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Second Language Learning in an Online Computer Game: Insights from Theories of Social Interaction, Practice, and Nonlinear Dynamics

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Second Language Learning in an Online Computer Game: Insights from Theories of Social Interaction, Practice, and Nonlinear Dynamics

by

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Dedication

To Mom, Dad, and Brad

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Second Language Learning in an Online Computer Game: Insights from Theories of Social Interaction, Practice, and Nonlinear Dynamics

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Research in second language acquisition has typically focused on classroom and laboratory settings. This study explores second language use in a non-classroom setting. It is based on research from divergent fields including theories of social interaction from sociology, theories of practice from anthropology, and nonlinear dynamics from the physical sciences.

This study is a qualitative study, which employs both ethnographic and discourse analytic methods. The study examines native and non-native English speaker interactions on a MUD, a text-based online game. Data

was collected for one year. The data for analysis consist primarily of logs of online interactions.

The major conclusion of this study was that individuals acquire language appropriate to a particular environment by interacting with others in that environment. As individuals come to an environment and strive towards particular non-linguistic goals, they necessarily interact with others in the environment. As they do, they create shared ways of interacting. Through interaction, they refine the ways in which they speak.

By employing multiple perspectives to guide the analysis, new insights into second language use and interaction can be obtained. This broadens our understanding of second language use in non-classroom settings. Implications for pedagogy in foreign language education are discussed.

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CHAPTER 1: INTRODUCTION

As a language instructor for 15 years and a language learner myself, I have often wondered why some individuals are able to learn to interact in culturally appropriate ways in a foreign language while others seem to continue to struggle to get their ideas across. Over the years, I have encountered a few individuals who seem to have the ability to quickly learn and come to use language quite fluently. These individuals learn not only the grammar but also the vocabulary, intonation, idioms, cultural references, and other aspects of their second language that make their conversation ability approach that of native speakers. These learners are certainly the minority. Most second language speakers seem to struggle to get their ideas across, and the language they produce is inevitably awkward. In short, they appear to be translating their ideas from their native language.

My curiosity was piqued again when, in the last semester of my master's program, I began to play online games where I encountered a large number of non-native speakers who used English in ways that were uncannily culturally appropriate for the game community. These game participants appeared to interact with others in English with ease. In fact, there seemed to be little difference in the language produced by native and

non-native speakers. Interestingly, game participants were not concerned with language learning at all but rather competing and winning the game.

My experience with non-native speakers contrasted with my experience in the classroom both as a teacher and as a learner. In the classroom, students and teachers appeared to concentrate on language rules that can be applied to any situation. Under this system, it seems that teachers and students exert a great effort to improve language ability. As a student under this system, I studied rules but had difficulty in producing language to fulfill communicative purposes. As a teacher, I watched my students strain to produce any language, much less language that would be deemed culturally appropriate.

I began my Ph.D. program, and in my courses, I was exposed to a great number of theories of second language acquisition. Many of these theories addressed differences in learning. From these theories, what I have become most interested in is the occurrence of second language users who successfully interact in culturally appropriate ways. In this study, I examine the Malaysians who interacted in uncannily culturally appropriate ways in English on an Internet Game.

I have pulled from theories not typically applied to second language acquisition and have used these to analyze how language was used in a text-based online game populated by both native and non-native English speakers. First, I will review theories from social interaction,

which come from the fields of sociology and communication studies. Second, I will review theories of practice from anthropology. Finally, I will present ideas from nonlinear dynamics, a field started in mathematics, meteorology and similar sciences that have spread to many other disciplines. Before reviewing these theories, I will briefly describe the current state of the field of second language acquisition in order to locate my study in relation to other studies.

SECOND LANGUAGE ACQUISITION

The field of second language acquisition is broad. It contains many research agendas, perspectives, and viewpoints that have helped to illuminate the complex phenomenon of second language acquisition. In this section, I briefly overview major trends and perspectives in an attempt to locate my study in the field. Two often cited and commonly discussed viewpoints are the cognitive and the sociocultural viewpoints. Cognitivists are seen as being mostly concerned with learner internal processes, and socioculturalists are mostly viewed as concerned with social and cultural factors in the learning process.

Cognitivists have perhaps been the most prolific of researchers. In fact, compendium studies such as Ellis (1994) illustrate the productive nature of this group of researchers. Further, cognitivists have been so

prolific that, at least several years ago, some have criticized the field for having focused too exclusively on learner internal variables (Firth & Wagner, 1997).

Part of the success of this fertile area of research has been its theoretical backing from the fields of linguistics and cognitive psychology. These two fields have provided important and well-researched perspectives on learning and language upon which researchers interested in second language acquisition have been able to base their own studies. Chomsky revolutionized structural linguistics when he stated that humans are biologically predisposed for language. In his view, the human mind contains the structure of a universal grammar that facilitates individuals learning languages. His model helped to explain the way children learn their first languages so quickly. His model has been particularly helpful to cognitivists because it provided researchers with a model for language.

In the last 20 years or so, a group of researchers have forwarded a concern for social factors in second language acquisition. These researchers have drawn from more current trends in cognitive psychology based on the works of Vygotsky and Bahktin. These researchers have been led by Lantolf (see Lantolf & Thorne, 2006 for a summary of the work by socioculturalists). Socioculturalists have emphasized the impact of social and cultural forces and structures on the learning process. They posit that learning is not the product of one individual's internal process but rather

the product of various individuals in interaction (Wertsch, 1991). Socioculturalists exchanged Chomsky's fully formed grammatical sentences with utterances – what people really say in interactions (Sampson, 1983; Volosinov, 2006; Wold, 1992). Furthermore, Artigal (1992) theorized that the learning acquisition device exists not in the mind but rather in social interaction. The sociocultural view has provided a different view of language, where knowledge, built in the head of one individual, was transported into the brain of a second via language. In sum, socioculturalists believe that meaning and language are built in interaction and not in the head of individuals.

Another group of researchers that sometimes goes unnoticed by those focused on the two aforementioned groups is a diverse group of researchers who have proposed various perspectives on second language acquisition. Each of these researchers has independently constructed different ways of thinking about second language acquisition in general or used theoretical backings other than those based on either Chomsky's or Vygotsky's work. An early example of one researcher is Schumman (1978) who proposed social distance theory. In his view, language acquisition strongly relates to the extent to which individuals integrate into the host culture. A second example is Gardener (2001), who proposed a socio-educational model of motivation. Another group of researchers who cannot be neatly placed into either the sociocultural or cognitivist camps

are those who have used perspective based on Lave and Wenger's (1992) communities of practice theory. These researchers have attempted to relate language acquisition to successful interaction and acquisition of practices within their local communities (Toohey 1996, 1998; Witse, 2001; Flowerdew, 1998; Johanson, 2001). A fourth example is Larsen-Freedman's (1997) use theories of chaos and complexity as a lens through which to view second language acquisition. More recently, there has been a proliferation of this third group of researchers as diverse researchers have made their voices heard in the field (Moore, personal communication, 2007).

My study fits most closely into this diverse group of researchers. This study differs significantly from more traditional second language acquisition research in two ways. First, this study focuses on the Malaysians who played an internet game. Most studies in the field, particularly cognitive and sociocultural studies, have tended to focus on classroom and laboratory settings. While such studies have certainly informed our understanding of second language acquisition in nontrivial ways, I feel that looking at other environments may help to inform and expand our understanding of second language acquisition.

Second, for my study, I have pulled from three broad theories not typically employed in second language acquisition research. These theories include social interaction from sociology, theories of practice

from anthropology, and nonlinear dynamics from the physical sciences. I hope that the use of alternate theoretical background will also help to provide a somewhat new perspective on second language acquisition.

THE ALTERNATE REALITY MUD

I conducted a one year study using ethnographic and discourse analytic methods on an internet game called the Alternate Reality MUD. Because researchers interested in second language acquisition may be unfamiliar with MUDs, it is beneficial to describe what a MUD is here. A MUD is a virtual environment composed completely of text. Thus, there are no graphics, such is common nowadays in online games. Individuals from around the world can connect to this environment via telnet or a specialized software program. Game players log on and create a virtual persona. The Alternate Reality MUD had a medieval theme, so players created wizards and warriors. When they logged on, they would be located in the central room of a hometown. Players would see a description of the room, any objects present in the room, and the personas, or avatars, of other players.

The Alternate Reality MUD consisted of over 8, 000 virtual room. Players could move about the virtual environment as they explored and looked for treasure. Each room they entered provided them with a paragraph description of the room along with whatever objects might be

present. Virtual objects included unmoving and unchanging items such as weapons, armor, trees, and doors and changing and moving objects, called mobile objects, such as humans, dragons, and other creatures. Players were constantly interacting with various aspects of the virtual environment, which included objects and mobile objects. The game was fast-paced; thus, unlike a chat room where individuals talk to other individuals, on MUDs, players must quickly react to changes in the environment as mobile objects might attack them or chase them. Text often scrolled quickly over one's screen a player would move through a series of virtual rooms or battle mobile objects.

Players also formed groups, collaborated, and competed with other players as they attempted to gain prestige by acquiring particular objects and conquer particular areas of the MUD. By forming groups, players were able to overcome greater challenges than they could alone. Thus, players interacted with other players and the environment.

THEROETICAL BACKING

In an attempt to explain the language use of successful learners, I have employed three theories not typically used in second language acquisition studies. In the following sections, I briefly outline these three theories, social interaction, practice, and nonlinear dynamics, to provide

the reader with an overview. In chapter 2, I explain these theories in greater depth.

Social Interaction

One broad perspective that I use as a theoretical backing is social interaction. A wide range of scholars in various fields related to sociology have discussed language, identity, and learning in social interaction. Mainly, these researchers have demonstrated that interactions can be analyzed systematically and logically without having to resort to innate models of language and language acquisition.

One of the earliest of these researchers was Goffman (1959, 1974) who founded microsociology. In his work, Goffman closely examined interactions in an attempt to build theories that would explain the rules that govern social interaction. Not long afterwards, Sacks, Schegloff, and Jefferson began the now prolific field of conversation analysis. In their early work, they found that rules arise and are applied in interactions (Sacks, 1992; Sacks, Schegloff & Jefferson, 1974; Schegloff, Jefferson & Sacks, 1977; Schegloff & Sacks, 1973; Schegloff, 1988; Jefferson, 1988). Later conversation analysts have demonstrated that grammar can be used as a resource in interactions (Tanaka, 2000). More recent researchers have built on work by conversation analysts by examining phenomena other

than words as a part of the communication system. These researchers analyze not only written and spoken words, but also gesture (Streeck, 2002, 1995, 1993), intonation (Local & Kelly, 1986; Local, Wells & Seba, 1985) and parts of the environment (Streeck & Kallmeyer, 2000; Goodwin & Goodwin, 2000; Goodwin, 2000).

This view of language as social interaction is beneficial for the field of second language acquisition for various reasons. Social interaction enables us to analyze how individuals interact, what they do or do not say in an interaction. Second, viewing language as social interaction enables us to examine the actual semiotic devices, verbal and nonverbal, that are used by individuals. This approach necessarily involves the environment and social factors as interactions arise at the intersection of meeting of two or more human beings. Finally, viewing language as social interaction enables us to view identities as complex (McCay & Wong, 1996) and determined in interactions (Bucholtz, 1999; Erlich, 1999; Liddicoat, 1997).

Theories of Practice

Several researchers from the field of anthropology have proposed different models of practice in an attempt to explain culture, human interaction, and learning. These theories are similar yet not exactly the same. Bourdieu (1984) was the first to produce a coherent theory of

practice. In his practice theory, he demonstrated the ways in which culture is a set of “dispositions.” In his view, individuals have understandings of how to behave in typical situations, yet circumstances cause no two situations to be exactly the same.

Lave and Wenger (1991) later proposed the theory of communities of practice in their attempts to examine learning that occurs in environments other than traditional school settings. Much of traditional education has centered on environments in which a teacher stands in front of a group of pupils and imparts his or her knowledge. This knowledge, it is hoped, is received and stored by students. To provide an alternative to the traditional view of learning, Lave and Wenger examined settings in which learning occurs outside traditional school environments. Most of their research focused on apprenticeship settings in which a novice learns from an expert in a particular trade. They found that newcomers to what they termed a community of practice acquired the practices of the community by being given incrementally more difficult tasks to perform and by observing more competent members engage in the community's practices. "A community of practice is a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice" (Lave & Wenger, 1991: 98).

A communities of practice perspective offers us new ways of viewing learning and identity. Rather than viewing identities as fixed,

communities of practice allows us to examine identities as flexible and changing as newcomers to a community acquire the habits, skills, and language patterns of the community. Learning becomes a part of one's identity. Likewise, the theory of communities of practice enables us to account for the influence of other individuals in a learner's environment.

Finally, Holland *et al.* (1998) further expanded on earlier theories of practice by proposing figured words and identities in practice. Figured worlds are sets of conventionalized interactions to which we give meaning. These anthropologists also proposed identities in practice, which is similar to Bahktin's dialogical selves. In identities in practice and dialogical selves, identities are viewed as being constructed through dialogues, or practices. For researchers interested in second language acquisition, theories of practice enable us to view language as conventionalized interactions that arise in a given community.

Nonlinear Dynamics

Nonlinear dynamics is a theory that originated in meteorology but has been used in many fields to explain complex phenomena in many fields, including mathematics, physics, biology, epidemiology, chemistry, psychology, and economics. More recently, researchers interested in learning have begun to apply concepts from nonlinear dynamics to learning situations. Syverson (1999) illustrated the way properties from

nonlinear dynamics are helpful in explaining composition situations. Nelson (2002) employed nonlinear dynamics theory to explain learning in a second language composition classroom. Ideas from nonlinear dynamics may also be helpful in explaining what transpires in second language conversational interactions.

Nonlinear dynamics contrasts with explanations of linear systems. Linear systems, such as grandfather clocks and pendulums, are easy to predict and explain. They contain few components. Their components act in regular predictable ways. Thus, simple mathematical equations suffice to explain the behavior of these systems.

Nonlinear systems are much more complex than linear systems. They involve a large number of components that are in constant interaction. The interactions of the components have emergent properties that cannot be explained or predicted with linear models. This theory has been useful in examining myriad and divergent phenomena, including the occurrence of avalanches (Bak & Chen, 1991), geometric patterning of leaves and flower petals (Sharon, Marder & Swinney, 2004), and the rise and fall of American Indian civilizations in the South West (Lewin, 1991).

Second language acquisition is a complex phenomenon. It occurs in diverse environments, and various factors, both internal and external, influence the learning process. Namely, nonlinear dynamics offers us the opportunity to re-conceptualize learning, identity, and language.

Language is complex. Language in interactions is a system arising at the intersection of individuals, composed of various subcomponents that interact in ways that are difficult to predict. Learning is also complex. From nonlinear dynamics, learning can be viewed as a change in reactions to a change in the circumstances in one's environment. This change may be a change in behavior, ways of knowing, skills, or habits. Finally, identity is complex. Nonlinear dynamics enables us to view identities as also composed of various components and constantly changing and interacting in order to maintain themselves.

CONCLUSION

I began this chapter with my curiosity over why some individuals learn to act in a second or other language in culturally appropriate ways while others fail. Because I am interested in the way individuals successfully learn to use language, I decided to focus on successful language users. I have also focused on a nontraditional classroom environment. I was strongly drawn to understanding the Internet game I played and the non-native speakers who played there. I decided to examine the way the individuals in this game, native and non-native speakers, interacted and learned while playing the game. Further rationale

for this choice and a description of the community are given in chapter 3. I have used a combination of ethnographic and discourse analytic techniques in examining this community as I attempt to address the phenomena of second language use in the studied environment.

RESEARCH QUESTIONS

I initially began this study with the question, "What is going on in this environment?" Why is it that there are non-native speakers interacting so fluently and effortlessly in appropriate ways, while in my classroom, students appear to be struggling. As I proceeded through my analysis, I refined the questions I was asking.

(1) How do the theories of social interaction, communities of practice, and nonlinear dynamics help us to understand better the patterns of language, learning and identity in this online community? How do these new understandings help us to understand better the phenomenon of second language acquisition in general?

(2) What does the language of this community look like?

(3) What does learning in this environment look like?

(4) What does identity in this environment look like?

OVERVIEW OF DISSERTATION

In this chapter, I have introduced the rationale for the study. In the next chapter, I present a more in-depth overview of social interaction, theories of practice, and nonlinear dynamics. In chapter 3, I describe the methods I used in gathering, coding, and analyzing the data. The results are divided into three separate chapters, each addressing a different research question. In chapter 4, I examine the data as I attempt to explain what the language used in the online game looks like. In chapter 5, I examine learning in the environment. In chapter 6, I examine identity in the environment. Chapter 7 is the conclusion. I outline the limitations of the study, provide a brief synthesis of the three results chapters, and discuss pedagogical implications.

CHAPTER 2: LITERATURE REVIEW

Second language acquisition has increasingly been viewed as more complex than originally envisioned (Toohey, 1998; Vanpatten & Cadierno, 1993; Oxford & Shearin, 1994). Language learning occurs in multifaceted environments, which include both written and oral texts, along with other factors including space, emotions, time, other individuals, and social structures (Firth & Wagner, 1997; Larsen-Freedman, 1997). In addition, learners are complex beings who bring with them their past experiences and present circumstances (McCay & Wong, 1996; Woodruff & Schallert, forthcoming).

Traditionally, the field of second language acquisition has treated variables as separable and analyzable outside of the context in which they occur. Variables have been treated linearly. Furthermore, researchers have typically focused on one or two variables or the intersection of two variables while attempting to control all others (Firth & Wagner, 1997).

In the last few years, some progress towards taking a more complex view of the acquisition process has been made. For example, there have been greater attempts to take into consideration social variables and their influence on the learning process (Appel & Latolf, 1994; Lantolf & Thorne, 2006, Donato & McCormick, 1994). Some studies, for example, have examined social factors affecting second language

acquisition in light of the theory of communities of practice (Toohey, 1998, 1996; Johanson, 2001; Wiltse, 2001; Flowerdew, 1998). However, these new researchers interested in social variables and traditional researchers interested in linear thinking have not come to terms with their separate research agendas. More specifically, we lack a coherent theory with which to connect the various types of research in the field (Watson-Gegeo, 2004).

The failure of the field to address adequately the complex nature of the process of second language acquisition has left several important questions unanswered. How does the individual fit into the greater social system, and how is that signaled through language? How is the structure of social interaction influenced by identity, and what is the influence of social interaction on language and identity? How is identity expressed at micro levels? How does this relate to macro levels? Can identities be changed through learning?

In order to address these questions, I will examine three divergent theories. To contrast with Chomsky's innatist model of language, I will briefly review the vast literature on social interaction to provide an alternative way of viewing language, learning and identity. In order to provide a counter argument to Chomksy's ideas, I have had to go back to the time of his argument. Thus, much of the literature I will present will be

"old," yet necessarily so. Arguments for non-innatist views of language as a system were made at that time.

From cognitive anthropology, I will present theories of practice in order to examine learning that occurs outside traditional school environments. Finally, I will examine concepts from nonlinear dynamics. In combining these three theories, I hope to offer a new model from which we may attempt to create more coherent and overarching theories for the field.

SOCIAL INTERACTION

The field of research on second language acquisition can be traced to the end of World War II and the beginning of the Cold War. At that time, the US government considered it important to teach strategic languages such as Russian and Arabic. They poured money into second language acquisition research. The government thought that structural linguists were the most equipped to undertake this task as they had impressed the government with their descriptions of unwritten American Indian languages. The US government found it expedient to support structural linguists in their research and thus it became the only view in the field (Newmeyer, 1984).

When Chomsky proposed his modification of structural linguistics (1957, 1965, or 2000 for a more recent version of Chomsky's ideas), second language acquisition researchers also took this view. Research, pedagogy, and theory have been guided by the assumption that we all posses an inherited ability called the "language acquisition device" that directs our grammar. Furthermore, the theory holds that all languages have common grammars tied to this language acquisition device. By thinking of language as a property of the mind, it was possible, at least for a while, to ignore any other factor, including social and environmental factors, from a coherent model of language. Chomsky's theory has been attractive to second language acquisition scholars because his model is an all-encompassing model of language which is analyzable, and which has a universal structure to which all languages can be tied. The assumption that language is tied to a structure of the brain provides researchers a simple model upon which to base their research.

However, around the same time that Chomsky presented his ideas, others were looking at language as something not housed in the brain but rather as a social phenomenon (Hymes, 1972). These theories take interactions, rather than individuals, their brains, and idealized speaker's perceptions of correct grammar, as central (Collins, 2003). These theories were initially ignored by scholars in second language acquisition, and thus Chomskian notions of language became foundational to our research,

pedagogy, and theory. While researchers may rarely cite Chomsky's work, they often base their research on his assumptions (Watson-Gegeo, 2004). It is necessary to take one giant step back in order to look at language from another perspective. This section is intended to provide an alternate view of language.

The Structure of Language in Social Interaction

Researchers interested in social interaction have depicted language as a structured system that can be analyzed and is predictable (Sacks, 1992; Wittgenstein, 1984; Goffman, 1955; Sacks, Schegloff & Jefferson, 1974). Researchers interested in language in social interaction have demonstrated that our behavior in interactions is structured. We have conventionalized ways of behaving, and our conventionalized behaviors affirm social structure as well as our beliefs about the world. Our conventionalized ways of behaving may or may not be symmetrical. Furthermore, we are tied to our co-interlocutors. We monitor our co-interlocutors, seeing if we gain or lose during our interactions. We continually test our hypotheses about nature and the world (Goffman, 1983).

At approximately the same time as Chomsky presented his ideas on language, Goffman founded the field of micro sociology. He used several metaphors in his attempts to describe interactions, including drama, rituals, and games. His ritual and game metaphors are particularly relevant to building a theory of social interaction as a system. When we come to many kinds of interactions, we know what to expect, and we have typified ways of behaving in face-to-face situation (Goffman, 1971). Furthermore, individuals have particular expectations in interactions of the behavior of others (Goffman, 1971, Collins, 2003). While there are typical forms, actors are left with room for improvisation.

Both Wittgenstein, from philosophy, and Goffman, from sociology, likened language in social interactions to games (Wittgenstein, 1984; Goffman, 1969). In an interaction, participants have opportunities to make moves. When making a move, individuals typically select from a class of moves that will be appropriate at a given time and in the given circumstance. Ritual order lays down what is and what is not expected, and thus the moves of participants are guided by established patterns guided by expectations. Each move has real world implications for all parties engaged. Each participant has a unique, idiosyncratic way of viewing the game, which comes from his or her own experience. In sum, in interactions, participants strategically chart actions and assess co-interlocutors, but ritual order guides possibilities.

Conversation analysts have shown conversations to be a highly structured system. An initial study demonstrated that turn-taking is a mechanism in social interaction that works in reasonably predictable ways. Conversation is sequentially ordered, with the succession of speakers regulated by this mechanism (Sacks, Schegloff & Jefferson, 1974). Speakers may attempt to construct or shape conversation by limiting future utterance types through the production of a current utterance (Sacks, 1992). Similarly, utterances tend to be placed carefully in dialogues, and the characteristics of a particular utterance depends highly upon the characteristics of previous utterances (Sacks, 1992; Sacks, Schegloff & Jefferson, 1974). The ending of a particular interaction typically leads to another type of interaction (Collins, 2004).

More recently, researchers have demonstrated that factors other than words and utterances may enter into and influence the communication system. Physical aspects of the environment are important factors in a communication system (Goodwin & Goodwin, 2000; Goodwin, 2000; Streeck & Kallmeyer, 2001). In addition, intonation may be used as a resource in interaction (Local, Wells & Seba, 1985; Local & Kelly, 1986). Finally, Streeck (1994, 1993) illustrated the way that gesture is an integral part of interaction. In short, people will respond to anything in the environment including what other persons do, say, or give evidence of. This includes but is not limited to silence, breathing patterns, eye

contact, and nervous habits (Syverson, personal communication, 2007). We are intricately attuned to other human beings via language and other systems in the environment.

To conclude, research on social interactions has demonstrated that interactions have rules. Interaction is a system, and rules arise and are applied during interaction. These rules constrain the behavior of participants yet allow for a certain amount of creative solutions. Similarly, the language that individuals produce in interaction is rarely fully formed grammatically correct sentences. Finally, language is seen as more than words and grammar but can include various elements that enter into the interaction system including physical aspects of the environment, intonation, gestures, and the shared history of the community's interaction.

Learning in Social Interaction

In Goffman's view, talk depends on two factors: a common understanding of previous utterances and a stock of shared knowledge. Talk is governed by social rules and common understandings. In other words, there are particular rules and fitting actions in any given situation (Goffman, 1983). The lack of understanding of fitting behaviors is often the cause of cross-cultural misunderstanding. As we strive towards common goals, we create ritualized behaviors. We take for granted most of these ritualized behaviors, and we expect others to do so as well. Thus,

life becomes the occurrence of recognizable forms of behavior. Each ritual has an exemplary form, yet, in practice, no two instances of a ritual are ever exactly the same (Collins, 2004).

As a way of explaining the nature of exemplary forms, Goffman (1974) created the theory of frame analysis. We place our experiences into frames. These frames organize our experience and guide behavior by enabling us to predict the behaviors of others (Collins, 2004; Tannen, 1992; Goffman, 1974). Furthermore, the many dialogues in which we engage are internalized and influence subsequent actions (Woodruff & Schallert, forthcoming).

Frames and learning in social interaction contrast with Chomsky's models of language learning based on Chomsky's ideas of language. Models of language learning based on Chomsky's theory of an innate language ability posit that as we experience a language, the parameters of our hard-wired language capacity in our brain are set to that particular language. Coming from a social interactionist perspective, there is no need for a pre-wired internal device to guide language. Rather, as we accumulate experience, we create models of typical situations in our minds that guide our future behavior. Thus, from this view, our behaviors come not from innate parameters but rather from models of behavior from accumulated experience.

Identity in Social Interaction

Social interactionists view identity as the product of an individual's experience (Collins, 2004). While identity is viewed as both stable and dynamic, parts of character are determined in interaction. I will be concerned with the part of identity that is determined in interaction.

Roles in Interactions

In interactions, individuals tend to take particular roles and each role has acceptable ways of behaving. Once an individual receives or takes on a role, he or she is expected to behave accordingly. Social rituals and roles reinforce each other. In Goffman's view (1959), the roles we portray are products of complex, ritualistic machinery that make up our interactions. Certainly, our identities come into contact with the complex structures that make up our identities in interactions. Roles are important to us, and they become a sense of who we see ourselves to be. Once we receive or take on a role, we sometimes have great difficulty relinquishing it. In fact, we may experience trauma when we are forced to give up a role (Goffman, 1952), and forcing one to relinquish his or her role may often require extreme measures (Goffman, 1961).

Different Roles in Different Situations

We may have different roles in different situations. An individual organizes his or her behavior based on his or her roles in a given situation. Individuals have limited types of behavior into which they can engage, according to their defined roles in an interaction. While there is no consensus as to how much flexibility an individual has in the reality they construct, social interactionists have argued that this flexibility is limited (Collins, 2004). Deaux (1993) stated that individuals have multiple identities which vary according to context. While contexts are continuously shifting, so too are identities. Furthermore, Pittinsky et al. (1999) argued individuals are inclined to play the roles that are most adaptable to the current context.

Section Summary

Identity is an important construct in social interaction. Some researchers view it as fluid and dynamic, while others view it as highly constrained by the rules of interactions. Further, identity is at least partially determined by the situation. Our behavior must be in line with our roles. We may vary our behavior, but only to a limited extent. We also have different roles in different contexts.

Summary to Social Interaction

Researchers interested in language that occurs in social interaction have described social interaction as something structured, formulaic and predictable. Metaphors such as ritual, machine and game have been used to describe social interaction. Each move in an interaction cannot be treated in isolation but rather is viewed as an integral part of the complex system of interaction. Through moves in interaction, individuals are able to construct and portray their social identities through their behaviors. Individuals typically have particular roles in interaction, and their behaviors are thus constrained by the limitations a given interaction places on their given role. Finally, social interaction enables us to conceptualize learning as related to frames, which are the accumulation of experience into typified interactions.

THEORIES OF PRACTICE

Anthropologists have been interested in defining culture and identity through observing what people do. In theories of practice, anthropologists have come to view culture as a system of practices. Anthropologists who promote theories of practice are not solely interested in large structures and more obvious interactions we stereotypically view as cultural artifacts such as ceremonies but also and more importantly in everyday, moment-to-moment dialogues.

Bourdieu's Practice Theory and Habitus

Bourdieu (1977; 1990) was the first to envision language and culture as a set of practices. He assumed that culture was a system of practices that were not rule determined, i.e. not reducible to objectifiable rules outside of the environment that they were applied in. Rather, culture was composed of a set of patterns, or what he called dispositions, that had histories and whose exact forms were determined in the moment. Our knowledge is more amorphous than a strict set of rules. He called this imprecise knowledge *habitus.*

Individuals are neither completely products of culture nor completely free agents. We can only exist by functioning as participants in

a series of habitual activities that are both presupposed and reproduced in our actions. We acquire competence by entering activities. Novices acquire competence by entering activities, through which they develop a set of expectations about the world and ways of being in the world. Through experience, individuals acquire an internal subset of the world's habitus. Culture is thus both internal and external. Shared patterns of perception enable meaningful social interaction.

