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Language Learning Through Contextual Input in a Virtual Reality Environment

By

Daniel C. Current

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

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Dr. Douglas Coleman, Committee Chair

Dr. Patricia Case, Committee Member

Dr. Daniel Compora, Committee Member

Dr. AnChung Cheng, Committee Member

Dr. Patricia Komuniecki, Dean

College of Graduate Studies

The University of Toledo

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An Abstract of
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This study reviews whether or not current video game technology can be used as a platform to foster the development of desired communicative behaviors in a second language student. In addition it will also review the capabilities of current technologies in regards to our ability to communicate with our peers and, how our culture's demand to increase the communicative capabilities of said technologies has shaped its use. This study will use many quantitative and qualitative studies as well as theoretical works in order to establish a framework of what is necessary to foster the development of communicative behaviors in both first language and second language learners. Finally, this study will apply this theoretical framework to the *Never Winter Nights* (2002) game engine in a practical example of how a three dimensional virtual environment can shaped to foster the development of specific desired communicative behaviors in a second language student.
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Chapter One

Computers, Gaming, and Social Media Technology Overview

A. Overview of Study

This study reviews whether or not current video game technology can be used as a platform to foster the development of desired communicative behaviors in a second language student. In addition it will also review the capabilities of current technologies in regards to our ability to communicate with our peers and, how our culture's demand to increase the communicative capabilities of said technologies has shaped its use. This study will look at a number of quantitative and qualitative studies as well as theoretical works in order to establish a framework of what is necessary to foster the development of communicative behaviors in both first language and second language learners. Finally, this study will apply a theoretical framework to the Never Winter Nights (2002) game engine in a practical example of how a three dimensional virtual environment can shaped to foster the development of specific desired communicative behaviors in a second language student.

B. Technology's Growing Role in the Classroom

Computers have become a growing part of academic institutions as tools to aid in teaching and research. As computer technology advances so too does its potential role in education. In the past, the internet has been used in a wide variety of ways to supplement the classroom. It has proven itself as a way of sharing materials for class (Yuan, 2003), email correspondences (Bloch, 2002), and hosting class discussions about materials and peer reviews (Guardado, 2007). Whole classrooms have been moved online in distance
learning programs. In such programs students can participate fully in the class without ever being in the same location as their classmates or teacher.

The same is also true of the relationship between computer technology and second language acquisition. The establishment of the global internet has placed the burden of pairing native speaking teachers with non-native speaking students on the capabilities of computers. The cost of having access to the internet compared to the cost of relocating either the teacher or the students to learn a second language is one of the biggest reasons for this. Furthermore, life in a country where the language and culture are significantly different can be problematic and dangerous. As a result there is a growing demand to use what was once used to enrich the classroom experience to take the place of the classroom altogether. However, before a detailed discussion of how the internet and computers can take the place of the classroom we should look at how they have been used as tools to enhance the ESL classroom in general.

C. Technology Use in the ESL Classroom.

In the past computer assisted language learning (CALL) has been used to enrich the student's classroom experience (Guardado, 2007). In his study of an online peer review exercise hosted on an on-line forum, of 22 ESL students Guardado found that 11 of the students made major revisions based on the comments and 6 of the students made minor revisions. He notes that 50% major revision rate for a peer review exercise of this type is significantly higher than what one would expect from the same type of activity conducted in a classroom. He points out that purely online peer review can have many distinctive advantages such as the anonymous voice of the reviewer and the ability for the writer to accurately locate issues addressed in the feedback, as well as heightening the
teacher’s ability to oversee the peer review feedback in its entirety. However, he points out that there are drawbacks such as the feeling of detachment and the lack of nonverbal communication through the on-line forum.

On-line forums are not the only format used to improve the performance of the class as Yuan (2003) points out. She uses a study of two ESL students in a graduate program. Each student had been identified as having issues with written communication. They participated in a language training program that involved one hour a week online chatting and a one hour class session. The chatting sessions were then printed out and used for class instruction. The phenomenon of interest in this study is the students self-corrections made during the chatting sessions. As the students became more aware of their grammatical mistakes they started catch and correct them; with the availability of instant feedback from the instructor the students’ learning experience were enhanced. By analyzing the printouts the teacher was able to compare what corrections the students made in comparison to what errors went without correction, allowing her to focus class instruction on those areas that corrections were lacking.

Just as in other academic fields, distance learning has lead to computer mediated language learning (CMLL) and distance language learning (DLL). In her study “Teaching and Learning Online: A Collaborative between U.S. and Taiwanese Students”, Cifuentes (2001) observes the online interactions between part time teacher students (PTS) American students preparing to teach distance courses and Taiwanese students. She points out that as of 1999 60% of American education institutions had internet access available to the student body, and that online teaching seems to be inevitable. The purpose of the interactions was in order to provide English instruction to the students
while giving the (PTS) practical experience giving purely online instruction. Much like Guardado she points out that there are many advantages to online instruction and suggests video conferencing with the students to combat the drawbacks pointed out by Guardado, such as the feeling of detachment and the lack of nonverbal communication through the on-line forum.

Traditionally, distance learning ESL courses have been unpopular for reasons such as lack of body language and nonverbal communication (Bloch, 2002), lack of verbal communication, and a sense of distance or detachment from the class structure and participants (Guardado, 2007). Without these components in the ESL class, it becomes problematic to improve the L2 skills of the students (Bloch, 2002). As it is understood in the field of hard science linguistics the lack of basic indicative behavior and other communicative behaviors through secondary channels such as body language restrict the learner’s ability to associate the contextual meaning with the communication.

D. Communication Technology and Cultural Adaption

It is now common for people to use personal computers as a means of hosting voice and sometimes video chat while performing other actions such as engaging in role playing games, browsing social networks, and watching movies online. The social capabilities of our current technology has developed to such an extent that an activity such as sitting in a quiet room by yourself with a computer connected with the internet you are more capable of having social interaction with one's peers then physically being at a social gathering. Social interaction can be defined as the potential of a given activity to enact a change in state of ourselves in relation to our peers. We are now able to
establish and maintain prolonged meaningful fully developed personal relationships with
people we have never actually met or rarely see in person.

