1. Introduction

The purpose of this thesis is to consider if language learning by CALL is effective in comparison with the process of first language acquisition. The CALL system has been widely used in the educational scene of Japan, replacing the traditional LL system with the new one. Has technical progress or change in the media of this kind altered language learning in itself? The question concerned does not seem to have been extensively discussed yet. The author will introduce here the models, which are supposed to explain explicitly the difference in the processes of first language acquisition and language learning by CALL.

People naturally master a language from their direct experiences, exchanging information in particular circumstances exposed to them. On the other hand, language learning takes place by the effective use of simulation run by software so far as CALL is concerned. The environments that people are immersed in seem to have something to do with the quality and quantity of experiences and their effects on memory. The author will examine which factors influence first language acquisition and language learning by CALL.

2. First Language Acquisition

First we will consider the significant factors related to first language acquisition. When examining them, you need to keep two things in mind, that is, how
linguistic elements are processed and how they are stored in memory. The author will consider them from neuropsycholinguistic point of view.

2.1. Dual Processing of Semantic and Linguistic Information

Some studies of aphasia have shown that the processing of spoken language works mainly in and around Broca's and Wernicke's areas. In the former speech is programmed and in the latter it is decoded. Damasio (1992) has also proved that the processing of linguistic information and that of semantic information is undergone individually though we actually integrate them automatically and instantaneously in the process of speaking. From what we have described so far, there is no doubt that the process of mastering a language occurs inside the brain. What is happening in the brain, then? Ikari (1999) illustrated in Figure 1 natural language processing from the viewpoint of neuropsycholinguistics.

![Figure 1 Brain Function and Language Processing](image)

This figure shows how auditory or visual information is being processed in some particular areas of the brain. The figure could explain fairly well how people cope with the word fish auditorily, comprehending its meaning, or how they deal with the fish visually, producing the combination of sounds correspondingly. As has been mentioned above, this figure also suggests that semantic information is treated independently of linguistic information.
2.2. The Role of Memory

In addition to the independent processing of linguistic and semantic information, memory function should be taken into consideration in order to explain how the inner system works in Figure 1. Considering the dual processing of semantic and linguistic information examined above, Ikari (1998) proposed in Figure 2 the model illustrating how the special organs are related to language processing in connection with memory function.

![Figure 2](image)

**Figure 2** Relation between Memory and Language Processing

The figure shows that linguistic and semantic information is processed at the same time and it is also treated individually in some particular areas or organs. Furthermore the author considers that the organs related to linguistic processing are restricted to ears and eyes so far as the availability of sensory devices is concerned. On the other hand the one involving semantic processing can be a nose, a tongue, hands and some other sensory organs, including the above two. This could imply that so far as linguistic or semantic information processing is concerned, memory works in specific ways depending upon the particular sensory organ involved.

2.3. Mechanism of Language Acquisition

It follows from what we have considered so far that as for first language acquisition linguistic and semantic information is treated separately in the dual
language processing and that memory function is closely related to each processing. Ikari (1999) introduced in Figure 3 the model of the mechanism of language acquisition, explaining the whole process concerned.

![Diagram of Mechanism of Language Acquisition](image)

**Figure 3** A Model of Mechanism of Language Acquisition

The figure includes a couple of new elements such as Analytic Procedure and Pattern Recognition, which we will not discuss here in detail because of their complexities. You will see in this figure how linguistic and semantic information is processed in combination with memory function. The figure makes it clear again that language is treated independently in the dual processing of linguistic and semantic information and this works quite well in relation to memory function involved.

3. Language Learning by CALL

We have observed thus far some significant factors related to the process of first language acquisition. Here we will consider some other important ones that might have great influence on language learning by CALL.

3.1. Five Senses and Language Learning

When looking at the process of language learning from the neuropsycholinguistic point of view, you will see that language learners only activate the visual
and auditory information in a restrictive way through CALL, while in natural environments they can make effective use of some other information, activating five senses. From the viewpoint of five-sense activation we will show the difference in information processing by illustrating how people approach to meaning in Figure 4 and Figure 5.