Bourdieu (1977; 1990) posited *habitus,* which is a system of "dispositions" with historical dimensions. This system is not a series of rules that dictate particular behaviors. Particular inputs do not correlate exactly to particular outputs as in each situation there are always novel combinations of stimuli. Rather, habitus is composed of a series of principles that guide behavior in recognizable situations. Individuals create endlessly creative moves and behaviors in reaction to novel sets of stimuli.

In this view, culture is both internal and external. Language is also viewed as a system of habits, which are guided by dispositions and expectations. Thus, language is a set of practices which only has meaning and power in a set of dispositions. In this view, practices are not a set of rules that individuals of a community follow. Rather, practices are particular forms or patterns which individuals tend to follow, but the instantiation of each is always unique.

Individuals function by participating in a series of habitual activities that are both presupposed and reproduced by his or her actions. Individuals are neither completely products of culture nor are they completely free agents. Also, individuals internalize our culture's system of practices through experience.

Communities of Practice

The construct of community has been studied by various scholars in various disciplines (Anderson, 1991; Galegher, Sproull & Kiesler, 1998; Labov, 1972, 1966, 1963; Gal, 1979, 1978, Bereiter, 1994). Researchers from various disciplines have attempted to determine what constitutes a community. Anderson (1991), for example, illustrated the way nations are communities built through imagination. Sociolinguists, led by Labov (1972, 1966, 1963; Gal, 1979, 1978), have defined community in a way that has enabled them to tie language to social structure and identity. These researchers have demonstrated that language variation has meaning, and that the way one speaks relates to one's identity or position in a given community.

More recently, cognitive anthropologists have used the construct of a community of practice as a way of explaining learning that occurs in settings both inside and outside of traditional school environments. The view of communities of practice contrasts with the traditional view of learning, in which a teacher stands in front of a group of students and

communicates his or her knowledge to the students, who, it is hoped, receive and retain this valuable knowledge. In response to this narrow view of learning, Lave and Wenger (1991) set out to examine learning that occurred in settings other than traditional school settings. They examined five apprenticeship situations and found that in these settings, individuals learned how to act appropriately in a particular community with little verbal instruction. Their theory has become quite popular within the last 15 years. It has been used as a theoretical framework for various studies in education (Browne-Ferrigno, 2003; Blakely-Duffelmeyer, 2003; Witse, 2003; Cobb *et al.*, 2003; Harris *et al.*, 2003; Matusov, 1999), foreign language education (Witse, 2001; Johanson, 2001; Flowerdew, 1998: Toohey, 1998, 1996), material anthropology (Crown, 2001; Kamp, 2001; Walleart-Petre, 2001; Sassman & Fudolpi, 2001; Minar, 2001; Minar & Crown, 2001), cognitive anthropology (Wenger, 1998; Ball, 2003; Hudeide, 2004; Down & Reveley, 2003; Merriam, Courtenay & Baumgardner, 2003: Hodkinson & Hodkinson, 2003; Sommerville & Abrahamsson, 2003; Howe, Stubbs & Harriet, 2003), and sociolinguistics (Holmes & Meyerhoff, 1999; Eckert & McConnel-Ginet, 1999; Bucholtz, 1999; Stapleton, 2001; Freed, 1999: Erlich, 1999; Bergvall, 1999).

Lave and Wenger's theory is important to second language acquisition because individuals encounter language use and interaction situations everywhere, not just in the classroom. Second language

classrooms often and unfortunately follow the model of traditional classrooms although more recently there has been a move to incorporate more "real-world" experiences through simulations (Reese & Wells, *forthcoming*). Learners, however, often need to acquire the practices of the members of the host community. Language structures taught in second language classrooms often do not adequately prepare students to engage in the language practices of a community. Since I set out to examine successful second language learners who were learning outside of the classroom, it is appropriate to consider this influential theory of learning that addresses learning outside of the classroom.

Practice in Communities of Practice

Practices are the ritualized ways in which community members interact with each other and with entities in their environments. As members of a community reach toward particular goals, over time, they create conventionalized ways of interacting with each other and with the environment. As these conventionalized ways of behaving spread and become more prevalent among a group of individuals, a community of practice emerges. Once formed, practices do not freeze but rather continually change as discontinuities arise from inside and outside the community. Thus, a history of practice emerges. A community of practice is thus comprised of the practices that individuals collectively create as they strive towards shared goals.

Practices help define boundaries for the community. Those who are able to engage in the practices are considered members of the community while those who do not understand, are unable, or simply do not engage in the practices are considered outsiders (Toohey 1998, 1996; Wenger, 1998). Practices are fluid and organic. They are continuously being negotiated. Much of the procedures and boundaries of a community are informal and tacit and therefore may not receive conscious attention or effort (Wenger, 1998).

Practices are also located in a history. Some practices may change frequently while others, such as those based on motor skills, may be more difficult to change because they involve a great deal of effort (Wallaert-Petre, 2001; Sassman & Rudolpi, 2001; Minar, 2001; Minar & Crown, 2001). Thus, for example, most of us still use the QWERTY keyboard although more efficient keyboard layouts such as the Dvorak keyboard have been invented. Members of a community may change a community's practices. The arrival of new members may induce a change in practices although experienced members may also attempt to change practices. Changes in the environment, such as the advent of new technologies, changing economies, or new competitors may motivate a community to change its practices. Wenger (1998) stated that changes inside and outside the community constantly arise, thus forcing a community to constantly re-evaluate and possibly alter its practices.

In the field of second language acquisition, practice can be viewed as more or less our ritualized ways of interacting with each other. Although individuals follow the norms of the community's practice, each has his or her own idiosyncratic ways of speaking, listening, reading, and writing. Idiosyncratic ways of engaging signal identity through affiliation or identification with the practice, or by signaling unfamiliarity with the ritual. Thus, practice can generate both identities of inclusion and exclusion, of membership and non-membership (Wenger, 1998).

Learning in Communities of Practice

Researchers interested in communities of practice have focused much attention on learning that occurs outside of traditional classroom settings (Lave & Wenger, 1991; Wenger, 1998; Ball, 2003; Bucholtz, 1999; Down & Reveley, 2003; Hundeide, 2003; Merriam, Courtenay & Baumgardner, 2003; Minar, 2001; Sommerville & Abrahamsson, 2003; Flowerdew, 1998). A communities of practice perspective contrasts with traditional views of learning that posited learning as occurring through the process of teachers imparting knowledge to students. In a community of practice, learning occurs through experience. Many researchers interested in learning outside of traditional classroom settings have suggested that individuals tend to learn more accurately and are more proficient at the tasks they need to perform when they learn in non-traditional, or practical, settings (Hutchins, 1995; Sommerville & Abrahamsson, 2003; Harris *et*

al., 2003; Browne-Ferrigno, 2003; Ball, 2003; Gee, 2006a, 2006b, 2003; Shaffer *et al.,* 2004). These researchers have focused on individuals learning skills, such as those involved in navigation of sea vessels (Hutchins, 1995), making pottery (Lave & Wenger, 1991), and playing computer games (Gee, 2006a, 2006b, 2003). Importantly, learning through experience occurs with little if any meta-talk about the to-be-acquired knowledge and skills. In fact, even in apprenticeship situations, there appear to be few questions or instructions about the tasks in which individuals are engaged and which they hope to acquire (Lave & Wenger, 1991).

In their attempt to describe the learning that takes place in apprenticeship type situations, Lave & Wenger (1991) developed the concept of legitimate peripheral participation. Beneficial experience, they said, is acquired when newcomers are allowed to participate in the community's practices, even as bystanders or observers Legitimate peripheral participation has two elements. First, newcomers are allowed to observe more competent members of the community as they engage in the community's practices. Second, newcomers are given simple yet increasingly more difficult tasks to complete once they have mastered simpler tasks. While there has been, to my knowledge, no explicit tie between communities of practice and research on computer games, computer games provide an tie to a communities of practice perspective

on learning. Computer games are explicitly structured to teach players how to play in action. Newcomers must master simpler tasks in the game before they are allowed to move to more difficult ones (Gee, 2006a, 2006b, 2003; Schaffer *et al.,* 2004).

For scholars interested in second language learning and communities of practice, learning a language can be viewed similarly to forwarded by Lave and Wenger (1991). Second language learners may observe more competent speakers, and, over time, acquire the ability to engage in increasingly difficult tasks. Learners may also be given more difficult tasks as they master simpler ones.

Identity in Communities of Practice

From the perspective of communities of practice, identity is viewed as related to one's proficiency in the community's practices. Newcomers to a community begin their journey along an invisible learning trajectory as they engage in the most basic tasks. Gradually, as they are given greater responsibilities, and as they take on riskier tasks, their identities progress towards the center of the community where the experts reside. Ideally, these two-dimensional trajectories should end at the center of the community, but in reality, not all do (Wenger, 1998).

Several studies illustrate the way these learning trajectories work in different situations. Merriam, Courtenay and Baumgartner (2004) delineated four identity positions for newcomers to a witch's coven:

neophytes who know nothing, first degree witches who can cultivate plants used in rituals, second degree witches who are capable of performing most ceremonies, and third degree witches who can found their own covens. Hudeide (2003), although somewhat critical of the construct of communities of practice for conversion type situations, described four distinct identity positions for learning neo-Nazi identities: being labeled as an outsider, dissociation from existing social networks, strong feelings of belonging to the new community, and "legitimation," in which the individual commits an egregious act that makes it nearly impossible for him or her to return to his or her former identity.

However, in their initial writings, Lave and Wenger (1991) cautioned against viewing identities and learning too simplistically (Lave & Wenger, 1991; Wenger, 1998). Masters, they said, continue to learn, and identities may or may not progress towards the idealized center of the community. In addition, although there may be clearly marked promotions as individuals pass certain milestones, not all changes in identity are quite so overt. Finally, identities that are not changing or growing require as much, if not more, explanation than those that appear to be gradually taking on the community's practices (Wenger, 1998). Another complication of this view of identity is that individuals may have more than one identity in different contexts, and individuals may behave

differently in different contexts (Wenger, 1998; Toohey, 1998; 1996; Stapleton, 2001; Bucholtz, 1999; Turkle, 1995; Erlich, 1999).

A communities of practice perspective presents several advantages and dilemmas for researchers interested in second language acquisition. First, can language be thought of as practice that can be acquired in a similar fashion as skills such as basket weaving (Minar, 2001), pottery (Crown, 2001), and meat cutting (Lave & Wenger, 1991)? Second, what constitutes a community of practice? Does this include all native speakers of a particular language or is it restricted to the individuals in our students' immediate surroundings? Earlier attempts to apply a communities of practice perspective to second language acquisition have focused on community as a classrooms of mixed ESL and native English speakers (Toohey, 1996; 1998; Witse, 2001), international academic communities whose practices are publishing articles (Flowerdew, 1998), and graduate students (Johanson, 2001). In this thesis, I use a communities of practice perspective to enlighten the participation of non-native English speakers in an online game.

Summary for Communities of Practice

A communities of practice perspective may provide us with new ways of conceptualizing the phenomenon of second language acquisition. There is an emphasis on the need for learners to be able to observer more competent members, i.e. native speakers, and be given incrementally more

difficult tasks. However, the typical foreign language classroom consists of one expert at the center, and many of the shared practices created in the classroom are not those created by expert speakers. Employing this theory to second language classrooms may provide us with new forms of instruction.

Bahktin, Dialogism, Identities in Practice

Bahktin (1984) has contributed greatly to our conceptualizations of identity through his writings on dialogism, in which he writes that human existence is fundamentally dialogic in nature. Our thoughts are ourselves talking to ourselves. We have conversations in our heads with "others." Identities arise in interaction. Becoming a self involves internalizing the ongoing conversation in the world around us. Our inner voices, when we talk to ourselves, is only partially our own construction, the rest is the construction of others.

The self is an ongoing process that cannot be captured by private introspection and is peculiarly dispersed. The dialogical self is a storied self. Our identities are dynamic stories and conversation with other lives, present, past, or imaginary. The self is partially decentralized, and thus fluctuates in different situations (Hermans *et al,* 1992).

Holland *et al.* (1998) expanded on these ideas of the self by relating it to practices. They posited that the self is instantiated in practice.

Individuals have a range of ways of behaving, and circumstances help to dictate what is fitting. Behavior is only a sign of the self, not the self in essence. Re-occurring conventions are useful for seeing more durable aspects of the self. The self in practice occupies the interface between inner speech and bodily discourse formed in the past and practice to which people are exposed.

Figured Worlds

Figured worlds are social processes with histories. Particular actions take on meaning and significance in these worlds. Figured worlds are populated with a group of people, or as they term them agents, who participate in a limited range of acts. The actions of agents have symbolic meanings. A figured world is a set of abstracted regular actions. These abstractions guide our expectations with how events in the world should unfold. Figured worlds are constantly being re-created as agents act out idiosyncratic versions of abstracted, regular forms of behaving (Holland *et al.,* 1998).

Summary to Theories of Practice

Anthropologists have created theories of practice to explain the systematic ways in which culture works, Practice is a set of expectations

or dispositions that guide our behaviors in typical situations. Newcomers learn these ways of behaving through observation of more competent members and being given incrementally more difficult tasks. Our identities progress through a series of stages as we become more competent at practices, and our practices also become internalized dialogues.

For the field of second language acquisition, we can envision second language learners coming to a new community. They attempt to learn the new cultural practices through observation and access to opportunities for practice. Their identities change as they become more competent in the practice.

NONLINEAR DYNAMICS

Second language acquisition has typically concentrated on what transpires in the learner's head with little concern for environmental factors that may affect the learning process. Recently, however, there has been a move to examine language learners with their surroundings, as both social and physical beings affected by and affecting the environment and those around them (Liddicoat, 1997; Firth & Wagner, 1997; Collentine &

Freed, 2004). By examining learning as a process that is unfolding in an environment, both shaping and being changed by various other entities, we have to decide how the pieces fit together. We must have some sort of overarching theory into which we can place our work. This is an area of opportunity for the field because, to my knowledge, no theory has defined in a comprehensive way the environment, nor have interactions between the environment and second language learners been examined systematically.

To provide such a theory, I have gone to nonlinear dynamics. The theory of systems from nonlinear dynamics provides us with a tool to examine communities, classrooms, and other social structures into which second language learners integrate. Nonlinear dynamics also provides us with a new perspective on learning and identity.

Nonlinear Systems

Nonlinear systems contrast with simple systems. A simple system is one that is comprised of a limited number of subcomponents. Furthermore, the behavior of a simple system is explainable by the interaction of its subcomponents. An example of a linear system is a clock.

A nonlinear system contrasts with simple systems in that their behavior cannot predicted solely by examining its parts. A nonlinear

system is an emergent phenomenon whose behavior modifies itself in response to perturbations arising both internally and externally. The way a system modifies itself "feeds back" into the system. Thus, behavior is partially determined by past behavior. Examples of nonlinear systems include the nervous system (Maturana & Varela, 1980), economies (Arthur, 1999), ecosystems (Medvinsky *et al.*, 2000), avalanches (Bak & Chen, 1991), dreaming (Kahn, Combs & Krippner, 2002), geometric patterning of leaves and flower petals (Sharon, Marder & Swinney, 2004), and dissociative disorders (Derrickson-Gossman & Drinkard, 1997). In this section, I will discuss a few of the characteristics of nonlinear systems as they pertain to my study: nonlinearity, aggregation, tagging, flows, diversity, and building blocks.

Nonlinearity

Nonlinear systems are difficult to predict because they behave in nonlinear ways. Bak and Chen (1991) created the theory of self-organized criticality. They said that a system that is composed of many elements will naturally evolve towards a critical state, at which point any small perturbation may produce catastrophic effects. In their theory, they differentiated between chaotic and non-chaotic systems. They stated that in non-chaotic systems, uncertainty is constant. Thus, the behavior of non-chaotic systems can be easily predicted if one knows the initial conditions

of the system. Examples of non-chaotic systems include grandfather clocks and pendulums.

Chaotic systems, in contrast, cannot be easily predicted. Therefore, it is impossible to generate accurate mathematical models to predict the behavior of chaotic systems. Examples of chaotic systems include the weather, economies, the nervous system, the immune system, the spread of infectious diseases, society and economies. Furthermore, the knowledge of initial conditions required to predict the future grows exponentially the further into the future one wishes to predict. Thus, for example, despite years of research in the field of meteorology combined with powerful computer technologies and models, weather patterns continue to be difficult to predict more than five days in advance.

Second language acquisition can also be thought of as a nonlinear system. There are various internal variables involved such as anxiety, cognitive abilities, the first language, and experience. There are also many external variables such as classmates, other people, spouses, work places, and access to TV and texts.

Tagging

Tagging is a mechanism that enables us to see properties of components of a system that would normally remain hidden or go unnoticed. Tagging is also the mechanism that allows for hierarchical organization and, similarly, selective interaction among subcomponents of

a system. Holland (1995) illustrated the concept of tagging by discussing pool balls. When we hit the cue ball, the spin of the ball remains hidden because the entire ball is uniformly white. However, when we hit a striped ball, the stripe reveals the direction of the spin. Likewise, when two individuals are playing pool, they can divide the balls based on color patterning: stripes or solids. Thus, particular characteristics of different balls enable us to organize and interact with them strategically.

Tagging in nonlinear systems enables various hierarchical organization through aggregation. Tags facilitate selective interactions. They allow agents to select among various agents that would otherwise be indistinguishable. Tag-based interactions allow for specialization, cooperation, and filtering. For example, when we read our email, we select and delete junk mail through titles or email addresses.

For the field of second language acquisition, second language learners are often "tagged" in many ways – non-native, student, housekeeper, soldier, diplomat, etc. How these tags influence and affect interaction is something we can explore in our research.

Flows

Flows are a property of nonlinear systems that allow for the movement of resources among the various subcomponents of a system. Flows consist of three elements: nodes, links, and resources. A resource may be injected into a particular node or group of nodes, and then the

resource can move around via links. Flows are particularly important because they enable us to explain the ways in which a small amount of substance injected into a system can be used many times over (Holland, 1995).

One phenomenon that occurs as a result of flows is what Holland (1995) termed the recycling effect. The recycling effect occurs when the same resource is used and reused by various nodes in a given network. Because of this reuse, input may produce a large amount of resources in the network over time. Holland gave as an example of the recycling effect the rain forest. The soil in the rain forest is nutrient poor because the rain is constantly washing all nutrients downstream. Thus, we would predict the rainforest to have little life, yet this is not what we find. Life is everywhere. This abundant life occurs through the recycling effect. Nutrients in the soil enter the ecosystem through the roots of plants. Various insects and other creatures feed off of these plants, which are food for other insects and creatures, which are food for yet other creatures. Some insects are eaten by birds, whose droppings are then eaten by particular insects. Eventually, and after having been used by many organisms, the nutrients are washed downstream. In fact, it has been estimated that 99% of all nutrients in a rain forest are contained in the biomass, and these remain in the system through recycling. The soil is nutrient poor, and new nutrients are added through rain and the weathering

of rock (Terborgh, 1992). Thus, the different beings in the ecosystem keep the nutrients in the ecosystem by using and reusing what others have already used. Thus, a small amount of overall resources results in greater resources for the entire system.

For second language acquisition, we can think of flows as affecting second language users. Speakers have various connections to others and access to different resources. Resources may or may not flow between individuals, and they may or may not be recycled.

Diversity

Diversity is the conglomeration of different complex systems (Holland, 1995). It is neither random nor accidental, though it may appear to be. Roughly, each subsystem fills a niche in a larger meta-system. This niche is defined by the interactions centering on the subsystem. For example, the eye is a subcomponent of the body. The eye becomes a link between the environment and the nervous system by interacting with both. If we remove a subsystem, a cascade effect occurs as other subcomponents struggle to re-define their place in the system in the absence of a particular niche. Thus, when the unfortunate event occurs that an adult loses his or her sight, the other senses will become more acute as they attempt to compensate for the lost interactions.

The diversity that we observe is the product of progressive adaptations made by paired systems. The spread of a particular type of

system will open up opportunities for specialization of other systems. Mueller and Gerardo (2002) illustrated the spread of diversity in co-evolving insects, fungus, and competitors. Forty or fifty million years ago, insects did not cultivate fungus, but they ate it when they found it. Some insects began to cultivate fungus. The insects who began cultivating fungus were successful as they underwent an advantageous adaptation. During the process, new species of insects and fungi arose. Parasites that fed off fungal farms evolved, and insects developed differing strategies to combat these parasites. Beetles sexually mixed fungi, creating even greater diversity as they created new species of fungi that were more resistant to parasites. Ants began carrying anti-parasitic bacteria from the soil on their bodies that combated these parasites. The bacteria and parasites continued to develop as they adapted to each other's competitive strategies. Ants created new roles for worker ants as they positioned several ants to monitor fungal farms. Thus, diversity developed in ant societies. Each time a niche opened up and was filled, a new niche or new niches arose, and the cycle continued.

For the field of second language acquisition, it is useful to think of language as exhibiting great diversity. In the classroom, a new word or phrase may be introduced, and other students may pick this up. Still more language units, utterances or words, may be created and used.

Internal Mechanisms

Through interaction, agents create models that enable them to anticipate and predict future actions by other agents in their environments. Agents must sort through a great deal of stimuli to choose reactions to their environments. They do this through eliminating details. Examples of agents using internal mechanisms are varied and not limited to "higher" mammals. For example, bacteria naturally move towards food, not randomly.

Internal mechanisms are mechanisms that enable nonlinear systems to anticipate and adapt to future situations. Internal mechanisms are different from schema theory, which posits that mechanisms for anticipating future events are explicit (Alexander, Schallert & Hare, 1991). Internal mechanisms, according to Holland, need not be explicit but can also be tacit.

The idea of internal mechanisms that guide behavior is especially important for the field of second language acquisition. Second language users need to be able to anticipate reactions of co-interlocutors to guide their language behaviors. As they become more competent, they may have more tacit models that guide particular aspects of their behavior such as subject-verb agreement, intonation patterns, pausing, and the past tense.

Building Blocks

We make models of typical situations, and these models enable us to decompose complex occurrences. Combinations of smaller building

blocks, or models, can yield a very large number of novel situations. We gain experience as we use building blocks. Internal mechanisms are composed of building blocks. Thus, for example, a face can be composed of eyes, nose, cheeks, lips, etc.(Holland, 1995). Language can be thought of as composed of smaller building blocks including words, tenses, and phonemes that are recombined in near limitless ways.

Section Summary

Complex systems have various traits that are distinct from those of simple systems. Nonlinear systems are difficult to predict because they are composed of a large number of subcomponents that are typically too numerous to detail. The properties of individual subcomponents can be illuminated through tagging, which also facilitates hierarchical organization. Nonlinear behavior can be at least partially accounted for through flows. Finally, while a system may contain countless subcomponents, each unique, we may group these subcomponents together into like kinds, calling each a building block (Holland, 1995).

Learning in Nonlinear Systems

In nonlinear systems, learning occurs as a system modifies its behavior through experience. Stated another way, learning is the continuous process of the change of an entity's behavior as it continues to

adjust to its environment, thus expanding/changing its capacity to interact with its environment (Maturana & Varela, 1980). Entities must persist in their environments. Thus, they may change characteristics of themselves or they may acquire new ways of responding to new types of situations. The terms that scholars who study nonlinear dynamics use to talk about learning include adaptation, evolution, co-evolution, and models of experience.

Adaptation

Adaptation is a major way in which learning is conceptualized in nonlinear systems. A nonlinear system must find its place in its environment, which is often composed, at least partially, of other nonlinear systems. Once a system finds its place in the meta-system, it must continue to adapt to changes in order to survive. Changes may arise from the environment or from within the system itself. The system must often change in order to accommodate previous changes from the environment or other changes that have arisen from within the system itself. Importantly, changes that a particular system makes will produce further changes in other systems. Thus, a circular, recursive process between interacting agents may arise. This ongoing process of change has been termed structural coupling.

Structural Coupling

Structural coupling refers to adaptations that occur between two agents continuously interacting with each other. Often, two or more systems may become closely tied to each other so that changes made by one will likely and directly affect the other. The type of relationship between the two may be cooperative, such as between species involved in symbiosis (Mueller *et al.,* 2005; Currie *et al.,* 2003; Sachs *et al.*, 2004) or competitive, such as relationships that exist between predator and prey (Lewin, 1992).

Holland (1995) presented an understandable example. He described a frog and a fly in a predator-prey relationship. In the initial stage of the relationship between these two species, we might assume that the frog and the fly were evenly matched. Then, however, the frog developed a sticky tongue that enabled it to catch the fly more easily, and the frog had the advantage in the relationship. Later on, the fly developed a special oily substance on its feet that enabled it to avoid the frog's sticky tongue, and the two species were evenly matched again. Thus, each species makes an adaptation that moves it relative its competitor. Species may make two adaptations, or moves, at once thus moving from the underdog role to the favored role. Structural coupling can be seen working in a large number or relationships: the AIDS virus and the human immune

system (Kauffman, 1995), terrorism and counter-terrorism efforts, the Democrats and the Republicans, etc.

Importantly, structural coupling creates a system of interaction between the two systems linked through this learning process. For second language acquisition, we can think of language learners coupled with other individuals in interaction. Learners must adapt to changes made by their co-interlocutors.

The Accumulation of Experience

A system cannot possibly know or predict all possible future interactions in which it will engage. However, a system will encounter similar types of situations. By knowing the type of interaction a particular interaction is, a system is able to make predictions as to what will occur in a given interaction. The more experience a system has with a particular type of interaction, the more fine-tuned its behavior will become. Thus, history sets up learned patterns as a system accumulates experience with classes or types of interactions (Holland, 1995). The memory of a system is the inclusion of past organizational states within new versions of complex systems (Pincus, 2001).

Experience is stored through weighted values on ties between perturbations and reactions. When a system experiences a perturbation, it reacts. If the way it reacts produces a beneficial effect for the system, then the tie between the perturbation and the reaction will be strengthened. If,

however, the way the system initially reacted produced a harmful effect, then the tie between the perturbation and reaction is weakened, making it less likely that the same reaction will be used when a similar perturbation is encountered (Holland, 1995).

Associations between perturbations and reactions thus acquire histories. The more experience each tie has, the more difficult it is for a system to change them. In fact, ties may be viewed as adaptive by the systems, but to those on the outside, they may not seem so beneficial (Lewis & Junyk, 1996). Rules for frequently encountered perturbations become automized so that no conscious thought need be employed for their implementation (Holland, 1995). However, when a novel situation arises, the system undergoes a period of uncertainty as it learns to deal with this novel type of perturbation. In human systems, this period of uncertainty has been termed anxiety (Fogel & Lyra, 1997).

For second language acquisition, we can envision learners having particular ways of reacting to particular situations such as how to greet someone or how to produce a particular grammar structure. Once acquired, these structures are often very difficult to change. For example, second language speakers who have acquired the wrong way of saying something may have great difficulty learning the correct way of saying something despite correction and instruction.

Section Summary

Learning in nonlinear dynamics is viewed as the ways a system and classes of systems continuously alter themselves as they attempt to fit into their surrounding worlds. Systems often become paired with other systems, and the two systems begin a series of progressive adaptations. A class of system may undergo a successive series of changes over time, thus evolving. Systems may use successful rules, ties between classes of perturbations and reactions, thus creating a system of experience. Responses to types of perturbation and reactions accrue a history.

Identity in Nonlinear Dynamic

Identity is viewed as something bounded. Lakoff and Johnson (1980), as summarized by Syverson (1999), stated that, as humans, we conceptualize ourselves as bounded. Lakoff and Johnson employed the container metaphor. They stated that we have definite insides and outsides.

When dealing with nonlinear systems other than our bodies, it is often difficult to differentiate between inside and outside. Nonlinear dynamic systems are composed of various and typically different subcomponents that are continuously interacting with each other and with entities in the environment. It thus becomes difficult to draw boundaries between the environment and the system. An example of the portioning off of a system from other systems around it comes from Maturana and

Varela's (1980) investigation into the color vision of the frog. They initially thought that light entered the retina, and an image of that color was relayed to the nervous system. In other words, the color was "grasped" by the nervous system of the frog. They discovered, however, that color was not transported by the nervous system as a representation. Rather, color was represented geometrically. To be sure, color is represented through particular configurations of connections among nerve cells in the frog's brain, not the projection of a "picture" into the head of the frog. The separation of the nervous system from external systems is therefore necessary to explain its behavior as particular states. Stimuli that come from the senses create particular configurations of signals among nerve cells. These configurations uniquely represent particular stimuli.

For the study of second language acquisition, it may be useful to isolate language and attempt to explain the way in which it makes sense internally. Rather than thinking of language structures determined by structures in the brain, we may think of it similar to color experience. Individuals have language experiences, which are represented in the brain geometrically, but they are different from the actual phenomenon of language, which is a system that makes sense to itself internally.