For example you wish to proclaim the superior “cuteness” of your pet. You could
go to a party and show pictures to everyone their individuality reaching perhaps fifty
members of your extended peer group in an evening. In geographical terms you might be
able to reach members of your peer group within a fifty mile radius. Or you could spend
five minutes posting the pictures on a social media website. By doing this you reach
everyone in your social network and potentially every member of the social networks of
the members of your network as well. The exposure of your idea then has potential of
exponential growth. As a result of the exponential nature of social media exchange it is
fully possible a rivalry over whose pet is the cutest could develop between individuals
whose only connection to each other is a mutual member in their respective social
networks. On the internet this represents a relationship with two degrees of separation.
Geographically speaking, the rivals themselves could physically be on opposite sides of
the world.

E. Multi-player Three Dimensional Online Video Games

Whole interactive multi-player virtual worlds have been created to host online
video games. These multi user domains, or MUDs, allow people to interact across the
globe in digital space. If a MUD can allow a large number of players to be online at a
time it is called a massive multi-user online role-playing game or MMORPG. Many
MUD and MMORPG worlds are up and running constantly, allowing for consistent time
lines and world history. As a result of the consistent history prolonged and well
developed relationships between online avatars can unfold.
Over the last ten years I have been an active participant of various MUD and MMORPG games. The information that follows is a direct result of my personal observations and experiences with interactions in the online gaming world. During that time I have joined and actively participated in several player groups. These player groups are sometimes referred to as guilds. A member of a guild has many advantages; typically they gain access to better game items and more game resources as well as access to more experienced players. (WowWiki/Guild, n.d.) However the guilds also have their downfalls mainly because of intra-group fighting and power struggles that result from a lack of social infrastructure for successful group management. These downfalls point at an important fact: MUDs can create and maintain complex enough social interaction that it becomes necessary to develop infrastructure and group management skills in order to maintain them.

<table>
<thead>
<tr>
<th>LOL</th>
<th>laughing out loud</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROFLMAO</td>
<td>rolling on the floor laughing my a** off</td>
</tr>
<tr>
<td>:)</td>
<td>smiling</td>
</tr>
<tr>
<td>:(</td>
<td>frowning</td>
</tr>
<tr>
<td>;P</td>
<td>winking and sticking out my tongue at you</td>
</tr>
</tbody>
</table>

*Table 1.* Sample ways to communicate nonverbal behaviors through text.

This social reality is in stark contrast with the majority of the criticism faced by distance language classes. As a result of the dominate cultures communication channels being restricted to text only the players of MUDs have adapted the accepted text-based communications to include symbol sets to communicate facial expressions and emotional responses. These consist of acronyms like LOL and ROFLMAO as well as so called
emoticons like that for smiling; see Table 1. This phenomenon is of interest because it points at the adaptive way we learn to use and create communicative behaviors to suit the needs of the group in a restrictive environment. If our attempts to communicate repeatedly fail to create a close enough approximation of the intended change of state of the observer we explore adaptive strategies. If the adaptive strategy is useful then others who observe the new behaviors success will also adopt the same behavior.

F. Conflicting Views of Video Games in an ESL Setting

“The notion of using games in education is as old as games themselves. In addition, the massive market opened by the digital games industry has caused great interest regarding their specific potential in education” (Moreno-Ger, Burgos and Torrente, 2009 p. 669). If we have as powerful of a tool as the internet to connect people on a variety of communicative channels in three dimensional interactive worlds, it seems logical that we should be able to use that tool for L2 acquisition. Unfortunately teaching establishments have been reluctant to incorporate video game learning. “Even if game-based learning can be a great complement to eLearning, several factors limit their real applicability, and they must be overcome to achieve a generalized implantation of games in these environments” (Moreno-Ger, et al. 2009 p. 670). The cost of development of materials, time investment, and intimidation of learning how to build with new technologies, and the perception that playing a game is not a productive activity in general all may be some of the most predominant factors contributing to this reluctance.

With the capabilities of our current gaming technologies I was able to create an interactive three dimensional environment designed to teach specific communicative behaviors such as; those required for receiving and following directions. This
environment was built in one year’s time with an overall cost of USD $25 for the game and with no computer programming education. I chose the *Never Winter Nights* (2002) game engine because it does not require a top of the line computer to use and because of the software’s low cost due to its age. By selecting an older game I was able to rely on the game's player community for support in building some of the most difficult parts of my module. As a result of NWN being older software a top of the line computer is not required potentially allowing it to be of use to more teachers and students than if I had used a newer program with heftier hardware requirements. A more detailed discussion of the structure and design of this module can be found in Chapter III. Before we can continue this discussion we must first look at the process of language acquisition.
Chapter Two

Learning to Communicate Through Contextual Input

A. Chapter Overview

This chapter will look at both quantitative and qualitative studies as well as theoretical works in order to establish a framework of what is necessary to foster the development of communicative behaviors in both first language and second language learners. I will begin with an overview of how we learn to communicate in our first language. This chapter will then review various strategies used by learners as well as strategies indicated by empirical study as effective means of acquiring vocabulary in both first and second language environments. This will establish the theoretical framework of what is necessary to learn how to communicate. I will also review how computer simulated environments can be shaped to foster the development of the desired communicative behaviors. Finally this chapter will end with a review of the selection of *Never Winter Nights* (2002) for the purposes of our demonstration.

B. First Language Acquisition

Brown (2007) claims that in order to better understand second language acquisition, we must first look at the process of first language acquisition and the differing theories and learning models associated with first language acquisition. Brown uses the nature of a child’s early attempts to communicate in their first language as an example; these two-word utterances when viewed through the filters of four of the major schools of thought can reveal a significant difference.

The behaviorist treats these two-word utterances as a sign of the toddler starting to grasp the fundamentals of language through behavioral reinforcement and stimuli. The
researcher in a mediation response framework on the other hand, sees this phenomenon as the result of a more internal process of the learner. The nativist however, sees the two-word utterances as the emergence of inborn knowledge of a Universal Grammar. Finally the functionalist views this as an attempt of the developing toddler to grapple with the various types of words used and the developing of a socially reinforced unique formation of grammar (Brown, 2007).

Brown leaves out the theory of Symbolic Interactionalism (SI) and the field of Hard Science Linguistics (HSL). SI and HSL focus on how people communicate and how symbols shape our social interactions. SI then uses this knowledge as a way to understand the functional aspects of our choices in our communicative behaviors for enacting changes of states in those who observe our behavior. HSL uses observations of people communicating in their environment to form territories of how people learn to communicate using speech gestures and facial expression (Coleman, 2012).

