise their thought processes (Hosenfeld 1984:231; Nunan 1992:117). The think-aloud technique employed in the study requires the subjects to complete two cloze texts and to verbalise their thinking strategies as concurrently as possible. The verbalisation stems from the subjects' own initiative with no interruption from the researcher at all.

Considerable criticism has been directed at the validity and reliability of think-aloud protocols as research data. For instance, Ericsson and Simon (1980) have expressed concerns about the use of data based on verbal report while Seliger (1983:189) has advanced a number of arguments "demonstrating why verbal reports of learners are not reliable data for the reconstruction of internal processing mechanisms from both linguistic and psychological points of view". Similarly, Nunan (1992:117) has also questioned whether the verbalisation accurately reflects the mental processes which normally underlie problem-solving tasks. Nevertheless such queries serve to raise awareness among researchers concerning the strengths and limitations of think-aloud protocols as research data.

The following discourse is an attempt to highlight controversial issues related to the internal and external validity as well as the reliability of think-aloud protocols as basic research data. Justifications will be put forward in order to support the adoption of think-aloud protocols as the major research data in the present study.

### 2.4.1 Internal Validity

"Internal validity or credibility" (Mc Donough & Mc Donough 1997:63) is concerned with "the accuracy of the information and whether it matches reality" (Merriam 1988 cited in Creswell 1994:158). In relation to the study, internal validity of the think-aloud protocol would refer to how precisely the verbalisation mirrors the actual mental strategies employed by the subjects. One severe threat to the internal validity of think-aloud protocols as research data may be the uncertainty regarding these data as evidence of the inner workings of the learner's mind. Such reservations are supported by a number of viewpoints put forward by researchers. Firstly, there could be a possibility that not all strategies are being verbalised (Lawson & Hogben 1996:110). Secondly, the manner in which subjects habitually respond to the tasks concerned may be altered ( O'Malley & Chamot 1990:223). Thirdly, the probable mismatch between verbalisation and actual action undertaken by the subjects may occur (Carrell 1989:122). The first concern raised is based on incomplete or absence of verbal reporting of strategies actually employed. The following two apprehensive criticisms are postulated from protocols collected under the influence of external interruptions or factors that may alter the natural thinking processes.

To begin with poor or incomplete verbal report data, such as, the failure to describe a particular strategy that is used, are often the result of poor methods of reporting (Cohen 1987:37). One of the assumptions underlying this statement is that not all information processing may be accessible to mental probes as some of it might be ingrained, automatic, and therefore occurs at an unconscious level. This may be due to the conscious content disappearing gradually with extended practice and growing automaticity of the processes involved (Woodworth 1938:236 cited in Ericsson & Simon 1980:236). Hence, the unconscious automaticity of some strategies may pose

problems for verbalisation (Ehrman & Oxford 1990:323). Furthermore, some subjects may prefer to lapse into silent thinking and forget to verbalise their thinking processes or provide less complete verbalisations when they are under a high cognitive load (Ericsson & Simon 1980:237). Subjects may indicate this by reorganizing problem representation or strategy (Durkin 1937 cited in Ericsson & Simon 1980:237), or directly expressing the feeling of difficulty (Johnson 1964 cited in Ericsson & Simon 1980:237). In addition various kinds of intermediate processes may intervene between the internal representation of information and its verbalisation (Ericsson & Simon 1980:218). For instance, the occurrence of "sudden insights" when the subjects have direct recognition of the appropriate action. The intermediate stages of immediate recognition processes often tend not to be verbalised (Duncker 1945 cited in Ericsson & Simon 1980:238). Ericsson & Simon (1980:224) have made an attempt to provide a cognitive explanation for these phenomena by citing three instances where it might happen. First, in order for verbalisation to take place, the information must be attended to, that is, the information should be available from short-term memory. Thus, when subjects are requested to produce verbal reports about information not attended to, they may infer missing information which they fail to verbalise and generalise incomplete memories. Secondly, it is also possible that not all the information which is in short-term memory at the time of the reporting, is actually reported. Thirdly, there may a probability that not all information previously available in short-term memory has been retained in long-term memory, or is retrievable from long-term memory (Cohen 1987:37&38).

It cannot be denied that such incompleteness of reports may conceal some information, making it unavailable for examination. However this should not be a factor that invalidate the information that is present as "a protocol is relatively reliable only for



what it positively contains, but not for that which it omits" ( Duncker 1945:11 cited in Ericsson & Simon 1980:243). In other words, "while verbal reports may be an incomplete representation of informants' underlying cognitive processes under certain conditions, they still contain useful information about internal processing given that what remains to be reported will not invalidate what has been reported" (Matsumoto 1994:377). Research has found that the products of cognitive activity that are in the current focus of attention will be reported concurrently (Lawson & Hogben 1996:110). Hence, this would lend support to the internal validity of the think-aloud protocol as research data.