State Space

Nonlinear dynamic systems are composed of a large number of subcomponents. The combination of these subcomponents can create an

astronomically high number of possible states. For example, the human genetic system contains 100, 000 genes. The combination of all possible genes makes $2^{100,\,000}$ possible combinations of genes. At the rate of testing one million per second, it would require longer than the age of the universe to test all possible combinations. However, nonlinear dynamic systems cannot afford to test out all possible states. Rather, their forms are confined to particular attractor states. Attractor states limit nonlinear dynamic systems to a very small area of the state space, typically the square root of the possible states. For the human genetic system, this is 1 divided by $2^{99,\,998}$, which is infinitesimally small compares to the state space.

Environmental Niches

Nonlinear systems are often the subcomponents of larger nonlinear systems. For example, a nerve cell is a subcomponent of the nervous systems, the nervous systems is a subcomponent of the human body, a human is a subcomponent of a social system. Each smaller system holds a particular slot in the larger systems. These slots are often called niches, and they are defined by the interactions that they fill. For example, the eye fills the interactions between light from the environment and the nervous system. Eyes in different species may appear to be very different and may be composed of very different tissues, but they function the same as they

fill the same slot between light energy in the environment and an organism's nervous system.

Another characteristic of niches is that there may be limited numbers of subcomponents that may fill a particular niche. Thus, for example, humans have only two eyes. The niche defines and limits the interactions into which a particular subcomponent can engage.

For second language acquisition, learners may play particular roles in a social landscape as defined by their jobs, relationships, etc. These roles may be defined and limit the types of interactions and thus the language they may produce.

Section Summary

Particular characteristics of nonlinear systems can be illuminated by distinguishing systems from their environments and other surrounding systems in their environments. The identity of a nonlinear system can be defined by the sum total of interactions of its subcomponents. This is infinitesimally small compared to its possible states and is defined by attractors. When a system encounters a perturbation, it will typically react by creating a new internal state. The structure of the system determined the response. For example, a motor neuron fires for motion. A successive series of internal states arise, and these internal states are deterministic: one state naturally flows from the previous. Thus, the identity of a system

is defined by its allowable interactions. Nonlinear systems fit into meta-nonlinear systems by filling particular interactions. The interactions in which an entity can participate are defined as its niche, and its niche also define the entity's identity.

Conclusion to Nonlinear Dynamics

Nonlinear dynamics is a theory that is focused systems that are not easily definable due to the large number of subcomponents and interactions. Nonlinear systems contain a large quantity of parts that interact with each other. Thus, the behavior of nonlinear systems is difficult to predict. Various characteristics and qualities of nonlinear systems have been described and analyzed by researchers. I have listed a few that are most relevant to the present study. Learning in nonlinear systems is viewed as a change in behavior as the system reacts to changes that arise in the environment and within the system itself. The subcomponents of a nonlinear system interact with each other, and the sum of their interactions creates particular states in the system. Each state determines subsequent states. Therefore, circular patterns emerge. The permissible interactions of the subcomponents define the identity of the larger system. The only study I know of that has explored nonlinear dynamics in second language acquisition situations is Nelson's (2002) dissertation, in which he found that second language learners appeared to

acquire new information when presented with information or situations that did not conform to their past experiences.

CONCLUSION

The field of second language acquisition has various theories on diverse aspects of the complex phenomenon of language learning. In an attempt to provide a framework into which various of these theories fit, and to better explore the issues of language, learning, and identity, I have examined three different theories: social interaction, communities of practice, and nonlinear dynamics. These three theories come from different disciplines, yet they have similarities. Each treats the concepts of language, learning, and identity somewhat differently. Figure 1 provides an overview of the theories and compares them across the constructs of language, learning, and identity.

Figure 1: Synthesis of the Three Theories

	Language	Learning	Identity
Social Interaction	* Interactions are conventionalized and predictable * Interactions are compared to games, rituals, and machinery	* Experience with interactions is accumulated and guide future participation through expectations	* Language use says something about identity * Identity is constrained by patterns of interactions
Theories of Practice	* Practice is seen as conventionalized systems of behavior * Individuals build shared lexicons and ways of speaking through ongoing interactions built around common goals	* Learning comes from observation of more competent members and being given incrementally difficult tasks	* Identity is largely defined in relation to one's ability to engage in key practices * Identity arises in interaction
Nonlinear Dynamics	* Systems contain numerous subcomponents that interact. A system is defined by the interactions of its subcomponents	* Learning is the change of behavior through experience	* Identity is defined by the interactions of subcomponents of a system

Language and Systems of Interaction

Researchers studying both social interaction and communities of practice agree that conventionalized ways of engaging emerge in interactions. Social interactionists view language in conversations as formulaic and predictable with various language elements occurring at predictable places. Researchers interested in communities of practice and nonlinear dynamics agree that patterns of interactions continuously evolve

as changes arise from within or outside of a system. A communities of practice view defines a community by its collective practice, and a nonlinear dynamics view states that a system is defined by the interactions of its subcomponents.

Learning

All three theories underscore the importance of experience in learning. Both social interaction and nonlinear dynamics state that systems or persons accumulate experience of conventionalized forms, and reactions are based on these models of typical situations. A nonlinear dynamics view emphasizes the fact that changes are made in reaction to internal and external perturbations, and changes made by one system are perturbations for another system. Thus, an endless cycle of change emerges. Learning in communities of practice is viewed as access to observation of more competent members and being given incrementally more difficult tasks to complete.

Identity

A social interaction perspective states that language signals aspects of one's identity, and identity is highly constrained by the rules and constraints of interactions. A communities of practice view defines identity largely in relation to one's ability to engage in key practices. The guiding metaphor, and much of the research from a communities of

practice view, has been of a linear trajectory upon which individuals progress from novices to masters. Identity in nonlinear dynamics is defined by the total possible interactions that a system can engage in and the possible interactions of its subcomponents.

Conclusion

The field of second language acquisition has produced various research fields and agendas that do not necessarily work together. I have used these three theories as an initial attempt to provide a framework into which we may begin to place some of these divergent research agendas. A social interaction view enables us to examine language as a non-innate, definable, and analyzable system. A theories of practice perspective enables us to view learning as something that occurs through experience and may occur in environments outside the traditional classroom. Nonlinear dynamics theory provides us a framework into which to place various aspects of research in second language acquisition.

I have also examined three aspects of these theories. In this thesis, I will examine concepts of language, learning, and identity employing concepts from nonlinear dynamics as I attempt to refine the ways we think about these concepts. Importantly, I have chosen to examine language in an online game that native and non-native English speakers participated in. My aim is to illuminate the ways in which language, learning, identity and social structures function in a non-academic setting.

CHAPTER 3: METHOD

This study is a year-long ethnography of an online text-based game. I participated as an administrator, and I logged observational data using a computer software program. Coding was guided by Strauss and Corbin's (1998) grounded theory methods and general discourse analytic techniques. A general description of the data and relations between the data were then related to the theories discussed in chapter 2. Further analyses were conducted on particular, representative pieces of data as I attempted to illustrate the relevance of this theory to the field of second language acquisition.

DESCRIPTION OF DATA SOURCE

I studied the interactions that occurred on an internet game called the Alternate Reality MUD. This game was completely text-based. It had a medieval theme. There were two types of participants: players, who played the game, and administrators, who constructed and maintained the virtual environment. Players created wizards and warrior avatars that they used to explore towns, castles, monasteries, forests and caves. They attempted to kill virtual monsters to amass experience, gold coins, and virtual objects. Administrators expanded the game by constructing new virtual locations for players to explore.

Participants

Thirty-four of the players and administrators on the game, including myself, agreed to participate in the study. There were two main groups of players: Malaysians and non-Malaysians. The Malaysians outnumbered non-Malaysians by approximately a six-to-one ratio. Malaysians connected to the MUD from internet cafes, computer labs, and dorms. Some only had internet access from their computer labs, so their playing time was limited. Five of the ten non-Malaysians agreed to participate. They came from Canada and the US. Most connected from home or work.

Figure 2: Participant Profiles

Nationality	Role(s)	Name	RL Gender
Malaysian	Head Admin.	Aeon	Male
Malaysian	Head Builder	Zorrak	Male
Malaysian	Admin (coder)	Djibril	Male
Malaysian	Admin/Player	Glorak/Hartson	Male
Malaysian	Admin	Irrybis	Male
Malaysian	Admin/Player	Raimen/Tamnsharr	Male
Malaysian	Player	Antugile	Male
Malaysian	Player	Duemar	Male
Malaysian	Player	Amedeaus	Male
Malaysian	Player	Dreadlord	Male
Malaysian	Player	Hyunkel	Male
Malaysian	Player	Iria	Female
Malaysian	Player	Jesse	Male
Malaysian	Player	Kadir/Paichow	Male
Malaysian	Player	Kyo	Male
Malaysian	Player	Leonhart	Male
Malaysian	Player	Leperkorn	Male
Malaysian	Player	Luciffer/Thorax	Male
Malaysian	Player	Najib/Rewt	Male
Malaysian	Player	Necromayhem	Male
Malaysian	Player	Necron	Male
Malaysian	Player	Nimitz	Male
Malaysian	Player	Oddesy	Male
Malaysian	Player	Serpico	Male
Malaysian	Player	Selina	Female
Malaysian	Admin	Spiral	Male
Malaysian	Player	Xavier/Cyrex	Male
Malaysian	Player	Xyrix/Cool	Male
Malaysian	Player	Zeo	Male
American	Admin/Player/Researcher	Vulrag/Nimraith	Male
Canadian	Player/Admin	Deglo/Balazin	Male
American	Player	Danae	Female
American	Player	Istanbilly	Male
American	Player	Thomas	Male

Data Sources

Most of the data came from observation of interactions of quasi-synchronous channels, which are channels similar to chat rooms. Other data came from emails, mudmails, virtual bulletin boards, and construction

of the environment. I logged observation of the quasi-synchronous channels using a MUD client called zMUD. Most logs were at least five hours. Some logs included a great deal of activity while others had little.

DATA COLLECTION PROCESSES

I collected data from March of 2002 to March of 2003. I attempted to log at least 12 hours every 2 weeks. At the end of the study, I had amassed 480 hours of logs which resulted in 4, 575 pages of transcripts.

I informed players and administrators that I was conducting this study. I asked Aeon, the head administrator, permission to conduct the study. I announced the study on the website, and then I asked participants individually to participate. The data include the words of individuals whom I had not explicitly asked to participate. This was inevitable as, with any MUD or public game, people may enter for short periods of time, try out the MUD, and then leave. Data with these participants were not included in this dissertation.

Logging Interactions

I used a software program called zMUD to log interactions on the quasi-synchronous channels. The log function of zMUD stored data in a simple text file. It is important to note that logging interactions on MUDs is a common activity. Frequently, players log interactions, and then they place these interactions on the MUD's website or their own websites.

Thus, I do not believe logging had an impact on participants' behavior because it was customary for this environment.

Data preparation

The MUD client conveniently logged data into a simple text file. However, these data were not advantageous for analysis. Due to the dynamic nature of online games, one hour interaction may result in over 1, 000 pages of the log as players move quickly through rooms and engage in combat, the game engine sends room descriptions and descriptions of battle players screens. During these situations, players may see hundreds of lines of text on their screen in just a few seconds. Much of the text from the logs was not always important to the interaction because it frequently contained information that was redundant or probably ignored by the participants. Thus, it was necessary to create transcripts from the data in order to code the data by removing redundant information. After having removed all seemingly redundant or unimportant game elements, I had 4, 575 pages of transcript. If during coding or analysis I felt a game element might have been important, I went back to the original log.

CODING METHODS AND DISCOVERY PROCESS

The goal of this study was to examine the language, learning, and identity representation of the participants in the Alternate Reality MUD.

Thus, I looked for patterns that would illuminate the language, the learning, and identity representations in the Alternate Reality MUD. I used several strategies. I closely examined the data as I looked for common patterns. After many categories had emerged from the data, I attempted to connect them. I completed a detailed description of the categories and their connections. I returned to the theories discussed in chapter 2 as I attempted to build a model of the phenomenon of second language use in the Alternate Reality MUD.

Coding Methods

The coding methods I used follow Strauss and Corbin's (1998) Grounded Theory approach. I began coding by attempting to break the data into discrete parts. I found that there were both long and short units of interaction on a quasi-synchronous channel. For smaller units, I attempted to identify the types of utterances and groups of utterances that I found. I also attempted to define common longer units of interactions.

After creating common categories and finding enough examples to be competent in my coding, I looked at each category more carefully in an attempt to find the dimensions and properties of each. I look at individual words, the placement of words and characters, spelling of words, the channels they occurred in, and the individuals who typed them. I placed instances of categories next to each other as I attempted to explain similarities and differences between the two pieces of data. I looked in

surrounding data as I attempted to find what factors may have caused variances in the category I was examining. I found that instances of categories varied from unmarked, or common forms to more marked forms. As I attempted to determine the reasons for occurrences in particular patterns or deviances from the patterns, I occasionally asked participants involved to share their perceptions of the data.

Connecting Categories

At this stage, I had well formed categories that related to language and the roles individuals played in interactions. I tended to put the data back together by making connections between categories. In this stage, I examined the context in which a category was embedded and the way that participants handled particular categories. I continued to try to link categories by comparing and asking questions similar, to what I have done in the initial coding. I constructed mini-models of what I thought was occurring.

EMERGENT CATEGORIES

In this section, I briefly discuss the overarching types of categories that emerged from the data. Emergent categories are divided broadly into categories of language and roles.

Categories of Language

The majority of categories I found in the data related to units or types of language. As I attempted to discover the structure of the language that occurred in the Alternate Reality MUD, several categories of language units arose. These categories ranged from small units such as words, spelling, and symbols to large units such as entire activities. I categorized different types of units at different levels.

Utterance Types

One category that emerged with different types of utterances. I categorized utterances in two major ways: game actions and nongame actions. I further subdivided these categories into more specific types of utterances.

Game Actions

Game actions were common. Participants and the game engine were constantly interacting with each other. There were two main types of game actions: player initiated and machine initiated. Players could initiate a game action in many ways such as by putting an object up for sale on the auction channel, initiating combat, and manipulating objects such as opening doors, chests, picking up objects, putting objects into containers, and combining items. Other player actions included movement as players moved from one room to another. Administrators also produced game

actions when they altered the environment by adding rooms or objects or when they altered them. The game machine also created game actions. A virtual object could initiate combat with a player. Virtual weather affected the players' health, or a mobile object could kill a player's avatar, causing it to be ejected from the environment.

Nongame Actions

I broadly defined nongame actions as communication not related to game play between individuals. Nongame actions included any sort of communication on any of the many public and private channels. For example, a player could greet another player, ask for help, or comment on the sale of a virtual item.

Subcomponent Utterances

Another category that emerged from the data was smaller units of utterances. Utterances were composed of subcomponents. These included: words, the structure of utterances including grammar and word order, symbols, and the spaces in which utterances were produced. For example, I considered the use of special symbols, particular words, and particular spellings of words as subcomponents of utterances.

Utterance Pairs and Small Groups of Utterances

Different types of utterances were often paired. These pairs resembled what discourse analysts often referr to as adjacency pairs. I

labeled these small groups of utterances according to what I perceived their purposes to be. The most common of these were: greetings, requests, inquiries, invitations, closings, congratulations, and postmortem dialogues.

Interaction Events

I also found larger units of discourse in the asynchronous spaces. These larger units often followed a particular theme or were motivated by the particular goals of the participants. Larger units included: problem solving, quests and game-play, "social talk," and conflicts. These larger units were typically composed of particular types utterance pairs or groups of utterances, which in turn were composed of particular types of utterances. Thus, for example, problem-solving situations often involved large numbers of inquiries and requests. Similarly, game-play was typically composed of invitations, requests, and numerous individual-machine game actions.

Relevance of Categories of Language to SLA Categories

The above categories that emerged from my data are common in much of the SLA literature, especially the literature on task-based learning. Current task-based learning research typically defines longer pieces of discourse as interaction events. The difference between my study and task-based learning is that researchers interested in task-based learning have exclusively examined classroom and laboratory settings. In

these settings, the researcher or the teacher gives students or participants a task to do. Transcripts of what actually occurs in interaction as students or participants attempt to do the task they were given is defined as the interaction event. Researchers often break interaction events into smaller units such as utterances, adjacency pairs, or utterances, similar to the way that I broke down larger units of discourse in my study.

Environmental and Situational Factors

In looking at variation, I examined environmental and situational factors that might have influenced the occurrence of a particular category. Thus, for example, time arose as a factor. The time between when players last contacted with each other had an effect on the variations in greetings. Similarly, particular recent actions on the MUD influenced subsequent interaction. A recent player killing off a friend affected the types and qualities of greetings and other utterances.

Roles

The last major category that emerged from the data was the roles a particular individual played in interactions. These roles were signaled through variation and occurrences of language structures and types of utterances, groups of utterances, and subunits of utterances. Many of the roles I found included: Malaysian, non-Malaysian, lab administrator, game administrator, player, newcomer, experienced member, leader, follower,

aggressor, victim, and victimizer. These roles had significant effects on the occurrence and the characteristics of particular categories of language units.

Relevance of Categories of Roles to Second Language Acquisition

Researchers in the field of Second Language Acquisition often talk about interaction roles. However, the vast majority of roles in the second language acquisition literature are student-teacher or participant-researcher. Too infrequently have researchers considered other types of interaction roles. Liddicoat (1997), however, convincingly demonstrated the way the particular roles individuals play in given situations affect the data, and thus we need to pay greater attention to the roles second language users and learners play. Two roles that are somewhat common in the second language acquisition literature and that are also common in my study are newcomer and old-timer. These roles have been employed in a limited number of studies that have combined second language acquisition and the theory of communities of practice (Toohey, 1996, 1998; Flowerdew, 1998; Johanson, 2001; Witse, 2001).

VALIDITY CHECKING

I employed several methods to help check the validity of my hypotheses and conclusions. Throughout the initial coding process, I asked participants their interpretations of the data. I particularly asked

them about pieces of data that I did not know how to interpret. These were typically more unusual pieces of data that contained more marked forms of language. Second, I was fortunate to have one of my advisors assist me with coding and interpretations throughout the process. We jointly coded two pieces of data together. She also looked at various drafts and gave me feedback on my hypotheses and conclusions. Third, I asked two individuals to break a long piece of data into smaller pieces. Next, I asked them to compare similar small groups of utterances, greetings, and asked that they find the differences. Fourth, I asked three individuals to read my results and offer other conclusions or insights. The insights that these generous individuals have given me have also helped me to refine my hypotheses.

ANALYTICAL METHODS

After having found categories, I wrote a description of some of the the discourse of the community. The description, while interesting, was not as useful for expanding theory in the field of second language acquisition. Thus, I attempted to relate this description to the theories described in Chapter 2.

Theory Informed Discourse Analysis

This study was informed by theory. As I re-examined the data that I had already coded and found relationships among, I looked particularly

for ways in which the data fit or did not fit the theories discussed in Chapter 2. For theories of social interaction, I looked for ways in which the discourse followed particular patterns that could be explained without resorting to an internal model language. The perspectives forwarded by theorists interested in theories of practice guided me to look for ways in which individuals learned from each other by observing each other and for ways in which particular language units resembled cultural practices. Research from nonlinear dynamic systems theory guided me to look for possible explanations of the complexities I found in the data. I also looked at mechanisms of change to help explain the ways in which language changed over time during interaction events.

Additional Analyses

I employed two additional analyses to illustrate several of the points that I was attempting to make. First, I took a transcript of a ten-hour period of time, which consisted of 365 utterances. I connected utterances that were responses to previous utterances. In this way, I discovered 109 groups of utterances that were connected over time. I mapped these groups on a graph and compared it to similar data from studies in nonlinear dynamic systems theory. The second method I employed was topic analysis (Schallert *et al*, 1996). In this method, I again linked together utterances and what they were responses to. The utterances and connections were then shown on a coherence graph.

CONCLUSION

This was a qualitative study of the discourse produced by 25 participants on the Alternate Reality MUD. As with any qualitative study, the researcher must engage in a great deal of interpretation. I hope that the quantity of data I gathered, the detailed comparisons of the data, the different analytical techniques employed, the methods of validity checking, and the inclusion of three divergent theories as background have permitted a rigorous study.

CHAPTER 4: LANGUAGE

In the introduction, I questioned the reliance of researchers and practitioners in the field of second language acquisition on structural linguistic theories of language. I was particularly critical of the fact that we have tended to view language as separate from and unaffected by the environment. Rather, we have tended to think about language as a property of the mind. Socioculturists have posited a more social view of language, yet they have been criticized for under-theorizing language (Mitchell & Myles, 1998).

To contrast with a structural view of language, I have presented theories from sociology and anthropology. These theories view language as a structured system that is part of a culture's practice. Micro-sociologists such as Goffman (1974, 1969) have viewed language as a structured system with conventionalized ways of behaving that help to guide human's actions. Anthropologists such as Bourdieu (1984), Lave and Wenger (1992; Wenger, 1998), and Holland *et al.* (1998) have presented theories of practice, which explain language and other actions as a system of cultural practices.

In this section, I attempt to examine the discourse of the Alternate Reality MUD as a system of interactive practices. This chapter uses data

from the Alternate Reality MUD as an example of the ways in which language can be analyzed as and examined through the lens of nonlinear dynamics systems theory, theories of practice, and theories of social interaction. In this view, language both affects and is affected by the environment. Mechanisms and properties of nonlinear systems aptly describe much of the data.

SHORT INTERACTIONS

Interaction in the Alternate Reality MUD seemed to be characterized by short, recognizable units of language. Most of the interactions assumed familiar, predictable forms, and most of them resembled adjacency pairs in which two utterances produced by two individuals were paired. Perhaps the most recognizable short interactions were openings and closings, but many other types of short interactions constructed the language in the studied environment. When data are separated by unrelated text, I have bolded the lines that I want to focus on.

Openings

1 [INFO] Nimitz has entered the realm.
2 Nimitz gossips, 'greeting'
3 Thomas gossips, 'hail'

1 [INFO] Glorak has entered the realm.
2 Glorak: Greetings
3 Vulrag: HI Glorak

1 [INFO] Thomas has entered the realm.
2 Thomas gossips, 'hail all'
3 Deglo gossips, 'Hi Thomas'
4 Kyo gossips, 'hail thomas'
5 Amedeaus gossips, 'hail thom'
6 Oddesy gossips, 'hail thomas'

1 [INFO] Jesse has entered the realm.
2 Exald gossips, 'greetings jesse'
3 Jesse gossips, 'grettins'

Requests and Inquiries

1 Spiral quest-says, 'where the hell?'
2 Spiral quest-says, 'reach buff already'
3 Iria quest-says, 'south of buff'

->1 Spiral says, 'where is the worm?'
2 Exald has arrived from the south.
3 Tamnsharr stares at Exald and utters the words, 'sabrairlko'.
4 Paralyzation starts to grip Exald, but Exald recovers.
->5 Nimraith says, 'east'

1 Exald gossips, 'spiral...care to gate me'
2 Spiral gossips, 'wait'
3 Spiral gossips, 'in no gate room'

Ritualized Behaviors as Practices

Two common interaction types were openings and requests, both of which were composed of a limited number of elements: two or three utterances of only a few words each. These short interactions had recognizable forms. Openings were composed of ritualized exchanges of recognized greeting tokens such as <hail> and <greetings> but also <hi> and <hello>. Openings could also contain references to people present, such as <lord>, a person's name, or simply <all>. Openings were also composed of three distinct elements: the entrance of an individual into the shared environment, a greeting utterance by the entering individual, and a greeting utterance by one or more individuals already present. Inquiries and requests also fell into predictable patterns, with a question followed by an answer. Shortened forms of utterances were preferred.

From a communities of practice perspective, ritualized behaviors emerge as individuals collaborate as they reach toward shared goals (Wenger, 1998; Lave & Wenger, 1991). Researchers interested in social interaction have also written extensively on the ritualized nature of interactions and the view that life is an imitation of exemplary forms (Goffman, 1974). In the Alternate Reality MUD, participants engaged in

patterned forms of behavior. Recognizable interactions repeatedly emerged, and short interactions were common.

Abbreviations and Shared Ways of Speaking

Members of a community of practice create shared repertoires and ways of speaking. These ways of speaking may be idiosyncratic to the community and may not make sense to outsiders. In the Alternate Reality MUD, forms of speaking emerged that were idiosyncratic to the community. The typical <greetings> was sometimes stated as <greetingz>, <greeting>, <greet>, or <greetz> which may not be common in other online environments. The names of virtual objects unique to the studied environment, such as <Demon Gods> or <Chiara's apron> would likely have had little meaning outside the environment. Over time and through interaction, the community constructed a system of interaction that was unique to that community.

One way in which new words and ways of speaking were created was through shortening longer utterances and words. In game play, individuals did not have time to type or read long utterances. The game engine proceeded at a pace of one action per second. Thus, players had to keyboard one game action per second and hit the return button, or they would lose their turn. Typing speed is essential for success on the MUD. In fact, participants who could not type quickly were frequently thought of as bad players or even mentally slow. Concomitantly, the ability to read

text scrolling quickly on one's screen is also essential. On the Alternate Reality MUD, it was possible for 20 to 30 lines of text to cross a player's screen every second if s/he was in battle or traveling quickly through virtual rooms. Thus, players had little time to type in non-game actions, such as requests or directions. When they did, they frequently used reduced forms. For example:

->1 Najib gossips, 'summon!!'
2 [Xavier failed summoning Najib to The Plains of Uz'Huhrr.]
3 [INFO] Najib killed by the piscodaemon.
4 [Najib entering game with no equipment.]
5 [INFO] Najib has just entered the realm.
->6 Xavier gossips, 'nosum '

->1 Necromayhem says, 'di'
2 Spiral stares at Necromayhem and utters the words, 'oculoinfra ubzuguvuruhl'.

In the first example, two reductions occurred. In line 1, Najib used a single word, <summon>, with two exclamation marks to indicate that he needed someone to summon him to a safe area of the MUD immediately. In line 6, Xavier communicated that he could not summon Najib because Najib had his nosummon flag toggled on through <nosum>. In the second example, Necromayhem asks Spiral to cast the spell <detect invisibility> on him through the shorthand <di>. These reductions made sense in the particular situations in which they arose in the Alternate Reality MUD.

The types of tasks, requests, and commands that could be required in the game were limited. Players knew what to expect and would

anticipate particular requests, such as <heal me> and <summon me>. Thus, in context, abbreviations made perfect sense.

Often, the short interactions that arose in the environment were isolated. Players and administrators often worked independently. Players engaged in tasks would greet entering individuals and then return to their tasks. A newcomer would ask a question, an old-timer would respond, and both would go back to their activities. An administrator or player would admonish a player for spamming the MUD, and then each would go back to their own tasks. Interaction would swiftly arise and just as quickly dissipate. Occasionally, however, these short interactions would develop into longer, sustained interactions. The simple sale of a virtual item might spark an extended conversation about real-life topics. A greeting could possibly lead to the formation of a group to explore a new zone. The death of an avatar could lead to playful joking. In the following two sections, I examine longer interactions.

UTTERANCE CHAINS

On June 14th, 2002, I recorded ten hours of interaction on the public channels. Interaction emerged and dissipated as individuals logged on and logged off. They formed groups, communicated with each other, and left. I have included the data in appendix A. The total number of

utterances in the data is 365. I counted the number of utterances used in response to each initial utterance to find the size of each utterance chain. By utterance chain, I mean all utterances produced in response to a given utterance. Figure 4.1 is a graph of the number and sizes of utterance chains.

Figure 3: Utterance Chains in Data

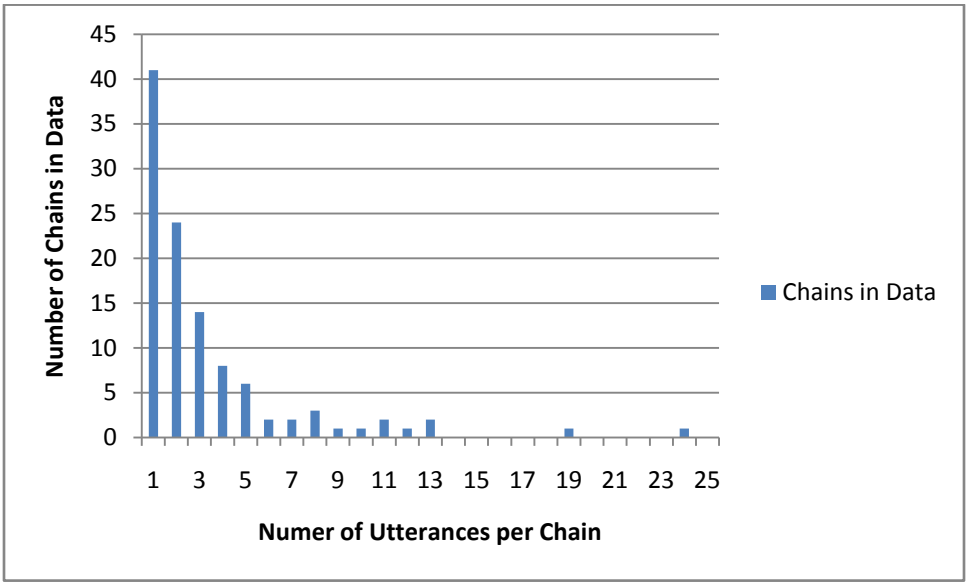


Figure 3 is a graph of the number of utterance produced in utterance chains. On the Y axis are the total number of utterance chains, and on the X axis is the number of utterances in each chain. From the figure it is apparent that there were more small chains than large ones. This is a classic power curve: there are exponentially more short utterances than

longer utterances. To illustrate the way this looked over time, I have graphed the order of each utterance on the X axis and its size on the Y axis.