According to SI, the two word utterances used by a toddler can be understood as the child making use of stored contextual knowledge they have associated with a particular category of symbols. This contextual knowledge emanates from past experiences the individual has had with the category of symbols. Finally this contextual information is shaped by the relative successes and failures they have had in their past attempts to enact a change in its environment in regards to their perceived role in the interaction (Goffman, 1954). Similarly HSL would see the early communicative behaviors as “...are changes in the properties of a learner relevant to his ability to communicate, resulting from his interactions with his environment. Most in the broader discipline of second language acquisition conventionally describe these changes and the
behaviors that result from them in terms of ‘language learning’ (or ‘language acquisition’)” (Coleman 2005).

These views may be seen as identical to the functionalist view as described by Brown on the surface, but they differ significantly in the manner in which meaning is derived. SI and HSL view meaning as having a different source than those held by the dominant views just considered. They do not regard meaning as emanating from the intrinsic makeup of the thing that has meaning, nor do they see meaning as arising through a coalescence of psychological elements in the person. Instead, SI sees meaning as arising in the process of interaction between people. The meaning of a thing for a person grows out of the ways in which other persons act toward the person with regard to the thing. Their actions operate to define the thing for the person. Thus SI sees meaning as social products, or as creations that are formed in and though the defining activities of the people as they interact (Blumer, 1969). According to HSL a communicative behavior can be interpreted in many different ways all of which are based on an everyday common sense understanding of a given communication, as opposed to a concept of meaning from semantics (Coleman, 2012).

Stated another way the meaning of a symbol comes from the shared context of the originator of the symbol and the observer of the symbol. With no shared context there cannot be a shared meaning. Without a shared understanding of the intended meaning of a symbol between the originator of the symbol and the observer a possibility of a misunderstanding of the symbol may result on the part of the observer. The SI view is clarified in David (2000). She claims that the reactions of the originator of a symbolic interaction to a given symbol have little to no effect on the observer’s interpretation of
the symbol. She uses a cut out silhouette of a vase that is interpreted by an observer as
two people having a conversation as an example. It is her stance that in order for a
symbol’s actual meaning and its intended meaning to be similar it requires an
understanding of the observer’s tendencies for interpretation and a choice of symbols
from those tendencies.

This dynamic of symbolic selection based on the perceived expectations of the
observer can also be applied to, how a speaker selects his words in the hopes that the
listener comes to a close approximation to the speakers intended meaning. In short what
David (2000) refers to as an understanding of the observer's tendencies of interpretation
can also be referred to as vocabulary acquisition? When we learn new vocabulary
(communicative behaviors) we learn how other people who use the given vocabulary
(communicative behaviors) tend to interpret the vocabulary's meaning (the
communicative behaviors contextual representation).

C. Vocabulary Acquisition

Brown (2007) claims that vocabulary acquisition is perhaps the biggest factor in
achieving communicative competence in a second language, without a command of the
words that make up a language, it becomes exceedingly more difficult to understand
communications, let alone, create your own. In order to better understand how
vocabulary is retained we must look at several empirical studies that focus on vocabulary
acquisition. Whereas this claim seems to makes sense it is important to point out the
domain confusion on the part of Brown’s claim. Brown seems to treat words as though
they are real world entities with real world characteristics and real world features. Words
however are part of the logical domain, the domain of concepts, not real world entities.
According to HSL instead of focusing on words and vocabulary acquisition we should instead be focusing on the acquisition of new or changed communicative behaviors.

We will start this exploration with an examination of what strategies for vocabulary acquisition are being used, and a study of the differences in learning strategies between the sexes. This should give us an understanding of the types of strategies that are being used by students from a variety of cultural backgrounds. We will then move to a review of how students of various competence levels associate words. This should provide the evidence needed to adopt the Involvement Load Hypothesis which states simply “the higher the level of engagement a vocabulary learning exercise has the better the short and long term vocabulary retention becomes” (YouJin, 2008). A review of, the effect the type of tasks vs., the time spent on task has on vocabulary retention provides further evidence for this hypothesis. The Involvement Load Hypothesis has a lot of supporting evidence; however, it is not the only thing that has an effect on the learning and retaining of L2 vocabulary. Our ability to use and learn communicative behaviors in our first language seem to play an important role in language acquisition. In order to better understand this dynamic we will review two studies about the effect phonological storage and first language decoding skill have on second language acquisition in general.

Fan (2003) attempts to analyze the frequency of second language vocabulary acquisition strategies, as well as the usefulness of those strategies as compared to the perceived usefulness of each strategy by the students. She does this in order to identify the appropriateness of the various vocabulary learning strategies in regards to the level of difficulty of the vocabulary being used.
The results indicate that certain strategies work better than others depending on the level of difficulty of the vocabulary being used. Fan (2003) found that the use of external sources such as using a dictionary or translator was very effective in acquiring vocabulary in the most difficult vocabulary levels but did not have a significant effect on the lower three levels of vocabulary. Guessing in contrast seems to be most effective with acquiring the lower levels of vocabulary and ineffective for the higher levels. Fan (2003) noted that the strategies of known word association and dictionary use seem to be effective in all of the vocabulary difficulty levels. The use of rote based strategies such as repetition and word association according to this study seems to have a negative effect in all of the vocabulary levels. This conclusion was reached due to the fact that the students who relied on the rote strategies scored the lowest on the tests, indicating that the types of strategies used in the class room should be based on what will be the most effective for the difficulty level of the vocabulary being taught.

The difficulty level of vocabulary is not the only thing that seems to have an effect on what strategies are employed by students. It was found by Catalan (2003) that there are subtle differences in the number of adaptive strategies we employ when presented with learning new vocabulary words. Catalan used a combination of post-test surveys and observations of actually used strategies to gather information. Many similarities were found between the sexes in that of the top ten strategies used the two groups shared 8 of the categories. However, with in-depth analysis of the data it was found that even though the types of strategies used were similar, significant differences exist in that females tend to use a broader area of vocabulary learning strategies than males. It was also found that male seem to favor visual types of learning strategies and
the females seem to favor more audio based strategies. This may imply a sexual tendency toward ear learning and eye learning; however, the author points out that this study is not capable of making such prediction.