Another cogent explanation that favours the view point that think-aloud protocols are incomplete representations of mental strategies is the limitations imposed by the subjects themselves, particularly if they are second language learners (Seliger 1983:184). This inhibition which encompasses a lack of proficiency in the second language (Block 1992:323) and the linguistic knowledge (such as, the metalanguage) may probably hinder the subjects from presenting a detailed account of how they process the second language task. Their think-aloud protocol may inevitably be a very superficial description of their means of second language processing with little salient information that could provide insights regarding language processing and production strategies. They may even adopt an avoidance attitude of not verbalising their thinking strategies. Hence, to encourage maximum verbalisation, subjects should be given the option to utilise the languages that they find convenient in expressing their thoughts. Based on this rationale, the subjects in the present study were allowed to verbalise in other languages (such as, Mandarin and Malay) that they are familiar with besides the English language.

Secondly, the internal validity of the think-aloud protocol as research data is viewed with reservation due to potential changes affecting the manner in which the subjects process the second language. In other words, there exists a possibility that the process of thinking aloud may change or distort the nature of the actual mental processing. One of the probable changes may be the reduced rate in thinking as compared with normal silent thinking. This may be due to additional time required for verbalisation of thoughts. Subjects may take time to translate the input and/or their output into verbal form, and to report them, particularly if the task performance is highly automated. However the focus of the present research is not on the rate of thinking. Hence this particular aspect would not invalidate the analysis of the think-aloud protocols. Even though the think-aloud may be actualised at the expense of slowing down the subjects' performance of the task as it tends to increase the time for completion of the task when compared with silent conditions, there is evidence that the concurrent think-aloud procedure does not lead to changes in the sequence of thoughts (Ericsson and Simon 1993 cited in Lawson & Hogben 1996:111). Hence, it would be quite presumptuous to conclude that the decrease in the rate of thinking would automatically lead to modification of the thinking process itself. On the contrary, it is quite possible that the quality of the content of concurrent verbal reports generated may still be intact. In fact the task of transforming input and/or output into verbal form and to report them may not appear as time consuming as proposed to be, since thought is encoded in language. This is evidenced in a study related to the writing process. Hayes and Flower (1983 cited in Cohen 1987:37) corroborate a finding by Ericsson and Simon that introspective verbal reporting does not change or slow down the reporting of memory traces that are verbal.

Another potential cause for the alternation and disruption of the actual course and structure of the cognitive processes may result from verbalisation task that involves frequent interruptions or probing by the researcher or with instructions that require subjects to verbalise their motives and reasons. (Ericsson and Simon 1980:220). The possibility that the probing will affect the cognitive process can be eliminated when subjects are probed after the task is completed. As in the present research, the subjects were entirely left on their own during their verbalisation and the probing was conducted after the completion of each task in the form of stimulated recall. However they were instructed to provide the rationale for each of their answers. It has been shown by empirical data from systematic studies that the task of verbalising this information would not change the course and structure of the cognitive processes if the required information is directly available in propositional form as heeded information (Ericsson & Simon 1980:235). Nevertheless the degree of such changes would vary depending on how normally or naturally the subjects employ logical reasoning to arrive at a solution or an answer. In particular instances when the subjects are unable to state verbally a reason for their answers, such as guessing the answer, the instruction for them to do so would inevitably change their natural course of processing. This may be due to their attempt to fabricate the required reason for which they are uncertain of. On the contrary, the subjects may have to revert automatic processing into focussed or heeded processing as they verbalise the reason for a particular answer. Studies have also revealed that the subjects become more focused as they abided by the same instruction. This in turn resulted in grisly improved performance (Ericsson & Simon 1980:230). However these probable changes would not exert an adverse effect on the think-aloud protocols since the aim of the present study is to find out the strategies employed by the subjects in carrying out the tasks and not to focus on the naturally occurring pattern of the mental processes. Furthermore, the results of a study conducted by Anderson

(1991:470) do not support these concerns. The results indicated no statistically significant difference in test scores between standard operational conditions and in connection with the subjects' verbal reports. Hence this particular study provides evidence that thinking aloud does not interrupt the process being examined and the data gathered is representative of actual performance.