Figure 4: Sequence of Utterance Chains

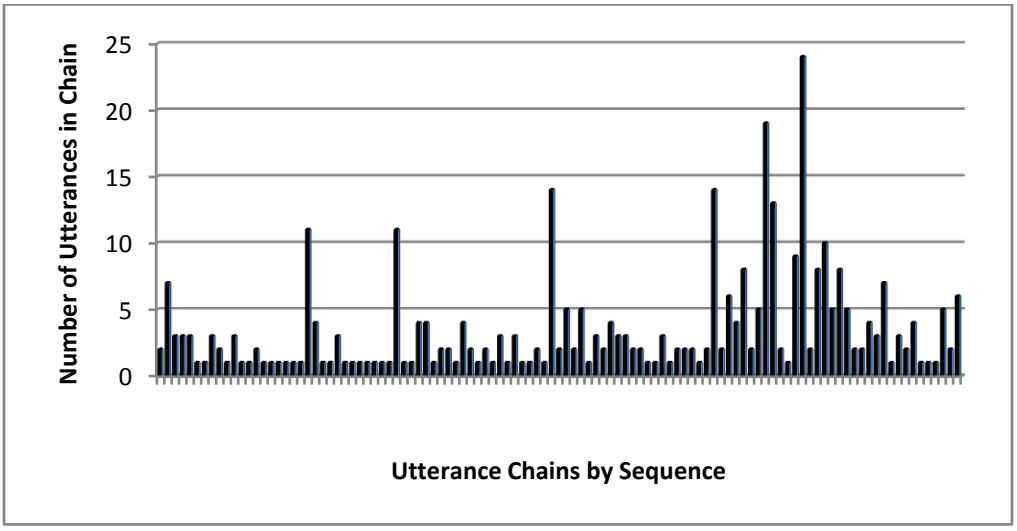


Figure 4 shows the chains of utterances produced over time. There were 109 utterance chains. Larger chains were interspersed with small chains. The ratios of small chains, those less than five utterances, to large chains, those greater than ten utterances, was about one to ten. This is approximately what Bak and Chen (1991) found in their work on self-organized criticality in avalanches.

Self-Organized Criticality

The emergence and disappearance of interaction in this online community resembled phenomena studied by Bak and Chen (1991). In linear systems, it is thought that actions create reactions of equal strength. In other words, small disturbances should result in small reactions, and large disturbances in larger reactions. However, nonlinear systems behave in unpredictable ways. In a system constructed of many sub-components, the behavior of the whole system emerges from the interaction of the components.

Bak and Chen's theory of self-organized criticality illustrates the way that small perturbations can result in a range of reactions from small, insignificant ones to larger, catastrophic ones. Bak and Chen studied avalanches on piles of sand. They added one grain of sand at a time to a pile of sand, and they measured the results of the addition of each grain. They found that the sand pile evolved to a point at which the addition of any new grain could trigger a large or small avalanche. Each grain had the potential of triggering a chain effect, as one grain would displace two more, which would displace two more, thus causing a large avalanche. Nonlinear systems evolve to a point at which any small perturbation may induce large scale effects. Further, they found that the mechanism that led

to small and large changes was the same: in their case, the addition of a grain of sand.

In the history of the system of interaction in the Alternate Reality MUD, each utterance was a building block that had the potential of creating an avalanche of other utterances. Many utterances were isolated and did not produce reactions from other participants. Others produced mid-sized interactions as a few individuals would respond to a given utterance, and still others resulted in long interactions. Thus, the practices proceeded in a nonlinear fashion as each short interaction was added to the history of the interaction system. Similarly, the mechanism responsible for both short and long interactions was the same: an utterance. Most of these triggering utterances were game actions. The ability of a system to generate extended discourse lay in the property of the system: the accumulated history of practices in the Alternate Reality MUD.

From a communities of practice perspective (Wenger, 1998), practice is not stable but involves continuity and discontinuity. Practice must be useful to members of a community. However, practices must always be modified and changed as the environment as well as relationships within the community are constantly changing. Thus, practice is a combination of stability and malleability. Practice is also a discovery process that exists in the historical domain as the new is discovered and reproduced in the old. In the next section, I use data from

an arena quest to examine the building blocks of interaction in more depth and their interrelationships with the participants.

KYO'S AUCTION

The following is a longer interaction that began as one player attempted to sell virtual food. From this simple sale, a longer, sustained interaction emerged as others competed with him as they attempted to sell their own goods, and other types of interactions arose.

1 Master Kalten auctions, 'Kyo puts An ear of corn up for sale,
2 minimum bid 10000 coins.'

[When a player typed<auction item>, the MUD's software would automatically produce the text in lines 5-6 with the seller's name and the item for sale. Every 5 seconds or so, the software would produce a new call for bids (lines 7-8) until the auction was concluded. Players only need type <auction item> to start the process.]

3 Master Kalten auctions, 'An ear of corn is going once to no one
4 for 10000 coins.'
5 Necromancers gossips, 'khokhoh'
6 Master Kalten auctions, 'An ear of corn is going twice to no one
7 for 10000 coins.'

Master Kalten auctions, 'An ear of corn is going for the last
call to no one for 10000 coins.'
Master Kalten auctions, 'An ear of corn is SOLD to no one for
10000 coins.'

[Interspersed throughout the auction are other activities. As Luciffer and other players continue to battle virtual monsters, some die. Then, Xavier comments on these deaths, and others respond to this comment.]

[INFO] Luciffer killed by the bog beast.
[Luciffer entering game with no equipment.]
[INFO] Luciffer has just entered the realm.
Xavier gossips, 'dead body everywhere....'
Luciffer gossips, 'heheh '
Najib gossips, 'asiey'

[Oddesy describes the food Items that he has found. Subsequently, Kyo places them up for sale. Oddesy is speaking for Kyo as Kyo has been muted and cannot produce text on the gossip channel.]

Oddesy gossips, 'i found a good food'
Oddesy gossips, 'i have apple'
Necromancers gossips, 'hehe'
Xavier gossips, 'wanna some...'
Master Kalten auctions, 'Kyo puts An apple up for sale, minimum
bid 1 coin.'
Master Kalten auctions, 'Xavier bids 2 coins on An apple.'

[Xavier and Najib to bid against each other in an attempt to buy the apple. This competition is playful and not serious. They are bidding one to ten gold coins on the item, yet a new player can easily gain 2500 gold coins in 30 minutes, and experienced players may have 15 million

or more gold coins in their accounts.]

Master Kalten auctions, 'An apple is going once to Xavier for 2 coins.'
Master Kalten auctions, 'Najib bids 3 coins on An apple.'
Xavier gossips, 'dont want bid la'
Master Kalten auctions, 'An apple is going once to Najib for 3 coins.'
Xavier gossips, 'lol'
Master Kalten auctions, 'An apple is going twice to Najib for 3 coins.'
You have been idle, and are pulled into a void.
[INFO] Embler has advanced to level 5
Master Kalten auctions, 'An apple is going for the last call to Najib for 3 coins.'
Master Kalten auctions, 'Xavier bids 4 coins on An apple.'
Master Kalten auctions, 'An apple is going once to Xavier for 4 coins.'
Master Kalten auctions, 'Najib bids 5 coins on An apple.'
Master Kalten auctions, 'Xavier bids 6 coins on An apple.'
Master Kalten auctions, 'An apple is going once to Xavier for 6 coins.'
Master Kalten auctions, 'Najib bids 7 coins on An apple.'
Master Kalten auctions, 'An apple is going once to Najib for 7 coins.'
Master Kalten auctions, 'Xavier bids 9 coins on An apple.'
Master Kalten auctions, 'An apple is going once to Xavier for 9 coins.'
Master Kalten auctions, 'An apple is going twice to Xavier for 9 coins.'
Oddesy gossips, 'i will sell Apple 73 for 40 coins'
Master Kalten auctions, 'An apple is going for the last call to Xavier for 9 coins.'
Xavier gossips, 'lol'
Master Kalten auctions, 'Najib bids 10 coins on An apple.'
Master Kalten auctions, 'An apple is going once to Najib for 10 coins.'
Master Kalten auctions, 'An apple is going twice to Najib for 10 coins.'
Master Kalten auctions, 'An apple is going for the last call to Najib for 10 coins.'
Master Kalten auctions, 'An apple is SOLD to Najib for 10 coins.'
Master Kalten auctions, 'Xavier puts a waybread up for sale, [Following Kyo's

successful auction, Xavier and Necromancers both attempt auctions of their own, but no one bids on them. One is a waybread, which is the typical food on the MUD, and some players can create waybread for free. The other is an antennae, which is a rather useless item that comes from a low level zone.]

```
66      minimum bid 51 coins.'
67      Master Kalten auctions, 'a waybread is going once to no one for
68      51 coins.'
69      Xavier gossips, 'buy laaaa really cheap..fresh one..still hot'
70      Xavier gossips, 'bake by Xavier'
71      Master Kalten auctions, 'a waybread is going twice to no one for
72      51 coins.'
73      Master Kalten auctions, 'a waybread is going for the last call to
74      no one for 51 coins.'
75      Master Kalten auctions, 'a waybread is SOLD to no one for 51
76      coins.'
77      Master Kalten auctions, 'Necromancers puts Antennae up for sale,
78      minimum bid 2500 coins.'
79      Master Kalten auctions, 'Antennae is going once to no one for
80      2500 coins.'
81      Master Kalten auctions, 'Antennae is going twice to no one for
82      2500 coins.'
83      [ INFO ]  Embler has left the realm.
84      Master Kalten auctions, 'Antennae is going for the last call to
85      no one for 2500 coins.'
86      [ INFO ]  Embler has entered the realm.
87      Master Kalten auctions, 'Antennae is SOLD to no one for 2500
88      coins.'
89      [ INFO ]  Embler has left the realm.
90      Oddesy gossips, 'u order from me'
91      Oddesy gossips, 'grapes, melon,apple,walnut,mushroom,corn and
92      etc'
```

93 Xavier gossips, 'i want roti canai..'
94 Xavier gossips, 'got it?'
95 Oddesy gossips, '1 bag for 100 coins'
96 [INFO] Necron has advanced to level 66

[During the entire auction, other random events occur. Necron advances to level 66. Next, players begin to talk about *roti canai*, a non-virtual Malaysian bread. This discussion leads to Oddesy asking why Kyo is unable to gossip.]

97 Najib congrats, 'Necron'
98 Necron gossips, 'thx dude'
99 Najib gossips, 'he he'
100 You gossip, 'what is roti canai?'
101 Oddesy gossips, 'no'
102 Oddesy gossips, 'services'
103 Xavier gossips, 'roti canai is speceal waybread for malaysian'
104 Najib gossips, 'roti tempayan is a good one'
105 You gossip, 'are those types of bread?'
106 Oddesy gossips, 'yups My Lord Vulrag'
107 You gossip, 'I'll see if I can find a baker who can
108 make those then :)'
109 Xavier gossips, 'haha i hope i can'
110 Necromancers gossips, 'so hard to make it aa u need
111 tepung and telur'
112 [INFO] DreadLord has left the realm.
113 Xavier gossips, 'yeap'
114 Xavier gossips, 'and a very soft hand...'
115 [INFO] Jesse has entered the realm.
116 You gossip, 'hmmm...'
117 [Closing link to: Jesse.]
118 Oddesy gossips, 'hi jesse'
119 [[666.internetaddress] has connected.]
120 Oddesy gossips, 'my Lord why kyo cannot gossip'

The above transcript presents an example of typical interactions that occurred on the gossip channel on the Alternate Reality MUD. Throughout, avatars die and re-enter the world to search for their courpses.

Then, Kyo attempts to sell virtual corn, but no one bids on it, perhaps because he is asking too high a price. More avatars die, and players comment on the high number of deaths. Oddesy announces his find of virtual food, and, using his friend Kyo's avatar, he begins to sell the food. Sustained interaction emerges as Xavier and Najib compete to buy the virtual apple. Xavier and Necromancers attempt to sell their own virtual objects, but both fail. Players begin a conversation about *roti canai* and *roti tempayan*, and finally Oddesy asks why his friend Kyo cannot use the public communication channels. Throughout, players enter and leave the environment and gain levels. The interaction is sustained over a longer period of time, and yet there appears no overarching topic governing the interaction.

Emergence

Of particular interest in these data to me was the fact that interaction was sustained for longer periods of time. Earlier, I discussed the way in which short, medium, and longer interactions arose in the interaction. Here, I examined this longer interaction in an attempt to describe the ways in which longer interactions emerged and were sustained. In this section, I draw heavily from Davis and Sumara's (2006) work, they identified and explained three pairs of complementary and necessary conditions for emergence to take place in nonlinear dynamic

systems: neighbor interactions and decentralized control, randomness and coherence, and internal diversity and redundancy.

Neighbor Interactions and Decentralized Control

Organization in nonlinear dynamic systems arises spontaneously as a result of neighbor interactions. Subcomponents of larger systems interact with those in their immediate surrounds. As various subcomponents of a larger system interact with other local subcomponents, order arises. Also necessary for the emergence of order is decentralized control. In many human systems we have hierarchical structures. These rigid structures often limit communication among human agents and, thus, limit spontaneous order from emerging.

Order in this longer interaction can be analyzed as having been produced through neighbor interactions and decentralized control. There was no apparent leader or boss who was directing the conversation. The only administrator present was me, and I participated in the discussion as a participant, not a boss commanding people what to do.

To illustrate the ways in which neighbor interactions generated order in the interaction, I have produced a coherence graph similar to those used by Schallert *et al.* (1996) in studying online discussions in classroom settings. The coherence graph links each utterance to the one that it is in response to. These data are different from the data that Schallert *et al.* typically analyze; however, I feel the method applies. I

have altered it in the following ways: I was not concerned with the topic of each utterance but rather what utterance it was a response to. From this, I have drawn arrows to indicate cause-effect relationships among the 83 utterances. A few utterances had multiple or unclear referents.

Figure 5: Analysis of Kyo's Auction

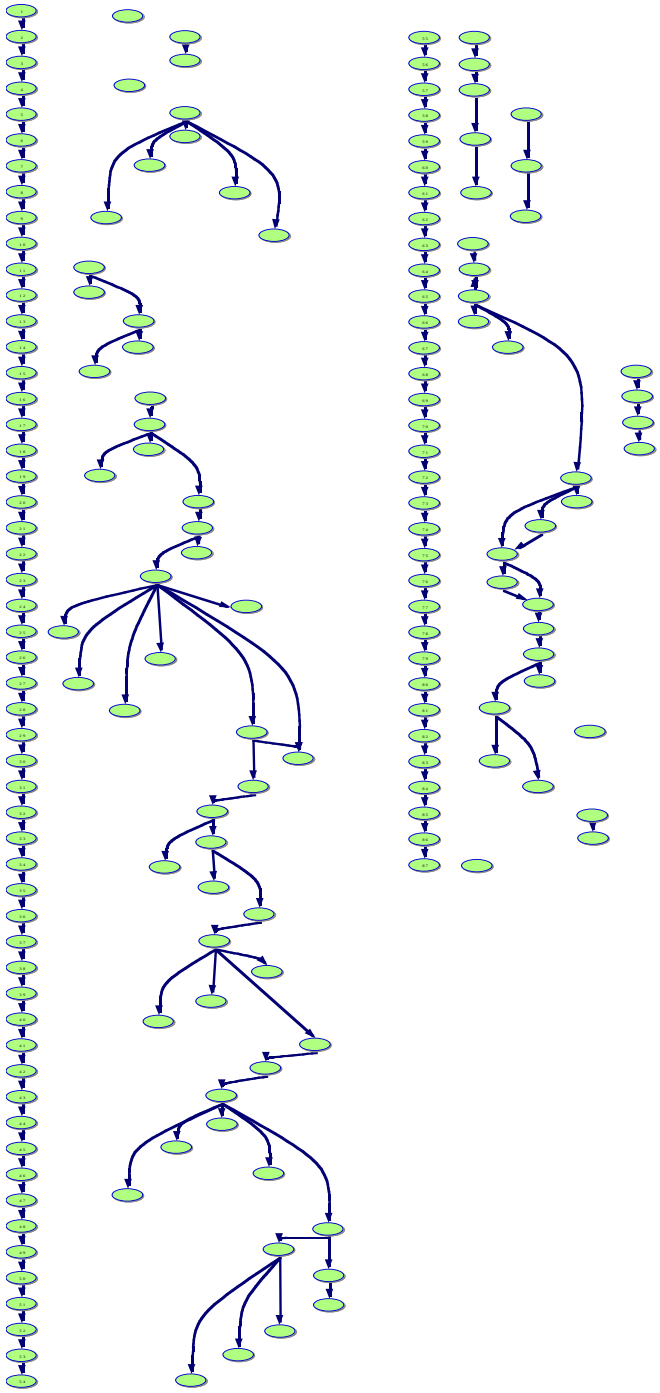


Figure 5 is a representation of the utterances produced in Kyo's Auction over time. Due to space constraints, I have split the graph into two parts. I have placed each utterance in order as it occurred on the left. This constitutes a continuous chain. To the right of the continuous chain is a graph of each utterance tied to the previous utterance(s) that it responded to. The purpose of this graph is to show the causal relation between utterances in the interaction.

From Figure 5, it is apparent that there is no overarching hierarchical structure producing the structure of the interaction. Rather, most utterances were produced in response to an utterance that occurred one or two lines earlier. Some utterances triggered the production of multiple other utterances while others did not trigger any response. Nevertheless, there appears a central "stream" of the discourse, or, in other words, a center to the ongoing conversation. Each utterance was not related to a central theme or overarching controlling entity but was rather regulated by the mechanism of neighbor interactions.

Internal Redundancy and Diversity

Another pair of characteristics necessary for emergence of order in nonlinear dynamic systems is internal redundancy and internal diversity. Internal redundancy enables communication between agents. Redundancy provides repetitions, replications, and copying of building blocks that

agents can easily recognize. Internal diversity is a source of creativity, of altering the characteristics, combinations, or positioning of building blocks in order to respond to unforeseeable perturbations that may arise in the environment. Redundancy enables the system to withstand external forces, while diversity enables a range of creative responses to perturbations.

In the above interaction, and in the discourse of the Alternate Reality MUD in general, there was a great deal of redundancy, so much so that much of the discourse was automated, either by the game engine or by players' MUD clients. The most obvious examples come from the auction and [INFO] channels. <Master Kalten auction, '(person) put (object) up for sale, minimum bid <number> coins>, and other auction functions were series of words always produced in the same order. Also, when a player entered, exited, died, or gained levels, the [INFO] channel produced formulaic utterances such as <[INFO] (name) killed by (mobile object)>.

A few players even programmed their MUD clients to produced formulaic responses to typical situations. For example, Deglo had programmed his client to produce <gossip Congratulations, (name), oc attaining (X) level>. Other players also produced redundant, typical responses to a player "leveling," or finishing the tasks of a certain level of difficulty, typically <grats (player)>, but obviously shortened forms.

1 [INFO] Hyunckel has advanced to level 45
->2 Deglo congrats, 'Congratulations, Hyunckel, on advancing to level 45'
3 Hyunckel gossips, 'thank'
4 Thorax congrats, 'hyunckel'
5 Spiral congrats, 'hyunckel'
6 Hyunckel gossips, 'thank'

Diversity also occurred in Kyo's auction. Interspersed throughout the more redundant utterances were more creative and unique utterances, what I coded as "comments." These could be about the death of individuals, the auction, or *roti canai,* a type of Malaysian bread. These diverse, more unpredictable utterances were mixed in with the more formulaic utterances. The interaction began as comments about player deaths. Random events arose, such as the gaining of a level, which resulted in the production of new types of utterances. Players began bidding, or game-related actions, in response to auctions. Then, a discussion about real-life Malaysian food, roti canai, emerged from the sale of food via the auction channel.

Coherence and Randomness

Coherence and randomness are enabling constraints that allow nonlinear dynamic systems to maintain their identities while changing through adaptation. Complex systems are governed by proscriptive restraints, or conditions that they must avoid in order to survive. For humans to maintain coherence, for example, they must avoid jumping off of a building. In this sense, emergent behaviors are like games. They are

about staying within the boundaries of possibilities, yet, within those boundaries, creatively pursuing goals and agendas. Structures that define nonlinear dynamic systems must be sufficiently unyielding to maintain a particular identity yet sufficiently malleable to produce varied responses.

Complex systems are also governed by randomness, which is unpredictable noise in the environment that the system can take advantage of. Noise from the environment can create potential states or behaviors that would otherwise not be possible. This noise is not bothersome but rather a necessary property for systems to grow and develop.

Similar types of utterances and game actions were produced repeatedly. There are four occurrences of selling items (lines 1, 22, 65, & 77), and eight occurrences of bids (lines 24, 27, 38, 41, 42, 45, 48, & 59).

In the above data, randomness occurs in places in which game actions occur. There was random noise as Luciffer died in line 12. Other random noise occurred as Embler and Necron gained levels (lines 33, & 96). Still other random noise occurred as players entered and left the MUD (lines 13, 81, 84, 110 & 113). Any of these random events occurring in the environment had the possibility of creating further interaction chains, but only some did.

Thus, two forces were at work at maintaining the discourse moving. Coherent elements spread across utterances to create a sort of coherence, which helped participants to make sense of the interaction. At

the same time, random noise enabled the interaction from freezing. Random elements opened up new opportunities for the interaction to deviate from coherent patterns, which also helped the discourse from "freezing."

Summary to Kyo's Auction

The longer interaction I have named Kyo's auction illustrates emergent characteristics of the language on the Alternate Reality MUD. I have outlined six properties of emergent systems. In longer interactions, structure emerges through neighbor interactions and decentralized control. Utterances were produced in response to nearby utterances, and there was no particular theme or topic governing the overall interaction. Utterances were characterized by having internal redundancy and diversity. Many utterances had such a high degree of redundancy that they were produced by computer programs, yet other utterances displayed more diversity. I will examine internal redundancy and diversity in chapter 6 when I analyze greetings. Finally, the interaction was characterized by coherence and randomness. Particular parameters limited what players could and could not do in the interaction. At the same time, random game events had the potential of generating new types of structures and behaviors in the interaction.

DISCUSSION OF LANGUAGE

In this chapter, I have analyzed the language of the Alternate Reality MUD as a nonlinear dynamic system. Individuals engaged in ritualized practices, which were the subcomponents of a larger system of interaction. The occurrence of utterances and actions in the studied environment were guided by mechanisms and properties of nonlinear dynamic systems.

This study is aligned with much of the research on social interaction. Researchers interested in social interaction have shown language to be a structured system that follows patterns (Goffman 1969; Sacks, 1992; Sacks, Schegloff, & Jefferson, 1974). A communities of practice view also posits that groups of individuals create shared ways of behaving and a shared lexicon as they interact with the environment and each other as they strive towards shared goals (Wenger, 1998). Nonlinear dynamic systems theory posits that order arises out of the interaction of subcomponents of a system and not from a pre-specified set of directions (Syverons, 1999; Kauffman, 1995; Holland, 1995). The language in the Alternate Reality MUD seems to fit these three theories. The language was a system that worked in predictable ways, was structured, but the structure arose not from a pre-specified set of directions but rather from properties of the system during interaction.

This view contrasts with cognitive views of language from the field of second language acquisition. Cognitive models of language assume that the structure of language is determined by an innate property of the mind. The most salient examples are those of Chomsky (1959), Krashen (1982, 1985), and Pinker (1995). However, the view of language as system of cultural practices contrasts with innate views of language. Importantly, researchers interested in social learning can appropriate this view of language. Viewing language as a cultural practice shifts our thinking on language learning from the acquisition of general grammar and phonological rules applicable in any situation to rules that apply in particular situations. These local practices may evolve and change in particular environments. In the next chapter, I explore a view of learning that is coherent with the view of language as a nonlinear dynamic system.

CHAPTER 5: LEARNING

All three theories from Chapter 2 discussed learning resulting from the accumulation of experience. As individuals interact with their environments, they accumulate experience, which guides subsequent behavior. Thus, one way of viewing learning is that is a process in which an organism is adapting and evolving to ongoing occurrences in the environment in order to survive, thrive, and persist. The theory of communities of practice adds the well-researched concept of legitimate peripheral participation through which newcomers to a community of practice learn through observation of more experienced individuals and by participating in incrementally more difficult tasks. Research from a social interaction framework has shown that as we accumulate experience, we build models of typical scenes. We continue to test out these models as we accumulate more experience. While there are typical scenes, there are not exact replicas of scenes (Tannen, 1993; Goffman, 1974). Research in nonlinear dynamics suggests that learning is a change in behavior as systems attempt to adapt to ever-changing circumstances in their environments.

The models of learning provided by these three theories served as the basis of analysis of the interactions that arose in the Alternate Reality MUD, where individuals from around the globe came and used English

voluntarily and enthusiastically as they pursued their goals, which included developing or playing the game. As they strove towards their goals, a system of interaction composed of shared lexicon and understood ways of communicating emerged. Learning occurred on both the group and individual levels. In this section, I examine two types of learning: group and individual. First, individuals, over time, learned to interact with each other and the environment in increasingly efficient ways. I present a description of long term learning of individuals in the environment. Second, groups of individuals changed their practices. In examining group learning, I present data from the World Building board, a virtual bulletin board upon which administrators posted alterations they had made to the game. Third, individuals changed the type of language that they produced in interactions. I will illustrate individuals' changing behaviors in interaction through an argument between an old-timer and a newcomer.

LONG-TERM LEARNING

Most of the participants were experienced MUDders who had played on similarly coded MUDs. Thus, they were able to complete basic tasks and did not need to learn elementary commands. There were other specific aspects of the environment that required even experienced MUDders to deal with novel situations. The Alternate Reality MUD had many unique areas, and some commands were also unique to the MUD. One unique command was the way individuals interacted with various objects of the same name. For example, when players died several times in the same room, they would need to get their objects out of the corpse from the first death, which would be on the bottom of the pile of corpses. In the Alternate Reality MUD, the command to interact with a particular object or a series of objects with the same name was <command number.objectname>. Thus, if there were five corpses and the bottom corpse had equipment, the player would need to type <get all 5.corpse>.

->5 Rewt gossips, 'uh my eq empty'
->6 Selina gossips, 'second corpse'
->7 Rewt gossips, 'where'
->8 Selina gossips, 'at The Temple Of Port blacksand'
9 Rewt gossips, ':P teknikal problem'

In this instance, Rewt and Selina had been playing for a while and had died several times. Rewt was unable to find his equipment because he was

using the wrong command. Selina let him know it was in the second corpse. It was likely Rewt would have remembered to examine the last corpse in a pile in subsequent instances.

Another example of this type of learning occurred when individuals learned about a new feature or characteristic of the game, or when particular aspects of the game were modified by administrators. The following example occurred after Aeon had instructed all administrators to place a <memory> flag on all mobile objects. With this flag, all mobile objects would remember players who had earlier attacked them and fled. The mobile objects would thus be aggressive to players who had earlier attacked them. Before this, mobile objects did not have memory flags. Players had to learn to adjust to this new characteristic of the MUD.

```
1    Antugile shouts, 'arghhh! no againn!> Hey!  You're the fiend that attacked me!!!',
2    exclaims Resident of the city.'
3    Antugile shouts, 'not againn!'
4    The night has begun.
5    Antugile shouts, 'me at hotel'
6    Antugile shouts, 'poorly they cant hit me there'
7    Valantriel gossips, 'Mobs will slowly get intelligent in the mud
8    and will remember whoever hit them'
9    Valantriel gossips, 'And will react back to the action you take on them'
10   Valantriel gossips, 'We will make mud more realistic'
11   Valantriel gossips, 'If you hit a person, the person will remember and hit back'
12   Valantriel gossips, 'This new mob intelligence will evolve the realm soon'
13   Antugile shouts, 'and how can i make them to forget?'
14   [ (GC) Valantriel restores the world. ]
15   Antugile shouts, 'ehanks'
16   Antugile shouts, 'to do it? is it that i have ti killed em all?'
17   [ INFO ]  Devilmaycry has advanced to level 84
18   Valantriel gossips, 'The new system is'
19   Valantriel gossips, 'If you attack a mob'
```

Valantriel gossips, 'It will remember you until you kill it'
Antugile shouts, 'gosh! its so many of them, and my parrys doesnt work to parry all of them'
Valantriel gossips, 'Then remember and wisely sellect your oppenent before you attack them'

Another common novel type of situation players had to learn was to navigate the virtual geography unique to the Alternate Reality MUD. Players would often die in new areas and had to spend long periods of time attempting to find where they had died. Once they mastered these new areas, however, they acquired the knowledge and skills necessary to quickly move through the previously unknown virtual landscapes.