Catalan's (2003) observation in the differences between the sexes in their approach to a challenging situation seems to suggest that the difference in perceived culturally acceptable behavior can affect the amount of types of strategies attempted. If perceived culturally acceptable behavior can shape how we approach new vocabulary does that then suggest that lexical storage is affected in the same way? To answer this question we will look at Zhang's (2008) comparison of lexical storage of vocabulary cross-culturally. In this study the Zhang has representatives of seven cultural groups: Mainland China, Hong Kong China, Africa, Europe, native English speakers, South America, and other Asian countries. Zhang found “that the students from mainland China made fewer syntax related word association responses but found no other significant differences in the responses cross-culturally” (Zhang, 2008). As a result Zhang concludes that culture seems not to play a significant role in how English words are stored, but the level of language proficiency seems to be the major contributing factor in lexical organization of vocabulary.

Zhang’s findings despite their domain confusion are intriguing in that they suggest that lexical storage seems to be dependent on the level of sophistication of language proficiency. This is significant because it shows that as our ability to pair context with communicative behaviors increases, the way we access those communicative behaviors changes. The change in lexical storage supports the idea that communicative behaviors are attributed to contextual input, and that the same
communicative behavior can be attached to different contexts. If the contexts were attached to the communicative behaviors then the lexical storage of communicative behaviors would not shift as more sophisticated language proficiency developed, the shift would be in the lexical storage of contextual input attributed to the communicative behaviors. The fact that cross-culturally there is no significant difference in the way vocabulary is stored in English learners around the world also supports Bloomer's ideas about how people communicate and learn to communicate.

YouJin (2008) conducted a study to test the Involvement Load Hypothesis, which states simply the higher the level of engagement a vocabulary learning exercise has the better the short and long term vocabulary retention becomes. In order to test this hypothesis the author conducts two experiments. The first experiment tests how level of cognitive engagement effects vocabulary retention, while the second experiment explores the effect different types of cognitive engagement activities affect vocabulary retention. In the experiments YouJin (2008) finds her results to be consistent with the Involvement Load Hypothesis. The first clearly indicated that tasks requiring greater cognitive engagement produced greater retention in both short and long term. The second found no significant difference in the levels of retention in either short or long term between the two tasks tested. This is significant because both of the tasks in the second experiment were judged to consist of the same level of cognitive engagement while the types of engagement differed. Putting the results of her findings together YouJin (2008) concludes that the type of cognitive engagement is not important for vocabulary retention; however, the level of engagement plays a significant role; thus, providing supporting evidence for the hypothesis in question.
This hypothesis though also domain confused supports many of the underlying principles adopted by SI and HSL in regards to how people learn to communicate. If you consider the type of engagement was judged on the number of channels of input and output were used and, the level of engagement was judged by the amount of types of references that were available to the learner. Though it is important to note for HSL the type of engagement has a very significant role in our ability to learn. If you hear two Chinese words and are shown the words written in Chinese you learn to associate the sounds with the written form but you do not understand what either the sounds or the marks refer to aside from each other. If on the other hand you hear the Chinese words and are shown the written form of the words and a picture of a car, you can then learn to associate the Chinese sounds and markings to the concept of a car. The number of channels of input is the same but the type of engagement differs.

For example, if I show you the written word “ball” and then show you a picture of a “ball” you may develop false concept of what the written word “ball” refers to. You could for instance assume “ball” refers to a picture of an object not to the object in the picture. Furthermore unless you already know how to read you have no way of knowing if written “ball” has the same reference as spoken “ball”. As a result of the conflicts that arise the cognitive storage of the concept of the written form of the word “ball” becomes compromised. In contrast if I say “this is a ball” while pointing at the ball in the picture and at a ball then it is less likely that conflicting concepts will arise thus allowing more efferent access to the desired contextual reference from the communicative behavior present in the written form of the word “ball”.
Hill (2003) examines the effects of various vocabulary exercises on vocabulary retention. As a secondary research question Hill also looks at the amount of time spent on each task in its relation to successful vocabulary retention. To facilitate this inquiry Hill makes use of a computer program built specifically for this task. She placed the test subjects into three groups each group was assigned one of three types of exercises: a message-oriented task (presenting the written word “ball” and a picture of a ball, then having the student perform a fill in the blank exercise without any other input); a form-oriented comprehension task (presenting the written words and a pictures of what the words refer to then having the student match the words with the pictures); and a form-oriented production task (presenting the written word “ball” and a picture of a ball then presenting the student with a picture of a table with a ball on it and asking the students to identify what is on the table). Though the first and third treatment may seem similar it is important to note that in the first task only asks the student to produce a one-word answer. The third treatment requires the student to produce a complete sentence as well as forces them to match the picture with the word in question.
Of the three types of tasks studied the message-oriented task performed the lowest on the post exercise tests. Hill attributes the ineffectiveness of the message-oriented task to the fact that such tasks require a less sophisticated engagement with the target vocabulary. Hill also found that form oriented comprehension tasks and form-oriented production tasks showed no significant differences in vocabulary retention. However, Hill speculates that this lack of significant differences between the two categories could have been a result of her limited sample size. Hill also found that time on task seemed to not play a significant role in vocabulary acquisition due to the fact that all three tasks took about the same amount of time to complete.

Hill's (2003) study is of significance due to the fact it points to types of exercises that will not only yield better vocabulary retention but, also that by using form-oriented comprehension task and form-oriented production task based exercises in second language instruction vocabulary retention and acquisition can be made more efficient. Interestingly in the form oriented comprehension tasks and the form-oriented production tasks not only was the information received by the student but they also required the students to contextually engage the target vocabulary more so than the message-oriented task activities.

These studies seem to all indicate that the greater the contextual input and cognitive engagement involved in learning new communicative behavior, the greater the retention of how to use and interpret the behavior will be. This gives us a basic understanding of how vocabulary is learned, however, these concepts are not the only factors that can affect language learning. Phonological sequence learning and first language decoding ability also seem to play a significant role in second language
acquisition. In order to demonstrate this point, Special (2004) conducted two parallel tests. The first test consisted of a comparison of student’s ability to pronounce and repeat non words using L1 pronunciation rules (in this case English) and student’s performance in L2 classes. Special (2004) found a direct correlation between the ability to pronounce the non words and repeating those non-words with performance in their L2 class. In order to reinforce this theory the second test used Spanish-like non-words in the same way the English non-words were used to indicate performance in a Spanish class. Much like in the first test the authors found that phonological sequencing and short term store ability did predict the student’s performance in the course in question.