![Figure 4 Approaches to Meaning through CALL](image1)

As Figure 4 shows, learners can only access to auditory and visual information through CALL due to their own restriction. In contrast people can use any of five senses in language acquisition, which is shown in Figure 5 and it is probable that activation of five senses makes it far easier to restore information in memory for language use.

![Figure 5 Approaches to Meaning in Language Acquisition](image2)
The difference in the approach to meaning shown in Figure 4 and Figure 5 makes the mastery of a language fundamentally distinct in nature between first language acquisition and language learning by CALL. Language learning by CALL is surely effective in that it could possibly lead the learner to be strongly motivated to master the target language through interaction of information with electric devices such as computers linked to the Internet. As far as the structure or the grammar of a language is concerned, this learning style seems to be efficient because of its nature of abstractness. Yet as to the mastery of the meanings of a language what they have learned through CALL does not seem to be a real language or a living language. It is something like a pseudo system of language.

Figure 5 shows that in language acquisition people can activate some or all of five senses to access the meaning and through this they can restore information in memory more strongly with the particular approach available. Concerning the approaches not only their quantities but their qualities are significant. The qualities can be greatly influenced by direct experiences.

3.2. Experiences and Language Learning

As has just been mentioned above, people cannot learn fully the meanings of a language by CALL because of its shortage of direct experiences, only accessing the fairly abstract level of auditory and visual information by use of computers, the relation of which is illustrated in Figure 6.
The fact that CALL learners are lacking in direct experiences might have a great influence on the acquisition of meaning. What would happen to them if they could not make use of direct experiences? They could understand abstractly the meaning of a word through indirect experiences but not in a concrete way. That means language does not work properly or is not fully activated in the neural network of the brain. In order to work it they must learn from direct experiences shown in the figure below.

![Diagram of Acquisition of Meaning](image)

**Figure 7  Acquisition of Meaning**

The Figure 7 does not just suggest that as people grow older, they can grasp the total meaning of a word, but implies that they can access the meaning freely with what they have acquired so far. In our assumption direct experiences would form the basic backbone of memory for language use. It follows from this that we should keep two points in mind. One is that direct experiences might make it possible to retain more memories than indirect experiences alone. The other is that direct experiences could lead you to make use of more ways to access the meaning.

4. Different Models of Language Processing

Finally, the models will be designed on the basis of what we have observed so far from neuropsycholinguistic point of view. Our observation is that language learning by CALL is effective from the viewpoint of the mastery of the linguistic form, but simultaneously does not put you in a real state of a particular language so far as the linguistic meaning is concerned.
4.1. A Model for First Language Acquisition

In the process of first language acquisition people master their language developmentally through direct and indirect experiences. In processing semantic information, they can access the data based on both experiences, which is shown in Figure 8.

![Diagram of Language Process in First Language Acquisition]

As Figure 8 shows, people can use effectively the semantic data based on both direct and indirect experiences. That is the way language works quite well.

4.2. A Model for Language Learning by CALL

When learning a language with the CALL system, you usually use a computer that provides you with an artificial learning environment. The environment you are actually involved in is a real one in a way that you are learning in an actual situation. Yet from what we have considered the learning by CALL can only be developed by use of computer software. It is therefore considered to be based on virtual reality, or indirect experiences. When people learn a
language by CALL, they do so through indirect experiences alone, which is shown in Figure 9.

This figure shows that learners can access semantic data coming from indirect experiences but not direct ones. This result might force them to use alternative semantic data based on their first language since it is deeply rooted in their earlier direct experiences, which is shown in the dark area. It follows from this that the language learned by CALL could not work in a proper way.

5. Conclusion

In this thesis we have observed that language learning by CALL might be effective in some ways but from the viewpoint of first language acquisition it is not always true. The fact that learners are lacking in direct experiences, in other words, that they are learning a target language in a virtual reality will make it hard for them to master a real language. Our conclusion is that there seems to be no other way but to leave learners immersed in real situations for some time in order that they could master the target language in a proper way by the
active use of five senses.

References