Other learning occurred as well. Players would explore new areas. Once they had mastered a new area, they would learn better tricks for overcoming the area. One area, called Into Earth, took Zorrak several weeks to explore. Once particular tricks to the zone were discovered such as secret doors, key locations, and portals, he was able to conquer the zone in one to two hours. He passed his knowledge on to other players who were also able to conquer the zone in several hours.

Administrators learned as well. Learning to make the first room or object in a new area often took a long time. Once they had acquired this skill, they could build objects and rooms much more quickly and with much more complexity.

The following two sections detail more specific instances of learning. These are specific ways in which individuals and groups of

individuals changed the way they interacted with themselves and the environment in order to better fit the circumstances. I relate these more specific instances of learning to mechanisms from nonlinear dynamics.

THE WORLD BUILDING BOARD

There were seven virtual bulletin boards upon which individuals could post messages in the Alternate Reality MUD. Five of these were for administrators only, and two were for both players and administrators. The World Building board was accessible only to administrators. Administrators posted changes they had made to the virtual environment on this board, and they also debated policy. The messages posted to this board are useful data as they chronicle many of the changes in practice that the two interacting groups, players and administrators, made over time.

The first two postings came on April 11th and 12th. Aeon officially opened the board, and the clapping referred to applause for successfully opening the board, and the MUD in general. Valantriel gave general advice on building and coding.

The World Building Board I

Message 1 : Thu Apr 11 (Aeon) :: Official opening

I officially open this board for builders!
clap clap clap

Aeon opened the board on April 11.

Message 2 : Fri Apr 12 (Valantriel) :: To all builder, Color code issue

Just 1 issue right now...
Please be aware of your color
Dont let color leakage
Always close color
Thank you...

Clap to This! Aeon

In messages 3, 4, and 5, Aeon continued to give instructions on the board as to how world construction should proceed by informing administrators where new players would load. In posts 3 and 4, he attempted to direct the actions of other administrators by asking them to focus on building specific areas. In his fourth posting (message 5), he provided specific instructions on how to connect newly created zones.

Message 3 : Fri Apr 12 (Aeon) :: Global Newbie Zone

Newbie shall load into zone 401 now. They shall remain there until they pass level 5. Please check on what other helps we can give to them by making descriptions, notices on the rooms.

Message 4 : Sat Apr 27 (Aeon) :: Various Area Levels Needed

Type help area.
Here you will see some of the areas that i list down for mortals to see.
We will need more of the mid level zone for the mortals.
Possibly just downgrade the high level ones which is stock.

Message 5 : Sun Apr 28 (Aeon) :: Connecting Worlds

To connect your world, after granted permission by the higher gods, the zones should be noted here on this board. I want to know where the zones are connected so that i can draft out a map of this realm. Now i myself find lost (besides using goto) in this world. Other than that please note the zone levels as well so that i can update the 'help area' file.

On Thursday, May 30th, Aeon posted more specific instructions on building requirements.

Message 12 : Thu May 30 (Aeon) :: Arming Mobs

Do not put mobs to wield weapons. It will just reduce their current barehand damage. For roleplaying purpose make them hold it instead. Holding or other methods of equiping will add or reduce the mobs default stats.
Thanks

A few days later, Valantriel posted more specific instruction on building and zone testing.

Message 13 : Mon Jun 10 (Valantriel) :: Take Note - Zone Testing

If you had done a zone walk and testing with mortals
Please ensure that no equipment from your new zone are given to them

The mortals should not know the statistics of the new eq in the new zone
Those new eq shouldnt be around if the zone is not yet connected
Please take note

Thank you

Verbal Instruction

Lave and Wenger (1991) found that little verbal instruction transpired in apprenticeship type situations. In the Alternate Reality MUD, and especially on the World Building board, much verbal instruction transpired, likely due to the fact that there was no other way to communicate or demonstrate on MUDs save for physically sitting next to another person at his or her computer. Experienced administrators gave specific instructions on how to build zones to less experienced builders. Because much building was conducted through a software program that appeared only on the user's screen, no observation was possible. Similarly in game play, players would often type commands and receive feedback from the environment, but neither the command nor the feedback was visible to other players. Also, it was often not safe for newcomers to follow more experienced members around. In the Alternate Reality MUD, there were often hidden or randomly loaded dangers. These could appear at any place. An experienced player would know how to react quickly and avoid and survive such a situation. Newcomers would not know how to

act, and because of their unfamiliarity with the MUD's geography, they might attempt to avoid a danger by running into an even greater danger. Thus, verbal instruction was a necessary component of the learning that took place in the Alternate Reality MUD.

I present one example of verbal instruction that occurred in quasi-synchronouos spaces. In the first example, Xyrix wanted to know how to open a door whose alias was the same name as the door. To unlock a door, players would need to use the command <unlock door key>. However, if the name of the door was <stone door> and the name of the key was also <stone key>, one would have to type <unlock stone stone>, which the MUD's software would not recognize as both door and key had the same name. Players would have to use the command <unlock west stone> or find if the key had another alias. In the first example, Xyrix does not know how to unlock the door, and so he asks.

1 Xyrix gossips, 'how to'
2 Xyrix gossips, 'how to open door that same the key'
3 Xyrix gossips, 'same name'
4 Kyo gossips, '?'
5 Xyrix gossips, 'the door name same like the key name'

The World Building Board II

When the MUD was first opened, there were only a few experienced builders: Aeon, Zorrak, and I. We spent much time assisting new builders learn to build. As newer builders became more competent, more building took place. As more areas were built, more were posted on the World Building board along with coding requests.

Djibril began by asking for special coding for his zone on May 12th. Valantriel, seeing a lack of equipment for monks, made a general request on May 15th. Each virtual object, mobile object and room had a unique number. When creating a new object, for example, an administrator would assign it a number. In message 7, the numbers in the first column pertain to mobile objects that Djibril had created, and the second column pertains to the rooms in which they loaded. The third column which contains <guildmaster>, <guildguard>, <banker>, and <receptionist> refer to the type of coding requested for each mobile object.

Message 7 : Sun May 12 (Djibril) :: for aeon

Spec Proc needed for zone 80 :

MOB	ROOM	SPEC_PROC
8001	8061	guildmaster
8002	8065	guildmaster
8007	8054	guildguard
8008	8062	guildguard
8009	8060	guildguard
8010	8057	guildmaster
8024	8128	receptionist
8028	8018	bank

Message 8 : Mon May 13 (Aeon) :: guildguard code request

Please give me room vnum, mob vnum, direction and class allowed.
that way i can make faster without checking.
thank you.

Message 9 : Wed May 15 (Valantriel) :: Monk Eq

I just wanna request
That some monk or ninja eq be added to any current building zone
Because i think we are low on monk eq

Just fowarding monk request

Thank you

I added a comment on monk equipment and a request to let players know

that some equipment had been added.

Message 10 : Fri May 17 (Vulrag) :: RE: Monk Eq

I have been trying to add monk equip to stock zones and my zones as well. Please add some monk equip to other zones that you have built please :)(: Also, let monks know that a substantial amount of equip has been added and that there is plenty out there for them to get.

Raimen informed the other administrators that he had connected a new zone. Aeon made another request after having observed other administrators' areas. More areas were connected, and lower ranked administrators asked permission to connect their zones.

Message 15 : Fri Jun 21 (Raimen) :: New connected zone

Zone 247 (Arid Regions) , room 24754 connected to room 24755 (into the slime)

Message 16 : Sun Jun 30 (Aeon) :: #115, #212, #248

zones connected by aeon

#11501 The Darkling Woods to #42449 An Entangled Path in the Lower High Forest
#21201 Before the Forest Arden to #42153 A Shaded Path through the Forbidden Highlands
#24865 Travelling an Icy Waste to #31104 On A Trail to Ice Cloak
#24810 Surrounded by Water to #3052 Outside the Fisher Gate
#24809 Into the Slime to #42243 The Plains of Uz'Huhrr

for any zones to be connected should be in this format.
thank you

Message 17 : Sun Jun 30 (Vulrag) :: 115, 45 (46), 424, 423

42489 to 3066 (North of PBS)
11569 to 42457 (11569 actual entrance to ZONE)
42399 to 42496 (423 lowbie zone can be moved to new hometown)
4646 to 42460 (4646 is to northern entrance of zone)

Message 18 : Fri Jul 5 (Vulrag) :: zone 216

connected 21648 to 515 (highway)
Message 20 : Mon Jul 8 (Raimen) :: Zone 50 (Intercontinent Highway)

Put warning sign at room #3053.
Now Intercontinent Highway (#50) have PK flag.

Message 21 : Fri Jul 12 (Balazin) :: On a positive note

On a positive note, my zone is done. Do I get to have any say in where it goes? Plz let me know if I do. Thanks
-Balazin-

A problem arose as particular mobile objects, town guards, were easily killing players. Aeon saw this problem with players and ordered administrators to make town guards less powerful.

Message 33 : Thu Aug 15 (Aeon) :: Blacksand & Other Town Guards

All town guards should be set to levels below 40 from now on. This is in line with the fact that the guards couldnt be as powerful as the other mobs which have powerful eqs in the adventure zones. Therefore plain guards should be stripped off their invinsibility now. After all the guards should be respecting the mortals when they are in high levels.

Aeon noticed players using a particular trick, summoning players out of difficult areas, in order to easily complete areas of the MUD. In order to make game-play more difficult, Aeon created a new room flag.

Message 64 : Sun Dec 1 (Aeon) :: !SUMMONED roomflag

I've added this flag so that the abuse by the players could be controlled. Please use this flag wisely. Do not simply put it. Think as a player as well. Using this roomflag will cause the player in it not to be able to be summoned by other players, just like the nosummon toggle for the players. I think this roomflag should NOT be used together with the !MAGIC or NOSUMMON flag in a !EXIT room. We dont want any players stuck dont we? Just be careful on using this roomflag on !EXIT rooms.

Message 65 : Mon Dec 2 (Zorrak) :: Aeon!

Great job!

Message 66 : Tue Dec 3 (Valantriel) :: !Summoned

I love this flag...hehe
/s

External Conflict as a Vehicle for Learning

Administrators, as a group, changed the ways they did things in reaction to players' actions. Similarly, players learned new strategies to overcome challenges that administrators created for them. The two groups

learned from each other in a competitive fashion. Players attempted to find easier and faster ways to conquer the virtual world. Administrators attempted to create more difficulties for players as they built and connected more rooms and altered code.

Kauffman (1995) defined co-evolution as a phenomenon that occurs when two entities are paired, interact, and change their behaviors in ways that result in ongoing recursive changes as each adapts in reaction to changes made by the other. Relationships characterized by co-evolution may vary: they may exist between predator-prey pairings, host-exploiter pairings, or symbiotic pairings. Regardless of the nature of the interaction, when two systems interact interdependently, a set of recursive changes emerges. One example of co-evolution is the human immune system and the HIV virus. The immune system evolves and changes as it attempts to defeat the virus by isolating it. The immune system recognizes the virus by its shape. The virus continually changes shape as it attempts to evade the immune system while the immune system is constantly attempting to discover the virus' new shape. Evolutionary adaptations made by one side are matched by the other.

In the data above, each group, players and administrators, changed their practices as they reacted to perturbations that arose from changes in the players' behavior and the administrators' adaptations. As administrators added new areas, players would explore and master them.

As players invented new strategies, administrators would create new coding options. Administration added new dangers and challenges, and players would invent new ways to overcome these dangers. Without new challenges, players grew bored. Collective learning was more than the mastering of established practices but also included the modification of practices in an attempt to adapt to changes in the environment.

The World Building Board III

While the group of administrators redefined its practices as it reacted to changes in the environment, it also changed its practices as conflicts among administrators arose. As administrators continued to build and code and post their accomplishments on the board, often times those actions were questioned by other administrators. One administrator would challenge the actions of another, and perhaps more individuals would get involved in the discussion. Disputes were discussed until resolved, typically with a new or standard way of doing things. The first conflict arose when Zorrak posted on July 23rd that he had completed and connected a zone.

Message 24 : Tue Jul 23 (Zorrak) :: #70 Blood Knight

I connect it at 43812

Aeon immediately disconnected his zone.

Message 25 : Tue Jul 23 (Aeon) :: Re:#70 Blood Knight

I disconnect it, reason:
1. Eq not following chart.
2. Mob not following chart.

ps. do not straight away put ultimate eq's please reserve for future expansion. do not assume that nobody cares if we downgrade/upgrade eqs as we wish.

Zorrak and Aeon continued to argue for the next few days of whether or not the zone should be changed. Each cited reasons to support his side.

Message 26 : Tue Jul 23 (Zorrak) :: re: Blood Knight

Why BK load the best eqs:
1. I make the zone hard .. not like other zone with level 100 mob and full with high level stat eqs.
2. You can take your mortal there Aeon then we talk about why i'm putting a high level eqipment there.
3. Yes.. EQ are not following YOUR chart .. from now on WE all must used chart that been made by YOU.
4. Only Sorcerer, Swordmen and Leader out of MOB chart ..
5. Why we make mob out of chart? to make the zone harder and mortals know that is not a good idea to leveling in zones with MAX mob.
6. If you want to disconnet all the zone that not follow YOUR chart .. YOU should do it now. WE have lots of them in our world.
7. Future expansion?? How about bored mortal NOW? they cry everday BORED to lazy to EXPLORE this is our future? GREAT!
8. Do not be to good to mortal .. hear them cry about downgrade euipment .. AND what about eqipment that been upgrade? are they happy with that?? or they still cry to make more and more powerful?

(. Yes, Mortal care about downgrade eq so they can cry . .. and we care to make them happy to play here with upgraded zones and eqs.

p.s If high level equipment is not allowed here. Please put it limit on OLC so WE all now what level of equipment we can create in high level area without someone just disconnect our zone easly.

Message 27 : Thu Jul 25 (Aeon) :: Re: Zorrak

Read the website about OLC and building and then tell me again what you didnt follow before you post anything. Follow what have been stated, its all for a reason. Mortals bored? Well, who ask them to power level and miss all the action. We are not doing a very hard MUD here. We are doing a MUD for them to feel fun to adventure. If they want to level so much go find a leveling MUD. If they want to find a hard MUD go find the complex type MUD.
Stick to our main target.

On July 25th, Zorrak accused Aeon of having deleted the zone in dispute. This misunderstanding generated further internal conflict. Finally, however, the conflict died down as the issue was resolved and the zone reconnected.

Message 28 : Thu Jul 25 (Zorrak) :: Aeon

Yes, I read the OLC rules .. Long enought before you read it .. And i really understand what i'm doing now. I made a hard zone .. Not very hard .. They still can finish my zone if they used their brain. Oh .. If you think we made mud for fun .. And why they cry .. BORED! QUEST! PEQ! .. Think first before you said anything Aeon. I know this is your mud .. And we dont care what you gonna do with it .. As long you are not act like Beltriz .. We all still working as a team behind you. Do not just remove the file in our OLC if you dont like the zone. We can edit back the them that you said 'NO' .. Not by just remove the all obj file

there. Like you did in my zone #70. Think about it .. You want to run the mud alone like Beltriz? SO be it ..

Message 29 : Thu Jul 25 (Aeon) :: Re: Zorrak

Do not just put your finger on when you dont know everything there is to know. I didnt delete your work. You on the other hand didnt follow the orders. I did ask all immortals to do work on zone above 327 because there are some difficulties in zone below that. Your zone is not deleted. The index file didnt register your zone. And thank you for reminding me about Beltriz. Who is trying to become him. You or me? You read the site did you? In case
you missed it, "This subject has lead to very long drawn out debates by the gods. Many of the gods have had their own equipment voted down and changed..... ... Most builders worry about people using their zones so they tend to try to make great equipment. " "1: Keep balance with your equipment and the toughness of your mobs. "

Message 30 : Thu Aug 8 (Aeon) :: Aethoenvan & Bloodknight & Haunted Grove

aethoenvan spec: done
bloodknight spec: done
haunted grove: checked (other imms please have a walk there also)
for all specs please put the SPEC flag on your mobs.
thank you

Message 31 : Fri Aug 9 (Zorrak) :: Aeon and Valantriel

Thank you, i will connnet BK soon .. i will update YOU all about Aethoenvan.

Another conflict that arose that was related on the World Building board was one that initially involved Zorrak and Djibril but spread to include Raimen and Aeon. This conflict involved a virtual object that had not been constructed according to pre-established standards. In this

conflict, Zorrak listed the characteristics of the item. Aeon rebutted by listing other items from Zorrak's zones that did not follow standards, and Djibril came back to cite other exceptions. Through this discussion, participants co-defined the particulars of creating virtual objects.

Message 35 : Fri Aug 23 (Zorrak) :: READ THIS

Name: 'Dagger Of Dark Angel', Aliases: dark dagger of angel
VNum: [31013], RNum: [1338], Type: WEAPON, SpecProc: None
L-Des: a Dagger Of Dark Angel is floating in the mid air.
Can be worn on: TAKE WIELD
Set char bits : NOBITS
Extra flags : !CLERIC !WARRIOR !MONK MIXER !RMTHEALER !RMTWARRIOR !NINJA !DISA
RM
Weight: 5, Value: 1000000, Cost/day: 0, Timer: 0
Object Level: 95
In room: Nowhere, In object: None, Carried by: Nobody, Worn by: Nobody
Todam: 8d8, Message type: 11

Dot not put or create such powerful WEPON without me or Higher God permission.
This will not happen again.

Message 36 : Fri Aug 23 (Djibril) :: READ THIS TOO!

In 212 we have 2 powerful weapon,
Name: 'the sword of Excalibur', Aliases: sword excalibur
VNum: [21210], RNum: [700], Type: WEAPON, SpecProc: None
L-Des: A beautiful hilted sword seems to be thrusted into a stone.
Extra descs: sword excalibur
Can be worn on: TAKE WIELD
Set char bits : NOBITS
Extra flags : GLOW !DONATE !MAGE !CLERIC !MONK !NINJA
Weight: 5, Value: 1000000, Cost/day: 0, Timer: 0

Object Level: 95
In room: Nowhere, In object: None, Carried by: Nobody, Worn by: Nobody
Todam: 8d8, Message type: 3
Affections: +2 to STR, +3 to HITROLL, +3 to DAMROLL, -1 to SAVING_SPELL, +10 to
MAXHIT

and the other one,

Name: 'a spear glowing with an unholy dark light', Aliases: spear unholy
VNum: [21229], RNum: [719], Type: WEAPON, SpecProc: None
L-Des: A spear is here, glowing with an unholy dark light.
Extra descs: unholy spear light
Can be worn on: TAKE WIELD
Set char bits : NOBITS
Extra flags : GLOW !DONATE !CLERIC !MONK !NINJA
Weight: 10, Value: 400000, Cost/day: 0, Timer: 0
Object Level: 50
In room: Nowhere, In object: None, Carried by: Nobody, Worn by: ******
Todam: 8d9, Message type: 14
Affections: +1 to STR, +2 to HITROLL, +3 to DAMROLL, -2 to SAVING_PARA

both are POWERFUL and the spear is full of shit(level 50 and do more damage than excalibur)

think before making any changes to the world!

Message 37 : Fri Aug 23 (Zorrak) :: 21229

this spear is from old grotto file and i have downgred them a long time ago. the last stat i downgred is ..

Todam: 8d4, Message type: 14
Affections: +1 to STR, +2 to HITROLL, +3 to DAMROLL, -2 to SAVING_PARA

and it's have been told to Aeon and Raimen.
and if you know nothing about how we upgred and downgred equipment ..

please shutup let us do it. Noone .. again NOONE can just put a new equipment in their zone without permission. Aeon have make this clear to me and to all. If you know nothing about balance. .. please let us do it .. You just do your jobs. Again do not edit/create/load a powerful equipment in your old zone.
We need to save it for other new zone.

Message 38 : Wed Aug 28 (Aeon) :: Upgrade/Downgrade Equipment

Do not upgrade/downgrade equipment without the consent of the Celestials. Do not create new powerful equipment and fix it to an already made mob which would make you upgrade the zone altogether. If you want to create new powerful equipment, then create a new zone please. Observe the website link in 'How2OLC' for FLAG usage on mobs.

Message 39 : Wed Sep 4 (Aeon) :: An example of an eq not supposed to be created

#26435
the green sword of faithful ranger
1) +5 to DEX
2) +5 to HITROLL
3) +5 to DAMROLL
4) +10 to MAXHIT
5) +10 to MAXMANA
6) +10 to MAXMOVE
D) Values : 0 7 7 3

What is wrong with this eq i ask?
i. it is a quest eq presumably, but never written on the board.
ii. this eq is way too powerful to be a quest eq which supposed to be lvl < 75.
iii. this eq doesn't comply with the eq chart, total HMV should be 10 the max, not 30.
iv. this eq never been into the process of checking by other immortals.
:because of this, i changed it to a proper one.
everybody should be responsible of their creations.
because this thing happen i would remind again any creation should be approved before the creation is given access to the mortals.

Irrybis initiated another conflict as he expressed his opinion of the characteristics of containers on the MUD. Players would carry around virtual backpacks, bags, sacks and other containers in which they could store objects. Irrybis posted his perception that the carrying capacity of these be limited.

Message 44 : Tue Sep 10 (Irrybis) :: ATTENTION PLS!!

As far as i can see .. There are too many 'Santa Claus' in this mud. What I mean is there are too many items being carried by mortals. I think this is not logic considering the strength and capability of mortals to carry such items in one time. Is there a limit to set the capacity of container? As we all can see the logic is you can't put a sword or chainmail in legging isn't it? I can see mortals carrying around 100++ bottles of potion and scrolls in backpack. I think you can only bring the most is 10 potions at one time. And 'magic wears' like legging should be not too big in size to be able to contain lots of items. What i can see now that they (mortals) are wearing baggys (i'm not sure the spelling though) :P

Thanks

Later, from his observations of what players had been doing, Djibril posted a problem created by players' actions – always completing the same zones to get the same prizes and amassing those prizes. Zorrak decided all high level equipment would load only half of the time, thus reducing the number of times players were able to accumulate objects. Typically, objects loaded when Aeon rebooted the MUD, which was at approximately a 48 hour interval. Thus, players could accumulate

particular objects every 48 hours. By reducing load percentages to 50%, Zorrak cut in half the number of times players could accumulate objects.

Message 46 : Thu Sep 26 (Djibril) :: Percentage load

I suggest higher level eq to be loaded with percentage so that it's rare. There have been an incident where player keep key's waiting for the eq to repop. So i hope in the future builder consider the percentage options.

i101 > read 47
Message 47 : Fri Sep 27 (Zorrak) :: re: Percentage load

Yes, after this all builder must make 50% load for 95-100 level equipment. Builder .. please take a note about this.

On October 18th, another conflict arose as Glorak posted an item from my zone that did not follow standards. I suggested that he retrieve those items by killing players. This resulted in even more controversy as we attempted to define particular procedures for administrator-player interactions.

Message 55 : Fri Oct 18 (Glorak) :: Sleeves of Greed

the sleevs of greed 4 damroll ?
Object Level: 70
and the bracers of crutlty Object Level: 90
just 3 damroll ?
any wrong chat?

Message 56 : Sat Oct 19 (Vulrag) :: Re: Glorak

Problem fixed, item was following stats on grotto I belive,
donno where problem came in.
Sleeves no longer load, different object has replaced it.
Didn't want to upset players by changing stats on their items,
but would be a wise idea for you to get equip back from the by
PK since you have high lvl mort.
Thanx!
-VUl

Message 57 : Tue Oct 22 (Raimen) :: Replacing EQ

Greetings,
I dont think that asking mortal to junk eq that we accidently create it. They deserve it as they go and die for it. Maybe next time we need to change the eq while thy are using it. This happened before, let them use it for awhile they will not notice it if we change the stat.

Message 58 : Tue Oct 22 (Djibril) :: Raimen

I agree with Raimen. No more statement.

Message 59 : Wed Oct 23 (Vulrag) :: Re: EQUIP Problem

The stat equip was my fault. I do caution, however, that there
are many items out there that are !chart. FYI.

Sorry for inconvenience. Just trying to expand realms some more.
Vully

Message 60 : Wed Oct 23 (Raimen) :: RE:EQUIP Problem

Immortal are also not perfect ... ehee... expand the world.
You guys are doing a good job here :)

Internal Conflict as a Vehicle for Learning

Internal and external conflicts occurred simultaneously. Internal conflict in this environment was conflict among players or among administrators. External conflict was conflict between the two groups. Internal conflicts occurred as individuals challenged the actions of others who in turn responded to those challenges. For example, Aeon removed Zorrak's zone because it did not fit standards, and Zorrak rebutted. Then, Zorrak questioned one of Djibril's creations. Disputes arose among administrators as they struggled to define the ways in which participants would engage in the environment. Challenges arose as perturbations, and as a result, administrators struggled to redefine practices by accommodating to the perturbation. Learning in this instance was the refining of practices that occurred as administrators jointly discussed issues. As internal conflicts arose among administrators and gained force, they were finally resolved with a change in behavior.

Summary of the World Building Board Section

Two groups of participants each learned as a group in three main ways. First, verbal instruction was prevalent, as detailed observation in the virtual environment was not always possible. Requests were placed on the boards, and questions were not uncommon. Second, learning occurred as

each group, administrators and players, reacted to actions by the other group. Each group was tied to the other in a symbiotic relationship. Each group would make changes in behavior in reaction to changes made by the other group. Thus, the two were structurally tied, creating a system of interactions that consisted of a progressive set of reactions to previous moves of the other group. Cooperatively, the two groups helped to redefine the practices of the other. Third, groups refined practices through internal conflict. Internal conflict occurred simultaneously with external conflict. Conflicts arose as individuals questioned the actions of others. Discussion continued until a decision was made, and practices were refined or redefined.

Research in communities of practice shows that as individuals come together to work towards shared goals, they create shared practices and ways of speaking. Verbal instruction and adaptation to perturbations provide mechanisms through which practices may be established and refined. Practices were not stable but rather had to be constantly re-evaluated and adjusted in response to changes in the environment and to other systems to which a group was structurally tied. Co-evolution provides a theory to explain the ways in which practices emerge and change over time. In sum, learning in this environment seemed to take the form of establishing and refining ways of behaving through verbal instruction and adaptation to internal and external conflicts.

In the next section, I turn to learning that occurred in more conversational interactions. In these interactions, individuals changed the words and types of utterances they produced as they reacted to changes in the system of interactions. The data presented is an argument between an experienced native speaker and a less experienced non-native speaker.

CHIARA'S APRON

The previous section discussed how groups of individuals changed their behaviors through verbal instruction and in reaction to perturbations. In this section, I turn to a description of individual learning as I explore how individuals modified their linguistic behaviors as they attempted to be more successful in an environment. The interaction is an argument between an experienced, native speaking player, Deglo, and an inexperienced, non-native speaking player, Necron. The interaction focuses on the auction of a virtual object <Chiara's apron>.

1 Master Kalten auctions, 'Necron puts Chiara's apron up for
2 sale, minimum bid 35000 coins.'
3 Master Kalten auctions, 'Chiara's apron is going once to no one for 35000 coins.'
4 Master Kalten auctions, 'Chiara's apron is going twice to no one for 35000 coins.'
5 Master Kalten auctions, 'Chiara's apron is going for the last call
6 to no one for 35000 coins.'
7 Master Kalten auctions, 'Chiara's apron is SOLD to no one for 35000 coins.'
8 Master Katlen auctions, 'Necron puts Chiara's apron up for sale, minimum
9 bid 30000 coins.'
10 Deglo gossips, 'nobody's going to pay more than 5000 for it'

Master Kalten auctions, 'Chiara's apron is going once to no one for 30000 coins.'
Master Kalten auctions, 'Chiara's apron is going twice to no one for 30000 coins.'
Necron gossips, 'just want to make money..hard to kill chiara..'
Deglo gossips, 'not hard at all'
Master Kalten auctions, 'Chiara's apron is goingfor the last call
to no one for 30000 coins.'
Master Kalten auctions, 'Chiara's apronSOLD to no one for 30000 coins.'
Necron gossips, 'maybe u are power than me...'
Deglo gossips, 'nope'
Necron gossips, '*smile*'
Deglo gossips, 'much less'
Necron gossips, 'maybe its not hard to fight her..but getting there without
flying..its going to be a problem..huge..'
Deglo gossips, 'so why not get there with flying?'
Deglo gossips, 'not hard to fly either'
Necron gossips, 'without flying..?? teleport..??..gate..?? with no multi..??'
Necron gossips, 'how.. ??'
Deglo gossips, '*WITH* flying I said'
Necron gossips, 'ok..'
Necron gossips, 'so its hard to get it rite..??'
Deglo gossips, 'nope'
Necron gossips, '*smile*'
Necron gossips, 'so..if its not hard..why is it simple in ure point of view..?'
Deglo gossips, 'what?'
Necron gossips, 'u said it is easy..why is that..without someone to cast
fly..teleport..gate..n potion...how u want to get it..??'
Deglo gossips, 'it's as simple as this, get fly, go up to clouds, kill chiara'
Necron gossips, 'how in the way u can get fly..?? with limited gc to buy
potion..n no multi to cast fly..??'
Deglo gossips, 'get someone to cast it on you.'
Deglo gossips, 'most wizards on here don't charge 35000 coins for fly'
Necron gossips, 'who want to cast u fly if it cost u more than 30k..??'
Necron gossips, 'really.??'
Necron gossips, 'who..??'
Pingu gossips, 'I would."
Pingu gossips, 'I would cast it for free.'
Necron gossips, 'hmm..its very nice of u...'
Necron gossips, 'so..what is the reasonable price for chiara apron..?'
Deglo gossips, '0-5000, I'd say, but you can charge 35k
if you want, but nobody would buy it'
Necron gossips, 'it cost me 20k for fly...n to fight chi..??'
Deglo gossips, 'I doubt you flew up to the clouds solely for chiara's apron.'