Thirdly, the mismatch between the actual mental processes of the subjects and their verbal-report data is perhaps the most fundamental concern in introspective research (Matsumoto 1994:373). This occurs when what is reported differs from what is implemented, that is, what the subjects say is different from what they do, particularly when they are children (Kirby 1988:250). For instance, the subjects may report what they perceive they ought to know or do as ideal learners or as instructed by providing the most desirable response instead of what they in fact know or do at the moment of reporting. This may be due to their consciousness of the researcher's judgements of their verbal reports (Matsumoto 1994:375). Notably it should not be assumed that the verbalised description accurately reflects the internal structure of cognitive processes. However, since concurrent verbalisation involves verbalising only the heeded information already generated by the task-directed processes, the extent of this mismatch would be minimised. In the study the act of verbalising the means of arriving at an answer and the task of finding suitable words to complete a cloze text are highly interrelated, that is, this concurrent introspection will yield mental processes that would be reasonably parallel with the task undertaken. Under such favourable conditions, the additional cognitive load imposed by the instruction to verbalise concurrently may be negligible (Ericsson & Simon 1980:218). consequently the think-aloud protocols produced by the subjects should provide quite an accurate picture of the actual strategies utilised. Hence the think-aloud protocols can be considered as authentic data

generated by the subjects.

The three issues (incompleteness of data, alteration of the mental processes, and mismatch between data and actual processing) that seem to threaten the internal validity of think-aloud protocols have been discussed at length. Studies have shown that verbalising information will affect cognitive processes only if the instructions require verbalisation of information that would not otherwise be attended to (Ericsson & Simon 1980:215). Hence, precautions should be taken by researchers in conceiving instructions which would not complicate the verbalisation task nor interfere with the mental processes. In addition the probes developed should also be sensitive enough to reveal the inner workings of the mind with as minimal disruption as possible. An example would be the use of symbols placed at strategic positions in the text or task sheet as a silent reminder of the need for subjects to verbalise their thoughts. Furthermore subjects should be given sufficient opportunities to practise thinking aloud while performing a task. This would enhance the quality of the protocol as incomplete verbalising could be reduced when the subjects are familiar in implementing the think-aloud technique. Hence the internal validity of think-aloud protocols is contingent upon how carefully they are elicited. Since the concerns over the use of think-aloud protocols are well founded, researchers need to respond to these issues by modifying and improving procedures to allow for more conducive conditions to eliciting representative process.

#### **2.4.2 External Validity**

External validity is the degree of "generalizability of findings from the study" (Creswell 1994:158). In more specific terms, external validity of the study depends on the extent to which the findings based on the protocol analysis can be applicable to

other second language learners.

Think-aloud protocols are commonly utilised in descriptive case studies. They are normally elicited from small number of subjects who are selected on the basis of their ability to master the think-aloud technique. This is mainly because of the tremendous amount of tedious effort in analysing the data should the research sample be large. Hence, it is difficult to generalise the results obtained to larger populations of interest as the data might not be summative across learners (Oxford & Burry-Stock 1995:2). The problem of generalisability is compounded by the fact that the subjects' application of strategies which can be considered as highly individualistic in nature, is also task-specific. Hence, the think-aloud protocols may not actually provide a general portrait of the individual's strategies (Oxford & Burry-Stock 1995:2). Moreover, learner variables, such as, familiarity of content, skills possessed, willingness or ability to report, language repertoire and learning preferences would further complicate the attempt to generalise the findings. Furthermore, the data in such studies tend to be implicitly and subjectively discovered in the open-ended data provided by subjects, via post hoc analysis (Carrell 1989:122).

Due to these inevitable factors, protocol researchers need to guard against generalising from data that may only reflect a process occurring at a particular time and under particular conditions (Smagorinsky 1994:16). Modest claims should be made, for example, most of such investigations are exploratory rather than conclusive. Researchers who exercise strict precautions in order to account for the potential perils to the greatest extent possible would be awarded with a rich source of data that can provide an illuminating view of the strategies involved in comprehending and producing language. In order to be accorded validity, think-aloud protocols also require

a context which can originate from other protocols collected in the same study, or from related research conducted by other scholars (Smagorinsky 1994:16). This would form the basis for comparison which would then enhance the validity of such protocols.

### **2.4.3 Reliability**

Reliability is associated with replicating the study (Creswell 1994:158). This involves examining whether “the same patterns or events or thematic constructs are replicated in different settings” (Creswell 1994:158). In other words, if the study is conducted according to the same procedure in another context and similar think-aloud protocols are recorded, reliability of the data and procedure are assumed to be in tact.

Although much research has considered the factors influencing the validity of think-aloud protocols as data, it seems that the reliability of such protocols has not generally been examined. Nevertheless with increasing number of research studies employing think-aloud protocols, particularly in the area of language comprehension (listening and reading skills) and production (speaking and writing skills), recurring patterns of language-focused strategies have been drawn up. Researches conducting separate studies seem to be able to agree upon common strategies identified. With the accumulated descriptions of second-language learning events, patterns have begun to take on a certain reality as they are corroborated by more learners (Cohen 1987:36). This would in turn lend support to the reliability of such concurrent verbal reports.