Meschyan (2002) examines the question of whether or not first language (L1) decoding skills can predict performance of students in their first semester of second language (L2) instruction. The hypothesis process is as follows. Does L1 decoding skill predict native L1 vocabulary retention? Do L1 decoding skills predict L2 decoding skills? Do L2 decoding skills affect L2 vocabulary retention? Do L2 decoding skills predict the overall performance in L2 learning? The researchers conclude that L1 decoding skills do in fact predict vocabulary retention in L1, the level of L1 decoding skill predicts L2 decoding skills, L2 decoding skills predict L2 vocabulary retention, and finally L2 decoding skills predict performance in L2 learning. So in short L1 decoding does predict L2 learning performance. This study shows that if a person has difficulty communicating in their first language then those issues will carry over into their attempts to learn to communicate in their second language.
Special's and Meschyan's findings point at the fact that the learners cognitive function plays a role in the learners ability to process and recall communicative behavioral information. This idea, that the student’s ability to process information affects their ability to learn how to communicate is in line with HSL and SI in that for both the inability to process the contextual input with the communicative behavior would adversely affect the person’s ability to learn to communicate in general. It should be mentioned however both Special and Meschyan seem to operate with the assumption that the primary input for language learning is language and not contextual input as it is understood in HSL and SI. Despite the domain confusion of the authors assumptions about how we learn to communicate their findings cannot be invalidated in that our ability to store and access phonological sequences should reflect and our ability to recall and apply the governing rules of communicative behaviors for a give group reflect our cognitive ability to process and access communicative behaviors and their governing rules in general.

As we have seen in the studies in this chapter the input necessary to learn to communicate is not the language itself. It is in the contextual input that emanates from the environment the communicative behaviors are experienced in. The ways in which others react or interpret our attempts to communicate affect what communicative behaviors we chose in our next attempt. The contextual information associated with a communicative behavior can change in every new encounter with the behavior. The more we use with a behavior to communicate the easier it is to recall the behavior and its associated contexts. Finally our cognitive ability to process information has a correlation to our ability to learn to communicate.
D. Generating Contextual Input in a Simulated Environment

With this in mind it is easy to understand why text based DLL has been unpopular. The lack of ability to generate contextual input in a variety of channels through text based communication for the learner to experience the language in creates a lack of ability to process the contextual information associated with the target behavior. However, as, computer technology progresses this concept becomes less true. We are now able to host DLL in simulated environments.

Jones (1996) points out simulations and games can be used as dynamic teaching tool that, when used to its full potential generates student immersion into the activity and personal investment both cognitively and emotionally. Through this cognitive and emotional investment in simulation and gaming activities it is possible for the pairing of meaningful context and the target communicative behavior to be achieved by the student. In the past simulations have been understood as being effective teaching tools for their ability to generate student involvement by being fun. This understanding of how simulations benefit the learner is unfortunately too narrow to account for its effectiveness.
Simulations have the ability to generate contextual scenarios in which, the learner, through social experimentation, manifests changes of states in their simulated environment. It is this process of experimentation to create a change of state in the imagined [simulated] environment, that facilitates the development of the skills necessary to create a change in state in the learner’s actual environment (Goffman, 1954). Stated another way simulations provide a safe place for the learner to experiment with the target skills (in this case speaking a second language). From the experience gained in the simulation mastery of the skills can be achieved (Jones 1996). These trends can be seen in commercial computer games as well.

*Figure 1: A player controlled avatar interacting with a chicken in a VR world (Bioware, *NWN ESL Server Module*, 2010)*
Computer generated simulations have now evolved into virtual 3D worlds in which players control avatars and interact with virtual objects and environments and each other. In Figure 1 there is a player controlled avatar interacting with one of four farm animals in his presence. In this case he is interacting with a chicken. Note how the program both highlights and labels the object being interacted with. This form of interaction with multiple channels is necessary to build context as we have discussed earlier. The “players” of these games similarly may be physically located anywhere in the world while interacting in the virtual reality (VR) environment. The builders of said environments are free to create any manner of object or environmental physics they choose. In Figure 2 we see an image of an avatar super imposed over three different environments a desert, a jungle, and a cave. In each of these environments the play experience is slightly different in that movement may be slowed, sound effects change, and general visibility changes as well. The players in these environments interact with each other in relation to the environments provided by the world builder.

*Figure 2*: This picture shows an avatar in three environments each environment has its own physics with relation to sound effects, avatar response, weather, and item manipulation (*Bioware, NWN, ESL Server Module, 2009*).
Examples of this can be seen in popular computer games such as *Second Life*, *Real Xtend*, and *Never Winter Nights (NWN)*. In all of these games the players each log onto the world from their separate locations and play (interact with the VR world) individually but at the same time. In this way players are free to interact with the world on their own or in groups by “meeting up” (having their avatars interact with the world at the same time in the same VR space as seen in Figure 3) in the MUD game.

E. MUD V.S. MMORPG

When a MUD can allow more than 60 people to interact in the same environment at the same time it is typically referred to by the online gaming communities as a “massive multi-player online role playing game” (MMORPG). A MMORPG is a MUD that does not limit the number of players. Both MUDs and MMORPGs facilitate the
interaction of players around the world as mentioned above but it also allows for a more dynamic interaction then what is available through text only communications. In a well developed VR environment indicative behavior is possible in multiple channels. You can make an avatar point at a ball type “this is a ball” in the text chat, and out lud say “this is a ball” over voice chat.

MUDs are of particular interest because of their potential uses in computer mediated language learning. If the instructor has the ability to customize the world in which the students interact the teacher then has the ability to control both the lexical and contextual input for the target language. Interactions with objects in the game can be shaped in such a way that the game can both teach and test the learner’s progress. In some cases the teacher even has the option to log into the game as a controller allowing them to shape interactions and events in real time within the game while the students are playing. This allows for quick fixes of unforeseen circumstances such as bugs or lack of player interest. Such options typically allow the teacher to choose whether or not the players can observe or interact with the controller in the game itself, allowing for a great amount of flexibility in the possible player experience in the game.