53 Necron gossips, 'nope..it accidently happened..i went up there to xplore..'
54 Deglo gossips, 'then there you go'
55 Deglo gossips, 'anyway, I'm not going to argue with you'
56 Deglo gossips, 'do whatever you want to'
57 Necron gossips, 'most newbie cant go there without knowing what they do...'

In this example, Necron, a relative newcomer, attempted to sell <chiara's apron>, a piece of virtual equipment that came from a relatively easy to conquer and well-known area of the MUD. Necron attempted to sell the apron for 25, 000 gold coins, but the object typically sold for no more than 5, 000 gold coins. The fact that he attempted to sell the object for such a high price probably signaled him as a not knowing what people usually paid for the object. When Deglo attempted to point this out to him, an argument ensued over the selling price. Necron maintained that 25, 000 was reasonable as players needed to be able to fly to obtain the object, yet flying was not usually a problem as players could get a friend to cast a fly spell on them if they did not have the spell themselves.

Co-Evolution

In the last section, co-evolution was employed to explain the changes in behavior that two groups of participants – players and administrators - made in reaction to perturbations, both from within and outside the group. The two groups were structurally tied so that actions made by one side were countered by the other. The same phenomenon occurred in interactions. Two or more individuals came together, and they

interacted. Each reacted to actions made by the other. Words and utterance structures used by one side were matched by the other. Thus, a series of recursive reactions resulted.

In the above interaction, Deglo and Necron are structurally coupled. Each reacts to actions made by the other. In this argument, both attempted to match moves by the other sides. One way this occurs is through the imitation of utterance structure. In lines 37-39, reproduced below, Deglo used a list of three things, and Necron matched this move by producing a list of three things as well.

37 Deglo gossips, 'it's as simple as this, get fly, go up to clouds, kill chiara'
38 Necron gossips, 'how in the way u can get fly..?? with limited gc to buy
39 potion..n no multi to cast fly..??'

Similarly, the participants imitated the types of structures used by the others. Deglo asked a question, and then Necron followed up with his own question.

24 Deglo gossips, 'so why not get there with flying?'
25 Deglo gossips, 'not hard to fly either'
26 Necron gossips, 'without flying..?? teleport..??..gate..?? with no multi..??'

Deglo and Necron also imitated the separation of utterances into two or more lines using the <enter> key. After Deglo had gone from producing a

one-line utterance to a two-line utterance, Necron one-upped him by producing a three-line utterance.

40 Deglo gossips, 'get someone to cast it on you.'
41 Deglo gossips, 'most wizards on here don't charge 35000 coins for fly'
42 Necron gossips, 'who want to cast u fly if it cost u more than 30k..??'
43 Necron gossips, 'really.??'
44 Necron gossips, 'who..??'

Deglo and Necron counter each other's moves by copying the other's utterance pattern. Deglo and Necron learned as they imitated the utterance patterns of their competitor in the above argument.

Abbreviation

In habitual interactions, individuals abbreviated behaviors in order to facilitate easier interactions.The above interaction contains two word changes – abbreviations of longer terms that occurred in the interaction. These abbreviations appear to be similar to mutation. An extant word in the dialogue is changed. Both occur as Necron reduced longer words to shorter ones.

48 Necron gossips, 'so..what is the reasonable price for chiara apron..?'
->49 Deglo gossips, '0-5000, I'd say, but you can charge 35k
50 if you want, but nobody would buy it'
->51 Necron gossips, 'it cost me 20k for fly...n to fight chi..??'

<chiara> is shortened to <chi>. This word is not used again in the interaction. Thus, it is not possible to tell if it propagated more widely.

->41 Deglo gossips, 'most wizards on here don't charge 35000 coins for fly'
->42 Necron gossips, 'who want to cast u fly if it cost u more than 30k..??'
...
48 Necron gossips, 'so..what is the reasonable price for chiara apron..?'
->49 Deglo gossips, '0-5000, I'd say, but you can charge 35k
50 if you want, but nobody would buy it'
->51 Necron gossips, 'it cost me 20k for fly...n to fight chi..??'

<000> is shortened to <k>. <000> appears preferred at first, it is used by the automated auction machine (lines 2-4, 6, 7, 11, 12, 16 & 17), by Deglo (lines 10, 41 & 49). This was the first way of expressing thousands. However, Necron, and later Deglo, shortened <000> to <k> as they needed to type more quickly.

In communities of practice, individuals create shared ways of speaking and have a shared lexicon. However, the lexicon and shared ways of speaking are always changing. In the past section, I alluded to the community's shared ways of speaking as a system of interaction that exists in the historical domain. Shortening terms is one way in which individuals changed their ways of communicating in interactions.

Cooperation and Non-Cooperation

Learning as a change in behavior occurred at many levels: group practices changed, and individuals changed their utterance structures and

words. Co-evolution and abbreviation help to explain these phenomena. However, I was unsatisfied with this analysis because it left most of the interaction seemingly unstructured. Thus far, I have illustrated the ways in which interactions are composed of smaller interactions, building blocks. However, I felt that there must have been some sort of change in behavior at a deeper level. To complete an analysis at a deeper level, I employed Axelrod's (1984; 1997) work on cooperation. Axelrod was concerned with how independent agents who work in their own self interest come to collaborate. His discoveries on cooperation illuminate a different level of patterns, which I found in the system of interaction that emerged between Necron and Deglo.

Patterns of Cooperation

In his attempt to unravel the mysteries of cooperation, Axelrod (1984; 1997) extensively studied a game called prisoner's dilemma. His aim was to see how cooperation arises between two agents who each work in their own self-interest. The game is simulated by computers. In the game, two criminals are caught, taken to the police, separated, and interrogated. Each criminal can only interact with the police and has no contact with the other criminal. The police want to elicit information from each criminal, so they offer each deals. If criminal A rats on criminal B, and criminal B does not rat on criminal A, then criminal A goes free, but criminal B goes to jail for 20 years. If both rat on each other, both get

sentences of 12 years. If both remain silent, both get light sentences of four years.

The optimal solution for each criminal working independently in his/her best interest is to rat on the other. By ratting on the other, s/he can minimize the possible damage done to him or her by the other. What actually occurs over time and through a series of these games is that long periods of cooperation occur in which both criminals remain silent. These long periods of cooperation are broken by small bouts of breaking the cooperative pattern. The most common of these breaks is called "tit-for-tat," in which one criminal squeals on the other in the first round, and the other squeals on the first in the second round. Other patterns of breaking cooperation like "tit-for-tat-tat" and "tit-for-tat-tat-tat" exist. Once a pair of agents has established a pattern for breaking, the pattern is relatively stable over time.

The interaction in the Chiara's Apron exchange can be analyzed as a game of cooperation between Deglo and Necron, similar to the patterns that Axelrod found in prisoner's dilemma. The interaction is an argument, and both are looking out for their self-interest. In this environment, as in others, even conflict requires cooperation. In the above interaction, participants cooperated by following a three-part interaction pattern. I have coded adherence to the pattern "cooperation," and breaking the pattern "defecting."

The three-part pattern consists of three-lines: participant A creates an utterance that can be responded to, participant B responds to the first utterance, and participant A acknowledges B's response.

27 Necron gossips, 'how.. ??'
28 Deglo gossips, '*WITH* flying I said'
29 Necron gossips, 'ok..'

This is the quintessential example of the pattern that underlays the interaction. At each line, participants had the choice of following or breaking the pattern. Here, both chose to follow the pattern, so both cooperated. Non-cooperation would be breaking the pattern. In order to analyze the data in this way, I have had to place each utterance into necessarily broad categories. My goal was to discover the mechanisms that drove the language to change as individuals did not continuously produce utterances that were obviously similar. I will go on to describe each element of the three-part pattern.

First Slot

The first position in the three-part pattern was typically a statement that could easily be responded to. These utterances may have been questions or appeared similar to questions. Below, I have listed several examples of the first-part of the pattern.

->18 Necron gossips, 'maybe u are power than me...'
19 Deglo gossips, 'nope'

->30 Necron gossips, 'so its hard to get it rite..??'
31 Deglo gossips, 'nope'

->42 Necron gossips, 'who want to cast u fly if it cost u more than 30k..??'
->43 Necron gossips, 'really.??'
->44 Necron gossips, 'who..??'
45 Pingu gossips, 'I would."
46 Pingu gossips, 'I would cast it for free.'
47 Necron gossips, 'hmm..its very nice of u...'

->52 Deglo gossips, 'I doubt you flew up to the clouds solely for chiara's apron.'
53 Necron gossips, 'nope..it accidently happened..i went up there to xplore..'

Many types of utterances could fill the first slot in the three-part pattern. Most were single line utterances, but others occupied multiple utterances (lines 43-44). Some opened up opportunities for comment through suggestions (lines 35, 42-44). All functioned equally well as occupying the first portion of the three-part pattern.

Second Slot

The second slot in the three-part pattern produced some response to the first utterance.

18 Necron gossips, 'maybe u are power than me...'
->19 Deglo gossips, 'nope'

30 Necron gossips, 'so its hard to get it rite..??'
->31 Deglo gossips, 'nope'

42 Necron gossips, 'who want to cast u fly if it cost u more than 30k..??'
43 Necron gossips, 'really.??'
44 Necron gossips, 'who..??'

->45 Pingu gossips, 'I would."
->46 Pingu gossips, 'I would cast it for free.'
47 Necron gossips, 'hmm..its very nice of u...'

52 Deglo gossips, 'I doubt you flew up to the clouds solely for chiara's apron.'
->53 Necron gossips, 'nope..it accidently happened..i went up there to xplore..'

Third Slot

The elements that filled the third slot in the pattern were typically tokens that acknowledged the occurrence of the response in the second slot. Sometimes they were tokens with extra information.

27 Necron gossips, 'how.. ??'
28 Deglo gossips, '*WITH* flying I said'
->29 Necron gossips, 'ok..'
42 Necron gossips, 'who want to cast u fly if it cost u more than 30k..??'
43 Necron gossips, 'really.??'
44 Necron gossips, 'who..??'
45 Pingu gossips, 'I would."
46 Pingu gossips, 'I would cast it for free.'
->47 Necron gossips, 'hmm..its very nice of u...'

Assembling the P*ie*ces

When all interactants cooperated, the three units occurred in a fixed order. Participants could break the cooperative pattern in one of two ways. First, they could place the type of utterance typically found in the first slot (an utterance to which one would normally respond) directly after another first-slot utterance.

22 Necron gossips, 'maybe its not hard to fight her..but
23 getting there without flying..its going to be a problem..huge..'

->24 Deglo gossips, 'so why not get there with flying?'

Or, they could place a first-slot utterance after a second-slot utterance and before a third-slot utterance.

35 Necron gossips, 'u said it is easy..why is that..without someone to cast
36 fly..teleport..gate..n potion...how u want to get it..??'
37 Deglo gossips, 'it's as simple as this, get fly, go up to clouds, kill chiara'
->38 Necron gossips, 'how in the way u can get fly..?? with limited gc to buy
->39 potion..n no multi to cast fly..??'

Thus, there were three patterns of participation: one pattern of cooperation, and two patterns of non-cooperation. There are several considerations I will list in considering my analysis. First, at each turn, individuals had the opportunity to follow or to break the cooperative pattern. Second, an individual could produce a third-slot and a first slot utterance in succession. If a person did this, I counted it as only one move as an individual could not cooperate with himself. Finally, added phrases after third-slot "acknowledgement tokens" were counted as part of the third-slot utterance.

Figure 6: Cooperation and Non-Cooperation in Chiara's Apron

Line(s)	Individual	Action
1	Necron	Cooperates
8	Necron	Cooperates
10	Deglo	Cooperates
13	Necron	Defects
14	Deglo	Cooperates
18	Necron	Defects
19	Deglo	Cooperates
20	Necron	Cooperates
22-23	Necron	Cooperates
24	Deglo	Defects
26-27	Necron	Defects
28	Deglo	Cooperates
29	Necron	Cooperates
30	Necron	Cooperates
31	Deglo	Cooperates
32-33	Necron	Cooperates
34	Deglo	Defects
35	Necron	Defects
37	Deglo	Cooperates
38	Necron	Defects
40	Deglo	Cooperates
42-44	Necron	Defects
45	Pingu	Cooperates
47-48	Necron	Cooperates
49-50	Deglo	Cooperates
51	Necron	Defects
52	Deglo	Defects
53	Necron	Cooperates
54-55	Deglo	Cooperates
57	Necron	Defects

Participants showed a penchant for cooperation. Necron cooperated nine times, Deglo cooperated eight times, and Pingu cooperated once. Necron and Deglo broke the cooperative pattern almost equally, and most breaks were patterned by tit-for-tat (lines 24, 26-27; 51

& 52). Necron had deviated from tit-for-tat with tit-for-tat-tat-tat (lines 34-35, 42-44, & 51-52). At this point, there was a near communication breakdown. The first part of the interaction was stable with cooperative periods interlaced with brief bouts of tit-for-tat. After the second tit-for-tat (lines 24, 26, & 27), Necron continued to break the pattern. Deglo did not respond after two extra non-cooperative moves. At this point, it appears as if there was a lack of a minimal amount of cooperation to keep the interaction going. A third party, Pingu, intervened and cooperated, which enabled the interaction to continue. Perhaps there was such a strong preference for cooperation and maintaining the interaction that a third party intervened to keep the interaction alive.

Summary to Chiara's Apron

A pattern underlay the interaction even recorded by the above data. This pattern could be characterized by mechanisms and properties of nonlinear dynamic systems. Micro-learning occurred as participants changed their behavior in response to actions made by their co-interlocutors. Participants cooperated with each other by following the pattern. They also broke cooperation by interrupting the pattern. Breaks in cooperation were patterned after "tit-for-tat." By breaking the "tit-for-tat" pattern by refusing to follow the pattern for three consecutive turns, Necron's continual defecting nearly caused the system of interaction to

stop and required the intervention of a third party to cooperate and rescue the interaction.

The adaptations made in the interaction were reactions to changes made by the individuals with one's co-interlocutor. Thus, it is difficult to imagine Necron beginning the interaction with multiple questions. Each change relates to the series of changes that came before.

DISCUSSION OF LEARNING

Learning in the Alternate Reality MUD occurred as individuals and groups of individuals adapted and adjusted to changes in the environment and changes in the behaviors of other individuals and groups of individuals. Individuals changed the ways they interacted in conversations as they attempted to one-up their co-interlocutors. Players and administrators collectively changed the ways they engaged in the environment as they reacted to changes made by the other group. Internally, administrators changed their practices through conflict with one another. Over time, individuals acquired new practices as they refined and expanded the ways in which they engaged in the environment.

A key aspect of the learning witnessed in the Alternate Reality MUD is experience. All three theories discussed in chapter 2, social interaction, theories of practice, and nonlinear dynamics, highlight the importance of experience in learning. Researchers in social interaction

discuss schemata as an internal system built from and modified through experience. Individuals use schemata to guide future behaviors through expectations (Tannen, 1993; Goffman, 1974). Similarly, researchers interested in nonlinear dynamic systems have explained internal mechanisms that are built through experience and that enable systems to react favorably to typical situations (Holland, 1995). Anthropologists interested in theories of practice have discussed the importance of experience in the learning process (Ball, 2002; Wenger, 1998; Lave & Wenger, 1992). Importantly, the theory of communities of practice has provided us with a model of learning in which individuals acquire skills for a particular trade through active engagement and involvement in the trade they are hoping to master.

The data analyzed in this chapter and the three theories employed as theoretical backing support theories in second language acquisition that promote learning in interaction. Classrooms and much of the research in the field of second language acquisition set linguistic goals for students such as memorizing vocabulary words or producing vowel sounds. However, several theories in second language acquisition posit that learning occurs best when students interact in situations in which there are no particular pedagogically oriented goals. Hatch (1983) said that the best learning situations are those in which learners interact in the target language. In addition, those interactions should have no set outcome but

rather the outcome should be negotiated. Nunan (1989) stated that as individuals pursue goals, they necessarily interact in their second language. As they do, they must make interactional and conversational adjustments, which is exactly what we witnessed in the data. Ellis (1984) argued that individuals typically learn target language structures through the process of interacting, and these new structures may be internalized. In sum, learning in situations in which learners have tasks with non-linguistic goals occurs as individuals acquire and create new structures in interactions and internalize them.

CHAPTER 6: IDENTITY

In this chapter, I discuss identity, building on discussions of the system of interaction and learning. Scholars interested in social interaction have stated that interactions are rituals in which we take on particular roles. Pairs of roles co-define each other. Individuals work together to come to a shared agreement of how a particular interaction should unfold. However, perceptions of the same interaction may vary. Some of the roles we play are important to us. We are invested in them, and giving them up is difficult, as is changing them (Goffman, 1959).

Anthropologists have employed models of identity from Bahktin. Dialectic models of identity show identity to be expressed in the moment and varied in different contexts. Importantly, identity is related to the language we use in words we say to each other and those we say to ourselves. Cognitive anthropologists have employed Lave & Wenger's (1992) communities of practice theory in examining identity. From a communities of practice perspective, identity is largely defined in regard to one's competence in shared practices. Individuals progress through a series of stages as they embark on a learning trajectory (Hundeide, 2004; Mirram *et al.,* 2003). However, identities do not always follow linear paths. Experienced individuals continue to learn, and sometimes

individuals fail to learn (Wenger, 1998). Also, individuals assume different identities in different contexts (Toohey, 1996; Wenger, 1998).

Identity is defined in two major ways in nonlinear dynamics. First, identity is bounded (Syverson, 1999; Lakoff & Johnson, 1980). Second, identity is defined by the interactions into which an entity can enter (Maturana & Varela, 1980). Recurrent interactions help to define the nature of the system. If a system goes outside its allowable domain of interactions, it will change identity classes or disintegrate. Environmental niches define positions in a larger system. Each niche is defined by the interactions into which an entity can enter.

Taking models of identity from these three theories, I will analyze units of interaction as bounded unities as well as the social identities of participants. First, I will analyze greetings as unities. I will attempt to explain the ways in which utterances such as greeting that comprise short interactions were bounded and had recognizable units that helped define them. In examining these short interactions, I will attempt to describe their identities by using properties and mechanisms from nonlinear dynamic systems theory. Second, I will examine an arena quest as I attempt to explain the ways utterances determined the situated identities of individuals in this virtual world. To be clear, in this chapter, I examine the ways that both language units and players were bounded entities as I attempt to explain their identities.

GREETINGS

The system of interaction that arose in the Alternate Reality MUD was largely composed of short interactions. Each short interaction was a subcomponent of a larger system. There were many kinds of building blocks. Each block had a typical form, yet each instantiation of each block was unique.

This section focuses on greetings as one type of building block in the greater system of interaction. I have chosen greetings because they occurred frequently, and they are one of the more formulaic types of short interactions that I found in my data. As this is an initial attempt to analyze interaction as a nonlinear system, it is important to begin with simple cases and later move to more complex ones, as suggested by Wittgenstein (1984). Near the end of the section, I will discuss the relevance of my analysis to other building blocks and the overall system of interaction.

Unity

Different types of discourse fall along a continuum from formulaic interactions such as greetings to more free-flowing ones such as monologues and novels (Wray & Perkins, 1999). At one end, there are the formulaic interactions. One example of a formulaic interaction is the purchasing of a movie ticket at a theater. The ways of interacting are highly formulaic, and there is little room for improvisation. Both customer and ticket seller know what to expect, and each has a particular role whose behavior is highly restricted. At the other end of the continuum are free-flowing interactions. An example of a free-flowing interaction is a monologue. The form of a monologue is less rigid, and it is difficult to predict (Duranti, 1997b).

To study greetings or other such interactions, Duranti (1997a) provided us with three requirements: ethnography, recordings of instances, and a working definition of the to-be-studied phenomenon. I will briefly include Duranti's definition of greetings here. First, greetings are particular, recognizable units of interaction that are close to the formulaic end of the spectrum of interactions. Second, greetings are social actions that confirm or test out our social relations. In greetings, the status of individuals may be determined, defined, or influenced (Goody, 1972; Irvine, 1974). Third, greetings occur at boundaries and are tied to other activities (Carlton, 1986). Fourth, greetings are about maintaining human

relationships (Firth, 1972; Goffman, 1971). Finally, there are different types of greetings for different occasions. For example, longer greetings may index special occasions, the social status of individuals, the relationships, or all three (Duranti, 1997a).

The greetings in the Alternate Reality MUD were easily identifiable. They consisted minimally of the entrance of an individual into a shared space and a greeting utterance.

1 [INFO] Raimen has just entered the realm.
2 Relonor gossips, 'greetings'

1 [INFO] Nimitz has entered the realm.
2 Nimitz gossips, 'greeting'
3 Thomas gossips, 'hail'

Optimally, a greeting would contain two greeting utterances. These would minimally contain greeting tokens, but they could also contain other terms of address, emoticons, and other possible elements.

1 [INFO] Leperkorn has entered the realm.
2 Thomas gossips, 'hail leperkorn'
3 Leperkorn gossips, 'hail thomas'

[data]
A or B: [enters a shared space]
A: [greeting utterance]
B: [greeting utterance]

Greetings could, but did not necessarily, connect to other building blocks.

->1 [INFO] Thomas has entered the realm.
->2 Thomas gossips, 'hail'
3 Thomas gossips, 'wonder if the new
4 zones in yet'
->5 Necron gossips, 'hello thomas..long
6 time no see..??'
->7 Thomas gossips, 'hail'
8 Necron gossips, 'where to..??'
9 Thomas, 'exping'
10 Thomas, 'trying to get lv 95 so i be
11 tough again'
12 Necron gossips, 'can i follow..?'
13 Thomas gossips, 'sure'
14 Thomas gossips, 'only 34 mil to go'
15 Necron gossips, 'hehehe...long way to go..'
16 Necron gossips, 'where r u..??'
17 Thomas gossips, 'healer'

A or B: [enters a shared space]
A: [greeting utterance]
B: [greeting utterance]
A: [inquiry]
B: [inquiry response]

Another variation in greetings was the participation of more than two individuals.

1 [INFO] Thomas has entered the realm.
2 Thomas gossips, 'hail all'
3 Deglo gossips, 'Hi Thomas'
4 Kyo gossips, 'hail thomas'
5 Amedeaus gossips, 'hail thom'
6 Oddesy gossips, 'hail thomas'

someone: [enters a shared space]

A: [greeting utterance]
B: [greeting utterance]
C: [greeting utterance]
D: [greeting utterance]
E: [greeting utterance]
X: [greeting utterance]

Another way in which variations could occur was in the changing of the subcomponents of greetings. Utterances were themselves composed of different building blocks, including tokens, emoticons, and terms of address. In addition, hybrid or unusual forms appeared when activities were combined, such as when someone had left the MUD momentarily for lunch.

1 [INFO] Cyrex has entered the realm.
2 Najib gossips, 'welcome back'
3 Cyrex gossips, '*smile*'
4 Najib gossips, 'he he he he'
5 Najib gossips, 'welcome welcome welcome'

A or B: [enters a shared space]
A: [variant greeting utterance]
B: [variant response]

Despite the large amount of variance in greetings, they were unequivocally recognizable. I was curious as to why they were so easily recognizable when they took on such varied forms. Chaotic systems also have recognizable forms, yet their exact forms are near limitless. In the next section, I address this issue by connecting it to the concepts of state space and attractors from nonlinear dynamic systems theory.

State Space and Attractors

Nonlinear systems are composed of numerous subcomponents. Each subcomponent is self-contained and interacts with other subcomponents. The position of all subcomponents at a given time is the state of the system. All possible configurations of the system, which is all possible combinations of positions of the system's subcomponents, constitute the state space of the system.

Nonlinear systems are typically composed of a very large number of components. The human genetic system contains some 100, 000 possible genes (Kauffman, 1995). Colonies of slime mold contain approximately 10, 000 independent cells (Briggs & Peat, 1989; Peat, 1987; Coveney & Highfield, 1990; Prigogine & Stengers, 1984)). Economies contain millions of agents, including individuals, companies, monetary units, and goods (Holland, 1995). Thus, the number of possible positions of a nonlinear system is astronomically high so as to make the testing of each possible state impossible. However, nonlinear systems do not randomly test out all possible states in the state space. Rather, they are attracted to a limited range of possible states, which is approximately the square root of all possible states. For example, the 260 different types of cells in the human body all contain essentially the same genes. Were

systems to fill randomly different possible states in the system, we would have a completely random system.

Attractors move systems into a narrow range of the state space. Kauffman (1995) explained attractors in the state space through the example of a grid of light bulbs. At any given time, each light bulb in the grid is turned either on or off. Bulbs are linked deterministically to the bulbs surrounding them, so the state of the bulb's neighbors determines the next future state of the bulb. For example, if most bulbs' neighbors are in the on position, the bulb will turn on or off in the subsequent state. As the system begins, it proceeds through a series of states consisting of various bulbs being turned on or off. The history of the system is its trajectory.

In a simple system containing three bulbs, there are eight possible states. In this system, there are three possible trajectories. First, the system can come to rest at one particular state. In this case, the system is said to be frozen. Second, the system can randomly cycle through all eight states. In this instance, the trajectory is completely random because it fills the entire state space. However, due to the limited size of the state space, once the system has been observed cycling through all eight states, future states are predictable because the system will always cycle through the same eight states. Third, the system can cycle through less than all eight states.

In this case, the system's cycle is attracted to a subset of the total possible configurations of the state space.

A network of three bulbs is easy to predict because it contains only three subcomponents. However, nonlinear systems are typically composed of a very large number of elements. Kauffman (1995) furthered his explanation by expanding the network to 1, 000 bulbs. In this case, there are $2^{1,\ 000}$ possible states. If we made a light bulb system like the human genetic system, which contains 100, 000 possible genes, there would be $2^{100,\ 000}$ possible states. To test all possible states at the rate of one trillion a second would take longer than the age of the universe. In their need to persist in constantly changing environments, nonlinear systems must adjust and adapt quickly. Thus, they cannot afford to test out all possible states before arriving at the state to which it is best adapted. Rather, they must have an adaptive plan that enables them to quickly find states that are adapted to the environment. The network of $2^{100,\ 000}$ light bulbs falls neatly into exactly 317 attractors states, which is the square root of the possible states. The system occupies a space of 1 divided by $2^{29,\ 998}$, which is infinitesimally small compared to the total possible states. Thus, with a network of light bulbs, we would see a large sea of bulbs turned off with tiny islands of bulbs blinking on and off.

Attractors limit the states of large networks to small islands of activity. Similarly, the system of interaction was limited to small spaces of

the state space. In the Alternate Reality MUD, the state space was constrained only by the keyboards of individuals and the space into which they could enter text. The range of possible combinations, numbers, and symbols in the environment's various virtual channels and spaces was astronomically high. Individuals could enter texts into many places: various public and private channels, postings on boards, MUD mail and email, postings on the website, and descriptions for virtual rooms, objects, and mobile objects. They could type any combination of symbols, numbers, and characters. However, interactions represented a miniscule and recognizable number of islands in the possible types of language that could be produced. A limited number of types of short interactions made up longer interactions. Postings on various boards followed particular patterns: some contained role-playing stories, others offered advice, and still others asked questions. There were also different types of MUD mails: many asked questions, and some gave directions. Descriptions for virtual rooms, objects, and virtual objects also followed patterns. Thus, despite the large range of possible occurrences of language in the virtual environment, a limited number of types emerged. Even though the interactions occupied an infinitesimal space of the state space, they took on near limitless forms. In the next section, I will attempt to explain how strange attractors allow systems to produce infinite diversity in recognizable forms.

Strange Attractors and Diversity

Of particular interest in examining conventionalized practices in the data is the way in which conventionalized forms were easily recognizable, yet there were near infinite forms they could take. In other words, a greeting was immediately recognizable as a greeting, yet each new greeting was different. In order to explain this phenomenon, I will discuss the way in which attractors function in nonlinear systems.