However it would not be unusual when discrepancies arise due to the characteristics of the subjects in research. One variant trait would be their verbal skills. Some may be more adept than others at providing the appropriate amount of verbal report data, at the appropriate level of specificity (Olsen et al 1984 cited in Cohen 1994:680). In addition,

the subjects may use different terms to describe similar processes or the same terms for different processes (Olsen et al 1984 cited in Cohen 1994: 680&681). Furthermore it may be the subjects' verbal reports that exhibit instability over time or it may be the researchers' interpretation of the subjects' protocols that shows inconsistency (Matsumoto 1994:375). It is proposed, in this regard, that the data collection should be from multiple administration of the verbalisation task, that is, not only one time, or data analysis should be conducted by multiple researchers to avoid possible researcher bias (Matsumoto 1994:375 & 376). Such measures would elevate the degree of reliability of think-aloud protocols to qualify as a valuable source of information pertaining to mental processes. In the present study which inhibits these two means of enhancing the reliability of think-aloud protocols, the alternative solution is to analyse the data at least four times or until a satisfactory level of consistency of the outcome is attained.

#### **2.4.4 Think-aloud protocols : State of the Art**

Thinking aloud as a research technique to study thought processes has its roots in social science. It has existed since the early part of the twentieth century (that is, Duncker 1926; Claparede 1934 cited in Smagorinsky 1994:3). In *Human Problem Solving* published by Newell and Simon in 1972, a detailed account of a procedure which they termed protocol analysis (also known as "on-line" or "concurrent" protocol analysis) was presented for the systematic coding and analysis of thought processes during problem-solving strategies (Smagorinsky 1994:3). Since then it has gained favour among researchers in a variety of fields who have adopted and adapted the think-aloud procedures to study the thought or cognitive processes of people engaged in all manner of activities. With specific reference to the field of second language learning, these include the study of learning strategies, oral communication, reading, writing, test-taking behaviour, grammar-task performance, vocabulary learning and cloze task



processing strategies (Markham 1987:303&304).

Such a mentalistic approach is applied to the study of language learning stems from the realisation that learners themselves may have salient insights into how they process language. For instance, a study conducted by Cohen and Hosenfeld (1981:293) found out that students' strategies are often quite different from strategies teachers assume they are using. Since the thinking aloud research technique is a means of assessing the mental processes used by the subjects, the think-aloud protocols represent some form of internal reality and provide direct evidence about processes that are otherwise invisible. The vivid illustration of thought process generated by protocols gives the technique a unique privilege in demonstrating the 'how' and 'why' learners perform as they do. The most fruitful goal of language learning research is to be able to contribute towards the enhancement of successful second language learning. With learners' own description of what they actually do (via think-aloud protocols) as the starting point, they might then be guided by different means (from the result of protocol analysis) in order to achieve profitable learning. In more specific terms, concurrent verbal report data may well provide further important insights for enhancing learners' attention to language input, facilitating their efforts to speak fluently, assisting them in reading more efficiently, and guiding them in successful vocabulary learning (Cohen 1987:38). In addition models or hypotheses of language learning can be generated as think-aloud protocols can suggest possible directions for future controlled studies and it might also suggest possible applications to teaching once empirical evidence is gathered (Seliger 1983:184).

Unveiling the mysteries shrouding the inner workings of the mind still remains a challenging undertaking. By means of think-aloud protocols generated by second

language learners as second language performers actively engaged in carrying out a second language task can provide researchers with useful information which may otherwise be unavailable from extrospective observational studies alone. Invisible insights pertaining to conscious strategies employed by learners can be obtained by taking the necessary measures and precautions to increase the validity and reliability of think-aloud protocols. These would in turn depend on the methodological skill, sensitivity, and integrity of the researchers to a great extent (Patton 1990:11). Besides the means to enhance the veridicality of verbal reports already mentioned, it is also advocated to use multiple introspective techniques, combining introspection with observation (observable nonverbal behaviours like eye movements may provide important clues to underlying cognition) as well as performance data (subjects' proficiency test scores may provide a useful hint for their use of certain strategies) (Matsumoto 1993:50). The stimulated recall utilised in the present study is another means of verifying the think-aloud protocols.

Nevertheless the concerns over the validity and reliability of qualitative data would not be peculiar to think-aloud protocols. Regardless of the methods used, the possibility remains that the data obtained are in some ways artefacts of the research procedures used (Nunan 1992:117). The human quality revealed through think-aloud protocols gives the data "a unique soul and spirit" as they illustrate ways in which learners comprehend and produce language, "an essence that animates our understanding of thinking and learning (Smagorinsky 1994:16). In the field of second language learning, more possible applications for think-aloud protocols will surely be found (Cohen 1987:38). The emergence of the think-aloud protocols as research data in the study of language comprehension and production is to be commended and the role played is gaining eminence now and in future.