MMORPGs have many advantages over smaller scale MUDs in regards to accessibility for the public and quality of the overall VR environment however, those same advantages cause the MUD to be a better fit for our purposes in DLL. Teaching in a MMORPG is similar to teaching at a public place like a train station. You can gather your students in one place but, you have no control over the other people's actions at the train station not associated with the class. Furthermore as a result of MMORPGs being
controlled by corporations and constantly accessible by the public, the teacher’s ability to shape the world to the lesson becomes difficult.

If the MMORPG allows the world to be shaped by the players then an outsider could reshape the world while the lesson is being taught. As a result consistent learning experiences would be impossible. If the class happens in an MMORPG that does not allow the players to reshape the environment then the teacher must find locations for the class to gather away from interloping passerby’s that is suitable for the lesson. This situation could result in confusion and difficulty in the gathering of the members of the class in the correct location.

In contrast many of the MUDs available have applications that allow the teacher to not only create the entire world but also control who has the ability to enter that world. This can be achieved with a password or a server specific program that is required to interact in that world. When compared to MMORPGs a MUD has many of the advantages teaching in a mediated classroom has over teaching in the train station. You have control over distractions available to your students and interactions with the world outside of the class room. The limited access to the VR also allows for game companies to allow for easier and more profound customizations of the games content.

F. Game Choice

In the case of *Never Winter Nights (NWN)* released in 2002 not only does the teacher have control of who is in the world they also have the ability to shape the world in order to produce the desired contextual framework for the lesson. The NWN game also allows for the teacher to log in as a game controller instead of a player. While logged in as a controller, the teacher, can build temporary objects and puppeteer the various non
player characters (NPCs) in the game, by doing this the teacher improves the game experience. For these reasons the NWN game engine was used to create a VR environment that will provide the contextual back drop for the target language skill set. The skill set in our case is receiving and following directions to a location and to complete a task.

All of the interactions with the NPCs in this simulation are set up in such a way that the student has the potential of a mis-communication. The mis-communication then results in the NPCs reacting in an undesired manner. The NPC will give a confused response and end the conversation. The student must then make another attempt at the communication. If the student makes the right choices in the conversation the NPC responds in the desired manor, by giving the information necessary to progress the storyline. Each of the conversations the player has with the NPCs contains information about how the player must interact in the world to progress the story.

As discussed in section II.D of this paper the NWN allows indicative information on multiple channels. The multiple channels will allow the learner to efficiently process the contextual input and the communicative behaviors presented to them as discussed in section II.B of this paper. This aspect of the design is in line with the Involvement Load Hypothesis discussed in section II.C of this paper. Furthermore the text based communication with the NPCs in NWN allows the student to take their time, review, and analysis the results of attempts to communicate.

As prescribed by Hill (2003) the game progression requires the students to perform various form-oriented production and form-oriented comprehension tasks. According to Hill these types of exercises improve the impact in the learners short and
long term recollection of the vocabulary being taught. Finally built into every
conversation is, the potential of the student making a production error, resulting in
undesired reactions from the NPC’s. This dynamic creates a positive reinforcement for
the correct use of communicative behaviors in the game. There will be amore detailed
discussion of the game design and pedagogical approaches will be had in the next
chapter.
Chapter Three

Game Design

A. Overview

This chapter will present the results of my attempt to build a *Never Winter Nights* (2002) single player module, designed to facilitate the improvement of an ESL student’s ability to use appropriate communicative behaviors in an English speaking environment. This chapter will be presented six more sections. Section B will discuss pedagogical approaches built into the game design. Section C will discuss the briefing period of the simulation. Section D will discuss the overall story line and flow of the game. Section E will discuss the debriefing for the simulation. Section F will highlight changes in the design necessary for a multi-player environment that uses the same pedagogical framework established in Chapter 2. Finally section G will close this chapter with a brief discussion of how a multi-player environment such as this could be coupled with other CALL and DLL tools such as chat rooms, message boards, emails and video conferencing to create an efficient learning environment without the use of a classroom.
B. Built in Pedagogical Approach

**Figure 4.1:** A PC interacting with an NPC

**Figure 4.2:** PC making a communication error

**Figure 4.3:** PC making correct communication choice.

**Figure 4.4:** NPC responding to communication error with a confused response.

**Figure 4.5:** NPC responding to proper communication by furthering the story line.

*Figure 4:* correct and incorrect communication choices and their outcomes

*(Bioware, NWN, ESL server, 2012)*
The primary pedagogical approach built into this module is cause and effect. When the player character (PC) exhibits the correct communicative behaviors and the correct responses (taking appropriate actions based on what the PC was told by the non-player characters or NPCs), the story line progresses. If the PC makes a mistake in an attempt to communicate with the NPCs or fails to follow the NPCs directions the story line stalls. The stalling of the story line is important as it creates a lapse in the overall entertainment value of the game. The lapse in turn generates motivation for the learner to make the right choices in their communication attempts. By consistently making the right choices the PC improves the entertainment value of the game experience. As the PC makes mistakes in attempts to communicate with the NPCs, the NPCs will respond in a confused manner and end the conversation. The PC is able to restart the conversation as many times as the PC needs to make all of the correct choices, see detailed discussion below.

These features are in line with Jones’s Idea discussed in section II.D that simulations allow the learner to experiment in a safe environment to build the skills necessary to perform in the real world (1996). Much like real world communication dynamics, this style of cause and effect pedagogy will both teach the learner by providing correct examples and, tests the learner and test the learner with every attempt they make at production. The success rate of each learner is automatically logged by the game as well as each action taken and the time it takes for the student to make a response or move to a new area. This activity log the game generates is important in that it allows the teacher controller to shape the debriefing of the simulation to better suit the student’s needs (Jones, 1997).
The PC is also able to take the time to reexamine what choices were made before starting the conversation again. This dynamic of instant feedback coupled with the ability to review communicative attempts is in line with Yuan's (2003) findings discussed in section I.C. Yuan (2003) points out that using instant feedback and shaping interaction based on student performance is beneficial to the improvement in the use of communicative behaviors by the students. Yuan attributes instant feedback facilitating the students correcting themselves over time.