Attractors limit the behavior of a system to a small region of the state space. Strange attractors, one form of attractor, are defined by differential equations that, while maintaining the system in the state space, also show the behavior of a system to be unpredictable. When the behavior of a system is defined by a strange attractor, the trajectory of the system never repeats and thus the same state is never assumed twice. Therefore, while it is possible to see the boundaries of the system's behavior, it is not possible to accurately predict its future states.

Lorenz (1967; 1996) researched strange attractors in pursuing his goal of predicting weather patterns. He generated a computer model for weather based on 12 variables. He found that weather did not always behave as predicted. Further, he found that small changes in one variable could cause very large changes in the behavior of the system. His analogy has been termed the butterfly effect, and he posited that a butterfly

flapping its wings in Brazil could have an impact on the weather in North America.

Strange attractors explain the diversity we see in greetings. Despite the fact that greetings were closer to the formulaic side of the spectrum of interactions, the forms that they took varied greatly, and their exact forms were unpredictable. Each greeting assumed a new form even when the same two individuals were involved.

1 You suddenly feel the presence of the Mighty Elven Enchanter in the realm.
2 Najib gossips, 'greeeting god'
3 Antugile shouts, 'greeting lord'

1 You suddenly feel the presence of the Mighty Elven Enchanter in the realm.
2 Antugile gossips, 'greetings lord'
3 Najib gossips, 'greeting lord!'

These two greetings occurred within an hour of each other and involved the same three individuals. Valantriel was building a new zone. While engaged in this task, he twice used a special god command that informed players he was present in the environment (lines 1-2 of each greeting). Najib and Antugile greeted him each time he announced his presence. The two greetings appear similar, but there are many subtle differences. First, Najib and Antugile alternated producing the first utterances. Second, Najib changed <god> to <lord> and <greeeting> to <greeting> from the first to the second greeting. He also added <!> in the second greeting. Antugile

used the shout command in the first greeting and the gossip command in the second. He also changed <greeting> to <greetings>.

Greetings occupied a limited space in the state space of the system of interaction in the Alternate Reality MUD, yet the form each took was unique. Variations in elements of greetings were motivated. As Holland (1995) described building blocks, a small number of building blocks can be combined and rearranged to create near infinite scenes. Similarly, in chaotic systems, small variances in one variable can cause the entire system to change its behavior, akin to Lorenz's butterfly effect.

1 [INFO] Leperkorn has entered the realm.
2 Leperkorn gossips, 'greeting all'
3 Leperkorn gossips, 'greeting lord Vulrag'
4 You gossip, 'Greetings Leperkorn'

In the above greeting, Leperkorn is a player. He greeted other players present with <greeting all> but me with <greeting lord Vulrag>. The higher status of administrators was signaled through the addition of extra words and titles that co-equal players did not necessarily receive.

1 [INFO] Leonhart has entered the realm.
2 Leonhart gossips, 'greeting all'
3 Jesse gossips, 'Greetings Young crusdar'

Well-respected players, similar to administrators, were afforded special titles.

1 [INFO] Cool has entered the realm.
2 [INFO] Serpico has entered the realm.
3 Thomas gossips, 'hail little ones'
4 Serpico gossips, 'greetings'
5 Cool gossips, 'hail alll'

New players with few levels could be referred to as <little ones>, a term of address that marked a difference in experience.

1 [INFO] Istanbilly has entered the realm.
2 Istanbilly gossips, 'Greetings all'
3 Leonhart gossips, 'greeting'

The lower prestige of an individual could be signaled in many ways, including not responding to a greeting utterance (see the first two examples with Valantriel, Antugile, and Najib), or not using any term of address. Addressing an individual with their name rather than a general <hi> or <hi there> or <hello everyone> could be motivated by social distance caused by differences in power or a lack of familiarity. Further subtle distinctions were possible. In this example, Istanbilly was a newcomer. He produced a reference, <all>. It was common for individuals entering to say <all> to all players present. Players who were well known typically received responses that included their name or even a title such

as <Thomas> or <Lord Zorrak>, but Istanbilly received only a greeting token. The asymmetrical nature of the greeting can be attributed to differences in experience: Leonhart was an experienced player, and Istanbilly was a newcomer. Thus, differences in power, experience, or familiarity caused deviations in elements of greetings, causing unequal patterns to emerge.

->1 [INFO] Cyrex has entered the realm.
->2 Najib gossips, 'welcome back'
->3 Cyrex gossips, '*smile*'
4 Najib gossips, 'he he he he'
5 Najib gossips, 'welcome welcome welcome'

This is a greeting that occurred after Cyrex had left to go have lunch. Typical greetings occurred after individuals had not "seen" each other for longer periods of time, perhaps a day or a few hours. The change in the time period from when one was absent caused an unusual greeting token <welcome back> with a response <*smile*>. The change in one variable, the time elapsed since the last encounter, caused the entire form of greetings to change.

More variations were certainly possible. Subtleties in perceived identities and power differences caused the symmetry of greetings to change. More words were produced for those with more perceived power, reputation, or experience. Intimacy and familiarity played a part in the type of greetings generated between individuals. Finally, the length of

time one had been absent from the MUD also influenced the form greetings took. The variance in one variable could cause the entire greeting to change forms radically.

Internal Mechanisms and Credit Assignment

My analysis up to this point has focused on the identity of greetings as a subcomponent of the system of interaction in the Alternate Reality MUD. In this section, I will begin to examine the identities of individual players. I will attempt to build a model for the online identities of the participants and relate these to the system of interaction.

Holland (1995) gave a model of internal mechanisms, which are smaller interacting systems that make up components of larger systems. Researchers interested in social interaction (Goffman, 1974; Tannen, 1992) and communities of practice (Lave & Wenger, 1991; Wenger, 1998; Ball, 2004) have emphasized the importance of experience in the learning process. A system of experience is a nonlinear system that guides and limits behavior and functions by receiving input and producing output.

Input is a perturbation that can arise either internally or externally. Output is a reaction to a perturbation. Relationships between types of input and output emerge over time. Also, many rules may be at work at once, and rules may work together, interact, and form various types of

relationships. Holland (1995) gave the example of the frog. One form of input may be seeing movement in the environment. The frog may react to the movement by fleeing. The rule "if movement, flee" persists and gains strength as it is a self-preserving mechanism that enables the frog to avoid predators. However, if the frog flees every time it sees movement, it will die from starvation.

A sub-rule of the above rule might be "if movement is small and flying nearby, stick out tongue." This rule enables the frog to catch and eat bugs. Thus, the two rules work together, the smaller overruling the larger rule through a bidding process. Every time there is a perturbation, various rules may bid for control. Each rule has a particular amount of "capital" to bid. If it wins the bid, its requirements are applied ("if movement, flee"). If the result of the rule is favorable, the rule is strengthened, giving it more capital to bid, but if the result is unfavorable, the rule is weakened, making it less likely that the rule will be applied again when the same type of perturbation is encountered. Over time, rules gain strength as they are applied and re-applied.

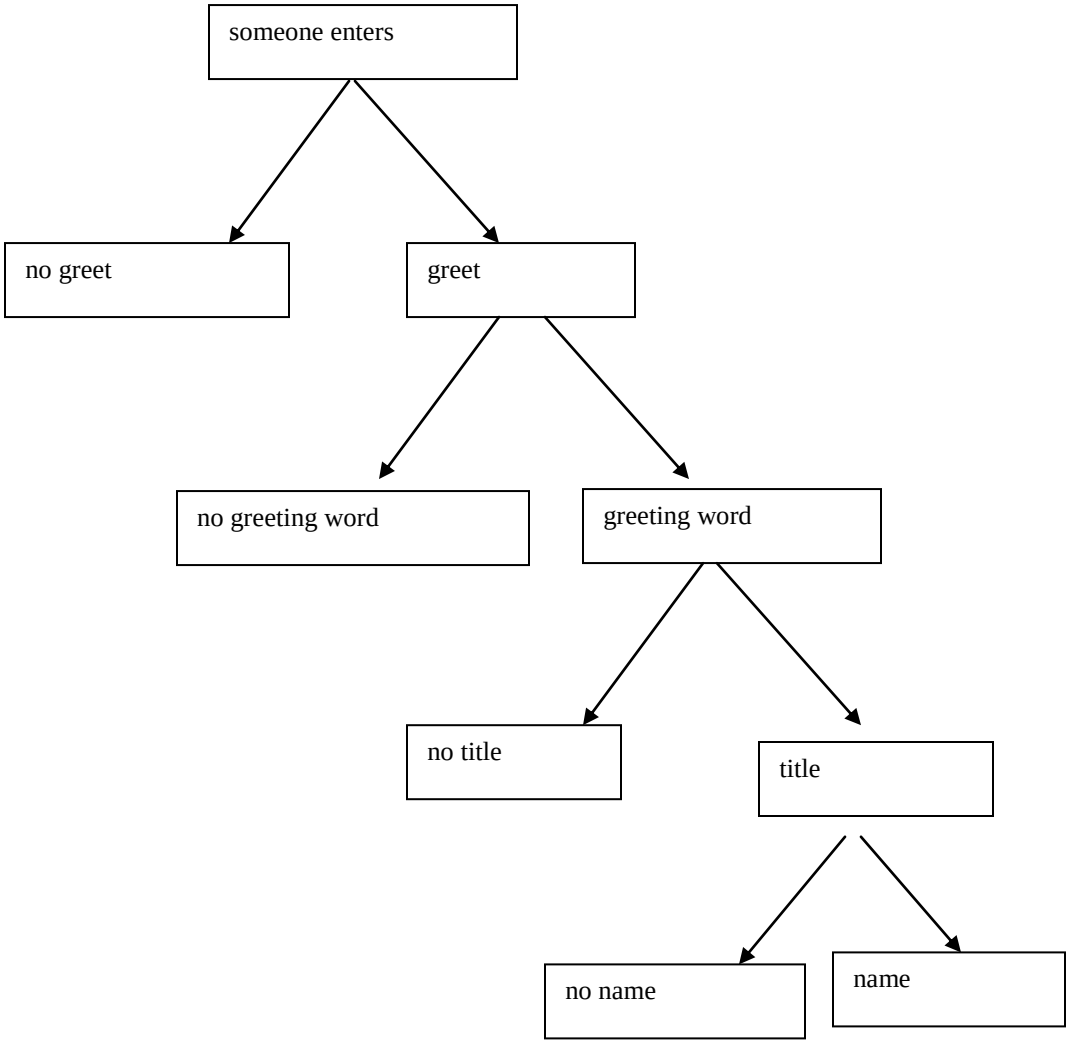
When two rules are working together, the more specific rule must outbid the more general rule. Thus, for example, the "if movement is small and flying nearby, stick out tongue" rule would bid more than the more general rule "if movement, flee," thus saving the system from having the more general rule fail, acting and not getting food. Thus, the two rules

form a symbiotic relationship. Because there are many types of input, there may be many types of rules.

Credit assignment and internal mechanisms help to explain the way individuals decided, either tacitly or explicitly, how to produce a particular greeting. Greetings were composed of numerous sub-elements: the entrance of individuals into shared space followed by one or more utterances each comprised of various elements. Three basic rules for greetings might be "if an individual enters a shared space, produce a greeting utterance," or "if entering a shared space, produce a greeting utterance," or "if greeted, produce a greeting utterance." These are very general rules that only explain the occurrence, or perhaps lack thereof, of greetings. Smaller rules are later formed, such as "if person with whom I am interacting is an administrator, produce title," "if administrator is Zorrak, add expletive," and, "if administrator is Zorrak and I need help, delete expletive."

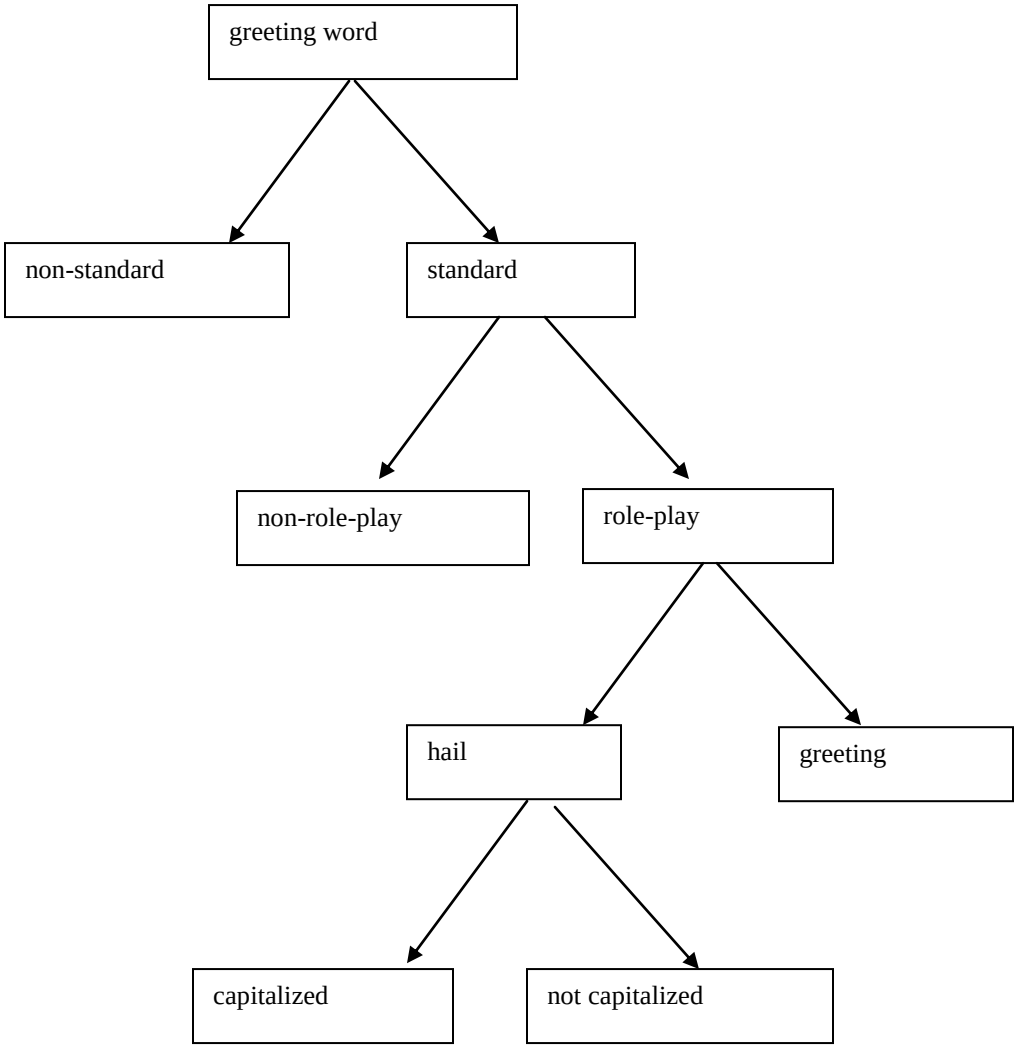
Holland described internal mechanisms as binary, but he cautioned that they need not necessarily be so. As this is an initial attempt at using these principles to describe the interactions in the Alternate Reality MUD, I have chosen to represent them as binary entities keeping in mind that they may take on other forms. A general set of rules for producing a greeting might appear as follows:

Figure 7: Internal Mechanism of a Greeting



The initial input, seeing an individual enter a shared space, causes a perturbation, which is tied to a set of rules that dictate output. The individual must then decide first whether or not to produce a greeting utterance. If s/he decides to create a greeting utterance, s/he must decide which elements to include (e.g. greeting token, term of address, name). In addition, many sub-rules function simultaneously. One such set of sub rules governed the production of greeting words:

Figure 8: Internal Mechanism for a Greeting Word



Individuals decided on such things as whether or not to produce a standard or non-standard greeting word, a role-play or non-role-play greeting word, the type of greeting word. Still other rules were functioning. For example, an individual who chose <greeting> would then have to decide on five spelling variants that were acceptable in the Alternate Reality MUD: <greeting>, <greetings>, <greetingz>, <greet>, and <greetz>. Capitalization also came into play as did rules governing manual dexterity.

Some of the diversity in greetings occurred in the application of smaller rules in the process of producing an utterance. An error or change in one of the sub-rules would create a mutation in the greeting utterance. In biological entities, mutation occurs when subatomic particles randomly interact with DNA molecules, and in doing so change their composition. A change in a sub-system of the DNA causes a mutation in it. This change has the possibility of propagating to the entire population. However, most mutations do not propagate. Similarly, a subsystem of the system of interaction – manual dexterity – affected the form of the system of interaction

1 [INFO] Glorak has entered the realm.
2 Vulrag: :)
->3 **Glorak: Heloo**

1 [INFO] Vulrag has entered the realm.
->2 Thomas gossips, 'haol vulrag'
3 You gossip, 'GREETINGS :)'
4 Nitro gossips, 'hail Lord Vulrag'

1 [INFO] Glorak has entered the realm.
2 Najib gossips, 'greeting lord'
3 Glorak gossips, 'Greetings all'
4 Selina gossips, 'where Lord?'
5 [INFO] Demon Gods has entered the realm.
->6 Najib gossips, 'greering'

In the above three examples, errors at the manual dexterity level caused mutations in greeting words. These mutations did not propagate throughout the system of interaction. However, sometimes keyboarding mistakes do propagate. One example comes from other Internet games. A common term in internet games is <owned>, which might be roughly interpreted as <you performed poorly and should be ashamed>. This is typically employed when a player died in a situation in which s/he should not have died. However, this form has been almost completely replaced with <pwned> and <0wned> from typing errors. Looking at the QWERTY keyboard, <p> and <0> are close to the key <o>. Similarly, <pwned> has also propagated to the spoken vocabulary of some internet game players.

Over time, as individuals accumulated experience, rules were defined through strengths. The more a rule was successful, the more likely it would be used again. Thus, a recursive cycle emerged, a sort of self-fulfilling prophesy. As a successful rule was used more and more, it

became more likely to be used. Individuals had that had different strengths that might be similar or different from those of other individuals. The strength or weaknesses of the rules tied to more stable representations of individual identities. Each instance of an interaction could be mapped to the underlying components:

```
1    [ INFO ] Leperkorn has entered the realm.
2    Leperkorn gossips, 'greeting all'
3    Leperkorn gossips, 'greeting lord Vulrag'
4    You gossip, 'Greetings Leperkorn'
```

Figure 9: Leperkorn's Performance Mapped onto an Internalized Mechanism

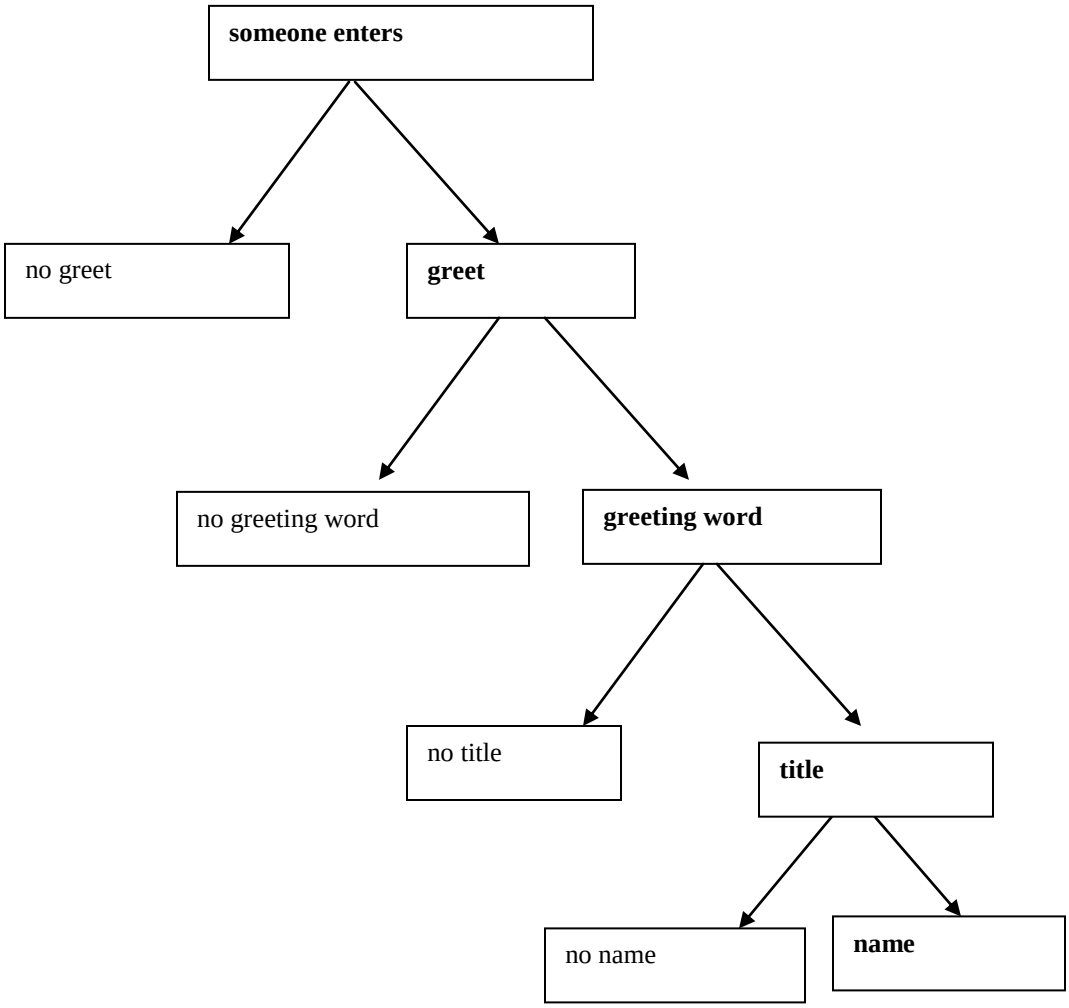


Figure 9 is a representation of the internal mechanisms that guided Leperkorn's behavior. Bolded choices are the options that he chose in this instance. Over time, this rule may seem to become stable, thus raising the question of whether rules could become completely frozen. Various rules were in action at the same time, and on occasion random occurrences would "unfreeze" a particular structure. As aspects of the environment continuously changed, individuals made changes in the ways they engaged, thus altering the exact form of particular rules to fit circumstances. Some rules may appear arbitrary and idiosyncratic: Some individuals capitalize, others do not. Some prefer to use <hail> while others use <greetings>. Some spell <greetings> with an <s>, and others delete the <s>. Each individual had a unique way of interacting.

To summarize, individuals had internalized representations of the system of interaction of the Alternate Reality MUD. These internalized representations were rules, sets of rules, and combinations of sets of rules that governed reactions to input, perturbations, from the environment. Words and language would be seen by individuals, and they would react to these words by producing particular language. In this model, agency is the conscious ability of an individual to choose his or her reaction in a given set of circumstances. In the next section, I will explore in greater

detail the ways in which individuals' internal mechanisms defined and constrained their identities.

Homeostasis and Domain of Interactions

Individuals formed typical reactions to typical situations. Over time, an individual's internal mechanisms became more stable as they formed more stable rules and thus identities. Pathways between perturbations and reaction were formed, and they were often influenced by myriad variables that were present in a given situation. Therefore, individuals' behaviors always varied although perhaps only slightly when they encountered typical situations. Ritualized behaviors can be viewed as similar to Kauffman's attractors in his network of light bulbs: there were particular recognizable spaces into which they fell, but the exact form of each was different.

At the same time, players varied the types of greetings they made. As stable forms emerged, players changed portions of their greetings. As individuals increased in power and status, they were often greeted with <lord> , <great one>, or other terms. Similarly, <greetings> was shortened to <greet>, but then changed by some to <greetz> and <greetingz>.

In the Alternate Reality MUD, each individual had a wealth of possible ways in which he or she might produce a greeting. Each individual had his or her unique set of internal mechanisms that guided the

production of greetings with other individuals. For example, an individual who was solely a player would have typical ways of greeting other players. S/he might develop more specified ways of greeting particular players with whom s/he spent more time. Thus, over time, greeting, or the state space of greetings for particular individuals, would change. Also, the individual would have typified ways of interacting with administrators although s/he might be befriended by a particular administrator and create a distinct way of interacting. It is possible that an individual would have a unique way of interacting with each of the other individuals in the Alternate Reality MUD. Each individual would have a state space of greeting with each other individual, and the sum total of all possible interactions would make up his or her internalized domain of interactions, which was a subset of the environment's domain of interactions.

The domain of interactions is the sum total of all interactions into which an individual could enter. It also defined the ways in which an individual could not behave. Thus, we do not see players greeting other players as <greetings, mortals> or <how are my dark children today?> However, these were ways in which administrators addressed players.

```
1       [ INFO ]  Hyunckel has entered the realm.
2       Hyunckel gossips, 'greeting all'
3       Hyunckel gossips, 'smile greetoing Lord Vulrag And Lord Zorrak'
```

In this example, Hyunkel, a player, greeted players with the term of address <all>, but he greeted the two administrators, Zorrak and me, with <Lord + name>. These are obvious examples, but there must be more subtle ways in which individuals could not interact with others. The nexus of interaction provides possibilities of interaction, but also limits behavior. The nexus of interaction defined the niche of particular individuals in the social organization in the studied environment, but it also defined their online social identities. Some were more flexible than others. For example, Glorak and I interacted in different ways depending on the circumstances. Sometimes, he would greet me as an equal with greeting tokens.

1 [INFO] Glorak has entered the realm.
2 Vulrag: :)
3 Glorak: Heloo

1 [INFO] Glorak has entered the realm.
2 Glorak: Greetings
3 Vulrag: HI Glorak

At other times, when he needed help, he would call me <sir>.

1 Glorak tells you, 'sir?'
2 You tell Glorak, 'what's up?'
3 Glorak tells you, '?'
4 Glorak says, 'you there?'

5 You tell Glorak, 'you said sir...'
6 You tell Glorak, 'mostly afk, what's up?'
7 Glorak tells you, 'help pls'
8 Glorak The Demon God disappears in sky.
9 You tell Glorak, 'help with what?'
10 Glorak tells you, 'here'

The first two greetings were typical between Glorak and me: they contained standard greeting tokens, emoticons, and terms of address. The third greeting is a combination of an inquiry and a greeting. I had been away from the keyboard (AFK) for about 30 minutes when Glorak produced this greeting. The greeting is tied to surrounding activities. Variation occurred due to current circumstances. Glorak typically did not call me <sir> unless he wanted help with something. The repertoire that he could produce, defined by probable and possible reactions, was a subset of the total possibilities in the environment.

An individual's nexus of interaction was flexible enough to allow for various situated identities between two individuals. Different language would be produced depending on various factors including surrounding activities and current circumstances. Thus, the greetings that arose between Glorak and me had typical forms but could change depending on myriad variables.

Summary of Greetings

The greeting was a bounded unity in the state space of the possible language of the community. Attractors created ranges of possible interactions that individuals could use as greetings. However, due to the vast space of the state space of the system of interactions, and even the vast subset area of greetings limited by an attractor, players could create near limitless possible greetings by varying words, spellings, and types of words they used. An individual's participation in greetings was further limited by his or her internal mechanisms. Thus, individuals' internalized mechanisms in many ways defined possible situated identities they could take on in given interaction types. The configuration of all ways in which an individual could interact with others was his or her nexus of interactions, an internalized system of rules guided by the nexus defining probable behaviors. In this model, agency is the conscious effort to engage in a particular way. Through agency, individuals could purposefully stretch their own internalized ways of interacting.

THE ARENA QUEST

The arena quest was a competition in which players battled each other in an area of the MUD designed for player-to-player combat. Several players congregated in the MUD's arena and attempted to kill each other. The last player standing was the winner. The arena consisted of 26 rooms: a five-by-five grid and a one-room entrance that could be closed off with a gate. Players met in the arena to participate in the player-killing activity, after which they received prizes for their performances. Administrators structured the activity by laying out guidelines and awarding the winning player a prize. Below is a transcript of the first portion of one such activity.

Data: The Arena Quest

1 Zorrak gossips, 'Who want to join a quest?'
2 Kyo gossips, 'what quest'
3 Amedeaus gossips, 'what type of quest?'
4 Deglo gossips, 'He asked who wanted to join.'
5 Kyo gossips, 'hahahaha ;)'
6 Thomas gossips, 'me'
7 Deglo gossips, 'If I'm not too much of a dead weight, I'd love to join.'
8 Kyo gossips, 'pat deglo'

[It was common for players in the same room to use social commands. Social commands mimicked nonverbal behavior. A common one was <pat name>, which would result in the text <Kyo pats Deglo on the head.> Here, Kyo uses the pat in

the gossip channel, which players understand because they were familiar with the social command]

9 Zorrak gossips, 'hunt Thomas'
10 Deglo gossips, 'hunt thomas?'
11 Zorrak gossips, 'inside the arena'
12 [INFO] Zeo has entered the realm.
13 Kyo gossips, 'hail otai zeo'
14 Kyo gossips, 'mean arena'
15 Thomas gossips, 'yeah bring it'
16 [(GC) Zorrak transfers Thomas]
17 Kyo gossips, 'if i can get my bow ----i will'
18 Zorrak gossips, 'Who can kill thomas in the
19 arena will have gift from me and Lord Valantriel'
20 Zorrak gossips, 'yes, no looting.' [No looting means that players could not take items from other players that they had killed.]
21 Thomas gossips, 'bring it'
22 Amedeaus gossips, 'ok'
23 Kyo gossips, 'how can laa~ he for me is
24 true warrior ;)'
25 Amedeaus gossips, 'i just a test of fighting skills'
26 Amedeaus gossips, 'bow thomas'
27 Zorrak gossips, 'Wait .. do not start till i said GO.'
28 Amedeaus gossips, 'i worship thomas as my idol'
29 Kyo gossips, 'me too'
30 Zorrak gossips, 'Who wish to join please on your Quest flag.'
31 Thomas gossips, 'all come lets rock *CACKLE*'
32 Deglo gossips, 'prepare to be spammed'
33 Thomas gossips, 'bring it'
34 Zorrak gossips, 'I will transfer you here.'
35 Kyo gossips, 'I lose it's me'
36 Deglo gossips, 'by [INFO] Deglo has been killed by Thomas.' [The INFO channel announced when players were killed by other players. Deglo is mimicking the INFO channel denigrating himself as he believes Thomas, perhaps

the more respected player, would kill him.]