The secondary pedagogical approach built into the interactions between the PC and the NPC's is the multiple choice structure of the conversations (See Figures: 4.1-4.5). At each instance of the PC interacting with an NPC a conversation window opens in the top left of the screen (see figure 4.1). The top of the window has what the NPC is saying to the PC. The bottom of the window has several choices of how the PC will respond to the NPC (see figures 4.2 and 4.4). Only one of the choices displays appropriate communicative behavior, specifically in regards to word order and basic sentence structure. This structure allows the student to see appropriate communicative behavior in isolation in what the NPC says and forces the learner though cause and effect to select the correct behavior. If the PC makes the right choice (Figure 4.3) they receive the information necessary to progress the story line (See Figures 4.5). If the wrong choice is made by the PC then the conversation will end (See Figure 4.4).

By the time the learner completes the game they will have selected the correct communicative behavior in seventeen unique conversations with NPCs, each time producing an effective result. All incorrect choices are communicatively ineffective and do not advance the game. Each conversation has several examples of correct
communicative behavior as well as several instances where the learner must choose the correct response. This provides the learner with exposure to a wide variety of communicative strategies employed by the NPC’s in their communication with the PCs. Furthermore by the time the learner completes the game they will have demonstrated seventeen instances of acting appropriately in regards to what the PC was told by the NPC. These appropriate actions demonstrate not only an understanding of the target vocabulary but also an understanding of the communicative behaviors exhibited by the NPCs.

The third pedagogical approach built into the game is redundancies of labeling. Throughout the game environment there are many road signs clearly labeled to allow the learner to verify location. The signs can be read in one of three ways. The mouse pointer can be held over the sign. This will cause the sign to glow and its title to appear in floating text above it. Or the PC can click on the object, this will open a conversation window and the contents of the sign can be read. The third way is when the player presses and holds the Tab key. When the player presses and holds the Tab key it causes all objects that can be interacted with in view of the PC to glow, and their labels appear in floating text above them. Similarly any NPC or object in the game that can be interacted with can have their name verified in the same three ways.

This third pedagogy is the fundamental way in which the game facilitates vocabulary acquisition. The PC must not only make the correct word order choices in their attempts to communicate with NPCs they also must make the correct choice of action after each conversation in order to progress the story line. This is an important part of the pedagogy because it facilitates vocabulary acquisition through realistic interaction.
with the objects and NPCs in the game. The first quest in the story line is a good example of how this works. The key vocabulary words in this quest are farmer, chicken, catch, pick, chicken feed, and chicken pen.

In order to complete this quest you must first find the NPC labeled “Farmer Brown”. This NPC is located in an area labeled “Farm” he is an older man working with a pitch fork near an animal pen and a few bales of hay. Farmer Brown explains that if you want him to help you, you have to catch his chickens. The chickens NPCs are small brown bird like avatars each labeled “chicken”. The chickens are programmed to run away from the PC. While the PC is pursuing the chicken NPCs the PC will encounter a young boy labeled “Jimmy Brown”. Jimmy explains that to catch the chickens the PC needs some chicken feed and tells the PC to talk to his sister Sara. Jimmy’s sister is a young lady standing in a field of crops; she is labeled “Sara Brown”. Sara tells the PC how to pick the chicken feed from the field. Once the PC picks the chicken feed from the field by clicking on the plants in the field an inventory page opens and the PC must drag the content from the plant’s inventory into the PC’s inventory, the chickens start to follow the PC. The chickens will continue to follow the PC until he talks to Farmer Brown again. Farmer Brown tells the PC they must put the chicken feed in the chicken pen by clicking on the pen a dialog starts and the PC is given a choice to drop the chicken feed or not, so that the chickens will stay in the pen and to return to him after the PC is done. The chicken pen is a small fenced in area next to where Farmer Brown is standing. After the PC deposits the feed in the pen and returns to the farmer, Farmer Brown tells the PC that he does not have the part the PC needs to fix the wagon but, he gives the PC
directions to find the blacksmith. Thus the story continues if the PC is successful in following Farmer Brown's directions.

The contextual environment generated by this scenario allows the PC to associate “farmer” with a man who works with animals on in a place called a farm. The PC learns through interaction with the chickens that a “chicken” is a small fast bird that does not fly, that is raised by farmers in a farm and a chicken is attracted by a type of plant they picked from a field called “chicken feed”. The PC also learns that to “catch” the chickens they must place the chicken feed in a small fenced in area called a “chicken pen”. In SI terms the vocabulary gains its meaning through how the NPCs interact toward the PC in regards to the object the vocabulary refers to. This meaning is then reinforced though a trial and error process as the PC attempts to enact changes in the simulated environment. In HSL terms the PC learns through the nature of the communicative behaviors enacting changes of state in the observer of the behavior. By observing and experimenting with various changes of state in the PC and NPCs based on their respective communicative behaviors (choosing the correct response in a conversation or not, and taking the correct action in the game after a conversation or not) the PC learns that certain communicative behaviors refer to certain simulated real word objects and simulated real word actions. As a result of the PCs observations, a persistent change in state regards to the PCs communicative behaviors occurs in regards to the objects and states of objects interacted with in the simulation.

This redundancy of labeling and the student’s ability to scroll back their conversations allow the player to verify their understanding of the NPC communication. This concept is explained in section II.C in our discussion of Hill's (2003) study.
Together the ability to review what was said as well as the redundancy of labeling should improve the student’s ability to recall the behavior in both short term and long term scenarios outside of the simulation as compared as well as help to simplify the amount of contextual input that is typically necessary in the real world. Unlike in the real world everything that can be interacted with in the game is in fact labeled with its target vocabulary word. Because of this labeling every time the PC interacts with an object or presses the tab key while the object is in view they build an association between the label and the object that is in addition to the association the PC builds during the interactions themselves.

C. Briefing

One of the reasons the NWN game engine was picked for this project was that it had been published in six languages. This makes the explanation of how to play the game convenient for a large portion of the world’s population. It is recommended that, for the purpose of allowing the students to become familiar with the game mechanics they are allowed to play the introduction module that comes as part of the standard game in the student’s first language. This will allow the student to become familiar with how to control the avatar and interact with objects in the game with instruction in their first language.

After the students become acquainted with the game interface they should be introduced to the ESL module. Before the simulation starts the students should be told they will be using a computer simulated environment to teach them how to communicate in English. The instructor should be careful in their explanation of the plot of the game itself. What the students should be told is that the story takes place a long time ago and
that their character is trying to get transportation to school before classes start on Monday. Do students should not be informed that they will have to talk to the farmer, blacksmith, or other NPCs. They should, however, be encouraged to interact with the NPCs they encounter in the game.

D. Story Line

The game opens with the PC standing on a small platform, facing a man labeled Carriage Master who is standing next to a wagon. When the PC interacts with the man by clicking on him with the mouse cursor a conversation starts. The PC asks him “why have we stopped”. The Carriage Master explains that the wagon the PC was riding has broken an axle pin and the horses ran off. The Carriage Master then asks the PC to head north to the farm the wagon just passed to see if “Farmer Brown” can help.

Once the PC walks to the area to the North the PC passes a sign that says The Farm. The first non-player character (NPC) the player sees in the farm area is named Farmer Brown. When The PC talks to Farmer Brown he tells the PC that, the wagon has broken his chicken coop and if the PC wants his help the PC must catch his chickens. The chickens are programmed to run away from the PC until the PC picks some chicken feed from a nearby field. By talking to the other NPCs in the area the PC learns that they must pick the feed and where to find it. Once the PC picks the chicken feed the chickens follow the PC until they drop the feed in the chicken coop.

When the PC reports back to Farmer Brown he tells the PC that he does not have an axle pin, but he knows where the Blacksmith is and he should have the item in question. Farmer Brown then tells the PC to go back to the crossroads and head west. The Farmer then tells the PC just before the town on the right hand side of the road they will
find the Blacksmith's shop. As the PC follows the directions provided by the farmer there are street markers to verify location for the PC.

Once the PC reaches the Blacksmith the Blacksmith explains that he does have the axle pin but that it costs $20. The PC must explain that they do not have any money. The Blacksmith then suggests they head into the town and see if they can find a job running errands for the shopkeepers in the town square. The Blacksmith then tells the PC to make sure they come back after they make some money. As the PC continues down the road they enter a town in the town square.

In the square there are three NPCs a younger man, a woman, and an old man. The younger man sends the PC back through the crossroads and to the South to pick up a shipment from the docks on the beach and return it to him. The woman sends the PC back to the farm to get some eggs and return them to her. The old man gives the PC a complicated set of street directions to find the hospital on the other side of town to deliver a letter. As the player completes each task they are rewarded with some money. As mentioned before the streets are realistically marked to allow the PC to verify location.

After the PC completes all of the delivery tasks they have the $20 needed for the axle pin. Once the PC has the money needed for the axle pin they are able to return to the Blacksmith to get the part. After purchasing the axle pin the PC can return to the wagon to deliver the axle pin to the Carriage Master to end the game.

E. Debriefing

After the simulation is over the teacher should check the game logs in order to identify areas where the students may need extra instruction. These can be identified by conversations where the PC consistently made the wrong choices or when there was a
long lapse in time between two stages of the quests. The first will indicate a lack of understanding of what is expected in communicative production. The later would indicate a lack of understanding of the instructions given by the NPCs or difficulty understanding the game’s interface. Once the trouble spots are identified and additional instruction is given for clarification. A review of the target vocabulary and communicative behavioral forms should be provided. This will help the students to realize what communicative behaviors they had learned as well as allowing the students to reflect on how the events transpired.

F. Design Changes Necessary for a Multi-Player Environment

In section III.D the flow of the game presented was for a single player. As such the flow and progression of the game is fundamentally liner in design. The PC talks to one person that person tells them what to do, that is, until you reach the town. In the town you are free to take any one of three quests available. Although all three things must be accomplished the player has the opportunity to choose in what order. Furthermore the plot is player centric in that all actions in the game are a result of the player’s actions in the area. Without the player in the area nothing happens.

In order for a multi-player environment to work the quest progression must move away from a linear progression model and use a much less PC centric overall plot in the story. As it stands in the single player module the world literally revolves around the one PC. Instead of using a plot where the PC is the main character, the plot of the game should be more general so that many players can enjoy the spotlight. With this in mind the plot needs to be more global in nature, such as one centered on life and times of the residence of simulated city. Then each player has a chance to pick the nature of their role
in the city. Various jobs could be built in. Factions or team competition such as a cops and robbers scenario or some kind of trade commerce may work well. Whatever the global plot it is important that every learner has an opportunity to play important roles as well as non-important roles at one point or another.

The second major change that must happen is that much more content must be added. In my module I have built seventeen quests. For a multi-player environment meant for sustained use I would recommend for a persistent virtual world that at least fifteen unique quests be available per intended user. So if you intend to build a module for ten simultaneous users at the same time you would need around one hundred and fifty quests for the players to choose from. These can then be set into strings of overlapping linear progression which could then be further stratified into different difficulty levels by quest string. By following this model the needs of students at many levels of proficiency could be met at the same time in the game.

G. Incorporating MUDs into CALL and DLL.

Perhaps the largest advantage a multi-player game would have over the single player one I built is the students would have an opportunity to learn from each other as well as the game. In my experience as a player in MUD games having access to more experienced players while playing is a huge benefit if for no other reason than just to have someone on hand to ask basic questions. If the game is set up for team interactions then player groups will form and that will foster collaborative work among the students. This can be further enhanced by adding a message board for the player groups to communicate out of the game on. The message board could also act as the venue through which the teacher addresses the class. As I mentioned earlier in this chapter the game
automatically logs everything the players do. This log can allow the teacher to identify communicative issues not accounted for in the game design and address them either in the game by manipulating the NPC for custom interactions or by shaping assignments outside of the game to foster improvement in that area the students are lacking.

This thesis does not suggest that all language classrooms be replaced by MUD environments. However, this study does suggest that MUDs should be used as a way to enhance the learning experience especially when a classroom environment can not provide an immersive environment in the target language, such as in a typical classroom in a non-English speaking country. In cases where the student and the teacher never meet the MUD can act as the venue for deeper understanding of the relationship between communicative behaviors and the contextual representations they refer to then what is otherwise possible.

In closing, I was able to create an interactive three dimensional environment designed to teach specific communicative behaviors such as receiving and following directions, proper word order for meaning, and a small group of vocabulary words. This environment was built in one year’s time with an overall cost of $25 for the game and no computer programming education. Though the result is limited in scope I am sure that someone with an actual computer programming educational background and the same ESL education training as myself could create a far more complex and broader scope game design in a similar amount of time.
References


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