37 [(GC) Zorrak transfers Kyo]
38 Kyo gossips, 'pat deglo'
39 [INFO] Put on your quest flag if you want to join
40 [(GC) Zorrak transfers Amedeaus]
41 Zorrak gossips, 'Zeo and Oddesy?
42 Oddesy gossips, 'me cannot'
43 [(GC) Valantriel transfers Hox]
44 Zorrak gossips, 'Wish to join Zeo?'
45 Zeo gossips, '*SHAKE* got some ogre zone to explore'
46 Zeo gossips, 'i have enough of fight last week'
47 Zeo gossips, 'sorry lord'
48 Zorrak gossips, 'erm.. ok then'
49 Zorrak quest-says, 'you have 3 more tick to get ready

[A tick is the unit of time in the MUD, which was equal to about 70 seconds.]

50 Zorrak quest-says, 'Potion, Staff , Wand all allowed
51 [INFO] Duemar has entered the realm.
52 Duemar gossips, 'Greetings all'
53 Kyo gossips, 'gretting all duemar'
54 Thomas gossips, 'hail duemar'
55 Zeo gossips, 'greetings Duemar'
56 Zorrak gossips, 'wish to join a quest Duemar?'
57 Duemar gossips, 'what quest Lord ?'
58 Duemar gossips, 'i wish to join any quest '
59 Duemar quest-says, 'hail'
60 Amedeaus gossips, 'is it all fight thomas or I by one?'
61 [INFO] Hyunckel has entered the realm.
62 Deglo gossips, 'all hunt him'
63 Amedeaus gossips, 'ok'
64 Duemar quest-says, 'may i join the quest ?'
65 Zorrak gossips, 'ready?'
66 Duemar gossips, 'yes'
69 Zorrak quest-says, 'yes'
68 Deglo gossips, 'yeap'
69 Amedeaus quest-says, 'go go go'
70 Zorrak gossips, 'ready?'
71 [INFO] Hyunckel has left the realm.
72 Deglo gossips, 'yes'
73 Start!!

Building Blocks

The above interaction was constructed of a limited number of types of short interactions. Instead of a large, amorphous system with near limitless creative possibilities in the language, the system was characterized by a limited number of recognizable types of short interactions that emerged repeatedly. These units are akin to Holland's (1995) explanation of building blocks in nonlinear systems. In his view, complex scenes are composed of limited numbers and types of blocks. However, from only a few initial building blocks, we can create near infinite scenes.

The data presented at the beginning of the Arena Quest can be broken into short interactions similar to adjacency pairs. Some units consist of single lines, but most are pairs of utterances. I have classified the short interactions into six. Each short interaction had a typical, recognizable form.

Invitations

Invitations were sequences that determined whether or not particular individuals would adhere to the collaborative activity.

1 Zorrak gossips, 'Who want to join a quest?'
6 Thomas gossips, 'me'
7 Deglo gossips, 'If I'm not too much of a dead weight, I'd love to join.'
8 Kyo gossips, 'pat deglo'

43 Zorrak gossips, 'Wish to join Zeo?'
44 Zeo gossips, '*SHAKE* got some ogre zone to explore'
45 Zeo gossips, 'i have enough of fight last week'
46 Zeo gossips, 'sorry lord'
47 Zorrak gossips, 'erm.. ok then'

Inquiries

Inquiries were sequences that were used to illuminate specific information about the activity.

65 Zorrak gossips, 'ready?'
66 Duemar gossips, 'yes'
69 Zorrak quest-says, 'yes'
68 Deglo gossips, 'yeap'

2 Kyo gossips, 'what quest'
3 Amedeaus gossips, 'what type of quest?'
9 Zorrak gossips, 'hunt Thomas'

Instructions

Instructions were used to direct participants to perform behaviors in particular ways.

30 Zorrak gossips, 'Who wish to join please on your Quest flag.'
50 Zorrak quest-says, 'Potion, Staff , Wand all allowed

Comments

Comments were used as a way for players to maintain themselves engaged while waiting for others.

28 Amedeaus gossips, 'i worship thomas as my idol'
29 Kyo gossips, 'me too'

32 Deglo gossips, 'prepare to be spammed'
36 Deglo gossips, 'by [INFO] Deglo has been killed by Thomas.'
38 Kyo gossips, 'pat deglo'

Openings

Openings were used to create the initial connection between individuals in the environment.

12 [INFO] Zeo has entered the realm.
13 Kyo gossips, 'hail otai zeo'

51 [INFO] Duemar has entered the realm.
52 Duemar gossips, 'Greetings all'
53 Kyo gossips, 'gretting all duemar'
54 Thomas gossips, 'hail duemar'
55 Zeo gossips, 'greetings Duemar'

Transportation

Transportation was the moving of an avatar to the virtual arena.

37 [(GC) Zorrak transfers Kyo]

40 [(GC) Zorrak transfers Amedeaus]

43 [(GC) Valantriel transfers Hox]

Figure 10: Types of Utterances/Short Interactions

TYPE	LINES	PARTICIPANTS
Invitations (4)	1, 6-8	Zorrak, Thomas, Deglo
	45-46	Zorrak, Oddesy
	48-52	Zorrak, Zeo
	63-65	Zorrak, Duemar
Inquiry (7)	2-5 (24)	Kyo, Amedeaus, Deglo, Kyo
	11-12	Deglo, Zorrak
	14, 16	Kyo, Thomas
	67, 69, 70	Amedeaus, Deglo
	71, 74	Duemar, Zorrak
	72, 3, 5, (6)	Zorrak, Duemar, Deglo, (Amedeaus)
	77, 79, 80	Zorrak, Deglo, (Zorrak)
Instructions (6)		19, 20, 21 Zorrak
	29	Zorrak
	32, 33	Zorrak
	37	Zorrak
	43	Zorrak
	54, 55	Zorrak
	56, 57	Zorrak
Comment (7)	9	Kyo
	16	Thomas
	28, 29, 30	Amedeaus, Kyo
	23	Thomas
	34	Thomas
	36	Thomas
	35, 38, 39, 40, 42	Deglo, Kyo
Openings (2)	13, 15	Zeo, Kyo
	58-62	Duemar, Kyo, Thomas, Zeo
Transportation (4)	17	Zorrak
	41	Zorrak
	44	Zorrak
	47	Valantriel

Each short interaction arose due to circumstances or perturbations in the environment in a dynamic process as individuals coalesced into a group

that moved towards a particular goal. Openings were used as individuals entered the virtual environment. Invitations followed openings. Negotiations took place through inquiries, and players were finally tagged as either wanting to be included or excluded from the group. Instructions arose in a progressive fashion as administrators attempted to prepare the players for the activity. Comments arose as players waited. Also, short interactions occurred only when particular situations required it. Transportation units only arose when particular individuals needed to be relocated to the arena. Greetings only arose when an individual entered the environment. Invitations only arose between administrators and players who had been greeted.

Tagging

Each type of utterance determined particular qualities or characteristics of the participants' online identities. Each utterance revealed a hidden property of a given individual relative the collaborative interaction. Openings recognized the presence of individuals. Invitations revealed inclusion or exclusion from the activity. Transportation relocated them "spatially."

It is possible to evaluate each short interaction as either having a positive (+) or negative (-) effect in regards to an individual's situated identity related to the task. I realize this is a simplistic analysis and that

things are more complex than this, but idealization often helps us to see the big picture (Kauffman, 1995). Individuals who accepted invitations were tagged (+) and, thus, proceeded further in the interaction. Administrators then asked them to put on their quest flags (lines 32-3, 43), thus opening quest-say space. Once individuals had toggled on their quest-say flags, their identities were marked with another (+). Next, individuals had to be located in the same virtual space. Some arrived on their own, and some were transported there. Once they arrived in the virtual space, again, we can mark their identity as (+) for being present in the same virtual room.

Figure 11: Tagging and Utterances

+/- Recognized as present
+/- Agreeing to participate in the quest
+/- Quest-flag on, can hear quest-say channel
+/- Located in the arena
+/- Ready to start

The group of players needed to have all flags toggled to + in order for the group to proceed. The situated identities of individuals underwent a series of changes in interaction as they adhered or did not adhere to the collaborative interaction. Each building block marked an individual's position in the group in time.

This analysis makes sense from a micro view of communities of practice. Much of the research in communities of practice has concentrated on measurable identity changes that individuals go through

as they progress towards becoming full members of a community. Hundeide (2003) examined the stages that neo-Nazis and child warriors in Africa go through to identify with their new group. Both groups go through a series of stages that involve specific actions. They achieve a particular closeness to the center of the group by committing particular actions: cutting off ties with family, changing dress and appearance, and committing irreversible crimes. The Arena Quest reveals a similar process at the micro level: as each individual completed a particular action (e.g. accepting an invitation, toggling on his or her quest-say flag, locating him or herself in the virtual arena), s/he moved closer to the center of the group.

The Dynamic Nature of Human Interaction

A useful metaphor through which to explain the collaboration in the arena quest is the assemblage of independent agents in nonlinear dynamic systems. The collaboration of individuals in the Arena Quest is akin to emergent behavior exhibited by systems studied by scholars interested in nonlinear dynamics. Several scholars (Briggs & Peat, 1989; Peat, 1987; Coveney & Highfield, 1990; Prigogine & Stengers, 1984) have described slime mold as an example of emergent behavior. Slime mold is mostly a conglomeration of independent single-celled creatures

that exist in colonies of approximately 50, 000 cells. Each cell searches for and consumes food independently. Eventually, however, the colony depletes all local food sources. When this occurs, some of the independent cells begin sending out chemical signals to other independent cells. Cells begin to come together to form a conglomerate that resembles a slug. In the new creature, the formerly independent cells specialize: some become the head, others the tail, others an antennae-like structure, and others the brain-like structure that sends out signals on how the creature should move. Eventually, the creature reaches a new area where there is more food. Spores sprout from the antennae, which are then blown about the nearby area to form more single-celled creatures.

Using slime mold as an example of emergent properties of independent agents working for selfish reasons seems an appropriate metaphor for the behavior of human agents in the Arena Quest. Individuals frequently worked independently. However, there were many tasks that were better suited for a group, and when such a task was imminent, multiple individuals would form groups. One or more individuals would send out signals as they attempted to bring various individuals together to work collaboratively.

Ongoing signals in the form of ritualized practices mediated the progressive forming of the group. Individuals obtained positions in the group and typically specialized. Community was not a static, slow-moving

group of individuals and practices but rather groups of individuals that emerged and dissipated through ritualized short interactions.

By examining the interactions that occurred in the Alternate Reality MUD, time emerges as an important variable as instances of community arose and receded dynamically. Ritualized behaviors were integral mechanisms of the community as they served to form and disband instantiations of community. Communities were constructed of various progressive and collaborative interactions that arose, grew, and died out over time.

DISCUSSION OF IDENTITY

The system of interaction in the Alternate Reality MUD was limited by small strange attractors in an enormously large range of possibilities. Each interaction was an activity that had an ongoing trajectory of a portion of the system. Changes in various factors could cause the system to behave unpredictably, often causing the system to produce novel forms of language, yet behavior was still limited by the strange attractors. Over time, changes to the form of an attractor might occur due to mutations. Individuals' behaviors in interactions were governed by sets of internal mechanisms, most of which were likely below the conscious level of thought. Errors made at any level in the set of internal mechanisms could cause a mutation in a behavior, also causing a mutation in the system of interactions.

Humans played ritualized roles in interactions. These roles related specifically to their internal mechanisms. Agency gave individuals the ability to change their identities by consciously altering their behaviors. Also, over time, as individuals acquired experience, the ways in which they and others interacted changed, altering their internal mechanisms and those of others. Perception was the internalized model of an individual's experience with others. Thus, we can think of identity in two ways. First, it was the total set of internal mechanisms. Second, it was the internalized mechanisms of others' in response to a particular individual. Conflict was likely when the internal mechanisms of two individuals did not agree.

These analyses tend to agree with the theoretical backing to this dissertation. Identities are largely defined through experience (Collins, 2004), and this experience can be seen through the roles people play (Goffman, 1952, Collins, 2005). Their behaviors in ritualized practices are largely defined by the roles individuals take in interactions (Holland *et al.*, 1998). Furthermore, and importantly, the roles we play are products of complex, ritualistic machinery that composed our interactions (Goffman, 1959). Also, recurrent behaviors in ritualized practices may signal more durable aspects of our identities (Holland *et al.*, 1998).

Theories of social interaction and practice fit with models of nonlinear dynamic systems, in which identity is bounded yet always expansive and changing. Identities of nonlinear systems are often defined by an

environmental niche, which is in turn defined by the types of interactions into which a system can enter (Holland, 1995; Lewin, 1992). Furthermore, identities may be defined by strange attractors, which limit the behavior to a particular region yet allow for infinite creativity (Kauffman, 1995).

In the field of second language acquisition, identity is typically viewed as stable and unchanging. Much of the research from cognitivists posit unchanging aspects of learners as parts of their identities. More recently, there has been a call to implement a more dialogical view of identity (Johnson, 2004; Nero, 2005). Importantly, by viewing identity as constructed in the moment and through interaction with an external world, we have the possibility of connecting the learner's internal world (cognitivists) with his or her external world (socioculturists) (Johnson, 2004). In this case, a learner's internal world may be composed of a representation of his or her external world(s), which is accumulated and changed through experience in observation and interactions. Learners may expand or modify their identities by playing new roles or participating in new practices. In the next chapter, I provide a synthesis of the three constructs, language, learning, and identity that I explored in the last three chapters.

CHAPTER 7: CONCLUSION

In this dissertation, I have a presented a view of language, learning, and identity of second language users in an Internet game. I have employed research on social interaction from sociology, theories of practice from anthropology, and nonlinear dynamic systems theory from various fields as I have attempted to shed new light on the phenomena of second language use and acquisition. This new view that I am proposing is a radical change from current views, and it also brings with it exciting new possibilities for research and pedagogy.

LIMITATIONS

In this study, I examined the language produced by individuals on an online text-based game. All communication was through text. I make no claims as to offline communication. Certainly, there is a vast literature on the differences between online and offline communication. This literature demonstrates that face-to-face communication is more constrained than online communication. Investigation into possible nonlinear characteristics of offline communication is interesting but cannot be maintained from the results of this dissertation. Similarly, I can

make no claims as to the offline identities of my participants, only what I observed transpire within the virtual world.

Second, and importantly, this was one study of non-native English users using English "in the wild." The study suggests interesting directions for pedagogy. However, this is just one group and one situation, and the suggestions I forward in this dissertation cannot be generalized to other populations. This limitation underscores our need to examine second language users.

Third, in this study, I have only what participants said, not what they were thinking, or what they read and learned from reading. The data were limited to what they typed, I had no access to their thoughts or actions that were not punctuated with the <return> key.

DISCUSSION

In chapter 1, I asked four questions. First, I wondered how theories of social interaction, practice, and nonlinear dynamic systems theory help us to better understand the patterns of language, learning, and identity in the Alternate Reality MUD. I also asked how these new understandings help us to better explain second language use and acquisition in general. In chapter 4, I examined the structure of the language in the Alternate Reality MUD. I posited that this language resembled a nonlinear dynamic system. Properties and mechanisms that govern nonlinear dynamic systems also

appeared to govern the discourse in the Alternate Reality MUD. In chapter 5, I examined the learning in the Alternate Reality MUD. Learning in the studied environment resembled adaptation: individuals and groups changed their behaviors as they adjusted and adapted to changes in their surroundings. Furthermore, individuals internalized structures they learned in interactions. In chapter 6, I examined identity. I found that the identities of individuals were constructed in ways in which they interacted in the community's ritualized practices.

The participants I studied in the Alternate Reality MUD combined with the three theories that I reviewed in chapter 2 help to illuminate who these individuals so successfully interacted in a new language in culturally appropriate ways. These participants immersed themselves in this studied environment. They were exposed to the language practices of others in that environment. Over time, they observed and began to participate in these practices as they strived towards goals related to the gain. These learners constructed internal representations of the external system of interactions. As they did, they developed virtual identities in the online world. Importantly, these new internal structures were not only about language but also about them.

A major theme that I have discussed throughout this dissertation is the ability to analyze social interaction as a nonlinear dynamic system. In this view, a system of cultural practices arises at the intersection of

individuals in their need to communicate. Mechanisms and properties of nonlinear dynamic systems can be used to explain many of the patterns we see in language.

A question that arises from this view is, what is the relationship between language and social interaction? I see two ways of looking at this question, and I offer this two possible views here, although I feel that this is a large question and beyond the scope of this single study. First, it is likely that language and social interaction are two adjacent systems that interact and shape different aspects of the ways in which we communicate. More specifically, there may be innate systems such as syntax and other aspects of language that are determined through genetics or other mechanisms. These may come to influence the ways in which cultural practices develop and unfold. To illustrate the ways in which these two systems may be operating, I will provide two studies from biology as a metaphor.

Biologists are often concerned with characteristics of organisms that arise from genetic coding. More recently, however, there has been research that has demonstrated particular characteristics of organisms that are emergent properties of systems, and not necessarily related to genetic coding. Sharon, Marder, and Swinney (2004) found that geometric patterning of flower petals and leaves characteristic of particular species was due to a constant growth rate, and not to genetic coding. Similarly,

Goodwin (cited in Lewin, 1992), found that the shape of a particular type of Mediterranean algae could be attributed to the orgnanism's calcium levels and growth rate, and not to genetics.

A second view may be that there are many aspects of language that may be more profitably analyzed as cultural practices. Patterns that we had earlier analyzed in more static ways may appear more dynamic at local levels. It may be possible to investigate phenomena such as vowel shifts as first occurring at local levels. Regardless of the exact relationship between social interaction and language, the science of nonlinear dynamic systems provides us with tools with which to investigate the ways in which humans communicate.

PEDAGOGICAL IMPLICATIONS

The environment that I studied and the theories I used to explain second language use and acquisition in it relate strongly to theories of learning through interaction and experience. In the Alternate Reality MUD, participants came to play a game. They formed groups. They interacted with each other and with the environment. While doing so, they had particular failures and successes, and from these, they changed the ways in which they interacted.

Possibly the greatest pedagogical implication of this study is designing activities and materials in ways that motivate students to actively use the second language. The second language users that came to

the Alternate Reality MUD engaged willingly and enthusiastically. Many of them participated 40 or more hours per week in the game as they competed with other players in an attempt to gain the best equipment and gain levels. Players often wanted to be the first to gain a particular piece of equipment, conquer a particular zone, or reach a particular level. Importantly, there were no grades or degrees awarded by the MUD, yet during their participation, they were exposed to large quantities of target language, and the also used the target language actively. The type of experience these learners had was similar to the experience Csikszentmihalyi (1975) described in his theory of flow. In flow experiences, individuals engage in tasks out of interest. They often are very successful in these tasks, and they often lose track of time when engaged in them. If we can create pedagogical materials, lesson plans, and environments that would invoke this type of motivation in students, we would have more successful schools.

A second pedagogical implication of this study is the importance of interaction in second language learning. In the Alternate Reality MUD, participants were focused on particular tasks and goals. As they strove towards those goals, they interacted with each other and with the environment in English. This relates to theories in second language acquisition that posit interaction as fundamental to learning (Hatch, 1983). Ellis (1984) stated that learners typically obtain information and

knowledge about the language through interaction, through negotiating meaning in conversation. Individuals acquire second language structures best when they interact with others in the second language. Interactions should revolve around a particular task or goal outside of the pedagogical domain. In other words, tasks should be such that they are not "finish a worksheet" or "passivize these sentences" but rather a more tangible, real type task that would occur outside classroom. In interactions in which tasks do not have linguistic goals, situations closer to what occurs outside the classroom ("in the wild") are produced, and understanding and using language successfully are required in order to accomplish the task. Ellis (1983) hypothesized learners internalize language better when structures are used successfully or unsuccessfully in these types of situations.

A final pedagogical implication is for the use of simulation and gaming theory to design pedagogical materials. Simulation and gaming theory is also based on theories of learning in which cognitive and behavioral changes are linked to experience. Jones (1995) defined a simulation as having the following qualities: an event, functional roles for individuals, duties for individuals, key information for individuals that enables them to carry out duties, competition, and rules.

Simulations involve tasks or activities in which individuals are geared towards accomplishing something, and they must use language in order to accomplish this (Bachman & Palmer, 1996: 44). In a MUD, these

goals are self-selected, meaningful, and socially valued. They are also challenging, achievable, and diverse. As individuals strive towards these goals, they must employ target language structures. These types of tasks promote learners changing the ways in which they interact as they strive to communicate better as they strive to accomplish the non-linguistic task at hand (Nunan, 1989). A further difference between MUDs and traditional school environments is that in MUD environments, feedback is not judgmental or evaluative, as most feedback in schools is, but rather informative. In other words, feedback helps learners achieve their goals, but it does not measure how they have not lived up to their teachers' expectations.

One benefit of simulations is that they provide learners with a maximum amount of practice time using the target language. Participants typically work in small groups. They coordinate, organize, and plan as they attempt to accomplish their tasks. What is particularly beneficial in this type of learning is the fact that teacher talk is limited. One practice of foreign language classrooms that has been highly criticized is the fact that teachers do most of the talking and students have little time to use target language. Simulations correct this teacher-student asymmetry as students do most (or all) of the talking. This is similar to the Alternate Reality MUD, where small groups of individuals worked together to accomplish a task, and there was seldom a central individual who directed these tasks.

In sum, I see a great value in Internet based games, particularly MUDs, that require second language users to interact in the target language. When second language users participate in MUDs, they are constantly interacting with others and the environment. As they do, they receive large amounts of target language input, and they produce target language structures. All of this they do voluntarily, without handing in assignments, taking tests, or receiving grades. The Internet's alternate realities have greatly expanded the ways in which individuals may learn second languages in the wild.

RESEARCH IMPLICATIONS

This study suggests new opportunities for future research in second language acquisition. It argues for the radical reconceptualization of language, learning, and identity. Viewing these three concepts as governed by mechanisms and properties of nonlinear dynamic systems, we have powerful theoretical tools with which to guide our research. We also may need to adjust our methods.

First, we need to broaden the environments and types of participants we study. In this study, I examined second language users in the Alternate Reality MUD, a text-based online game. For many in the

field, this group would be a highly unusual group of individuals to study. However, I want to assert that my study creates a picture of what more commonly happens in second language use situations. We need to remember that second language users are everywhere, not just in the classroom. Since the advent of the Internet, millions of individuals from around the globe participate in online communities in their second or third languages. Situations and environments in which second languages are used abound offline as well. Students travel abroad to study for a few weeks to a year. Immigrants move to new countries to take advantage of new opportunities or to escape political or economic hardships. Missionaries go to foreign countries in attempts to spread their beliefs, and linguists travel to new countries to study and record dying languages. Military personnel conduct war and peace-keeping missions abroad, and diplomats and business people negotiate deals and pacts in second languages. In their lives abroad, individuals interact and move in different figured worlds as they strive towards particular goals. A vast amount of research has been conducted on students in language classrooms or laboratory settings. The study of second language users "in the wild" and their successes or failures to learn will greatly help us in generating a more coherent meta-theory.

These types of studies should include ethnographic and qualitative research methods. There already exists a narrow strand of research in the

field that examines learners in non-classroom settings. One example is Schumman's (1974) research on six non-Native English speakers in the US. Schumman observed and interviewed six Spanish speakers and attempted to explain their successes or failures to acquire English after immigrating to the US. His results suggested that the closer his participants saw themselves to the host culture, the more likely they were to have success in acquiring English. While his results are not generalizable to other learners, they do provide beneficial suggestions for future studies in the field, as linking second language users to their surroundings and communities into which they try to integrate.

Viewing language as a nonlinear dynamic system composed of cultural practices enables us a theoretical backing with which to proceed further into investigating second language users. In particular, the study of successful language use situations outside the classroom may help us to inform pedagogy.

Examining L2 users may require particular methods, including case study, ethnography, and discourse analysis. While ethnography is not generalizable to other cases, it does help us to build theory, and while there is no lack of theorizing in the field of second language acquisition, we are lacking an overarching theory into which we can place our various research agendas. It is in this way that I believe nonlinear dynamics systems theory helps us. If we hope to understand second language

acquisition more fully, we need to look at a wide range of second language users and second language acquisition situations.

CONCLUSION

This dissertation presents a hopeful view of the future of second language acquisition. I believe that this dissertation presents new ways for us to envision language, learning, and identity as we strive to better understand the phenomenon of second language acquisition and as we attempt to create more effect pedagogical materials and methods. While the new views presented in this dissertation may help to illuminate our research and pedagogy in important ways, I hope that this study has raised more questions than it has answered.

APPENDIX A: TRANSCRIPT FROM JUNE 14TH, 2002

```
Up since Fri Jun 14 19:51:22 2002: 2 days, 3:05

 where
Players
-------
Vulrag                - [ 1204] The Immortal Board
Room
Cyrex                  - [31103] On A Trail to Ice
Cloak
LuN                    - [31103] On A Trail to Ice
Cloak
Antugile               - [31103] On A Trail to Ice
Cloak
Rewt                   - [31103] On A Trail to Ice
Cloak
Twin                   - [31103] On A Trail to Ice
Cloak
Hebe                   - [31103] On A Trail to Ice
Cloak
Nosferatu              - [31103] On A Trail to Ice
Cloak
Selina                 - [31103] On A Trail to Ice
Cloak
Najib                  - [31103] On A Trail to Ice
Cloak
Leperkorn               - [ 3004] The Entrance To
The Savant's Guild

[ INFO ]  Rewt killed by Ice Golem .

[ INFO ]  Nosferatu killed by Ice Golem .

[ INFO ]  Nosferatu has just entered the realm.

[ INFO ]  Rewt has just entered the realm.

Rewt gossips, 'uh my eq empty'
```

Selina gossips, 'second corpse'

Rewt gossips, 'where'

Selina gossips, 'at The Temple Of Port blacksand'

Rewt gossips, ':P teknikal problem'

[INFO] Nosferatu killed by the cityguard.

[INFO] Leperkorn has advanced to level 84

[INFO] Nosferatu has just entered the realm.

Nosferatu gossips, 'uh'

Antugile congrats, 'guildmaster'

Leperkorn gossips, 'thank'

Leperkorn gossips, 'wave all'

Najib gossips, 'wave'

[INFO] Leperkorn has left the realm.

[INFO] Hyunckel has entered the realm.

You have been idle, and are pulled into a void

[INFO] Antugile has left the realm

Hyunckel gossips, 'lab closing'

Hyunckel gossips, 'wave all'

[INFO] Hyunckel has left the realm.

Nosferatu gossips, 'credit

[INFO] Nosferatu has advanced to level 8

[INFO] Rewt has advanced to level 14

You have been idle, and are pulled into a void.

[INFO] Twin has advanced to level 18

[INFO] LuN has advanced to level 90

Najib gossips, 'congrats'

[INFO] Hebe has advanced to level 18

[INFO] Selina has advanced to level 19

[INFO] Nosferatu killed by the cityguard.

[Nosferatu killed by the cityguard at The Entrance Hall To The Guild Of Thieves]

[INFO] Nosferatu has just entered the realm.

You have been idle, and are pulled into a void.

[INFO] Najib has advanced to level 44

[INFO] Rewt has advanced to level 15

[INFO] Nosferatu has advanced to level 9

[INFO] Selina has advanced to level 20

[INFO] Twin has advanced to level 19

You have been idle, and are pulled into a void.

[INFO] Hebe has advanced to level 19

Najib gossips, 'congrats!'

Hebe gossips, 'tq tq'

Najib gossips, 'yaya lun aku dah 26 jams ngadap pc gila bil internet mesti *&^$*&#^@7'

Najib gossips, 'siot punye game MUD tak tidur sampai'

LuN gossips, 'ahhaahhaha'

Selina gossips, 'ahhaha'

LuN gossips, 'macam dulu aku :P'

Selina gossips, 'macam dulu aku pun'

Najib gossips, 'he he he'

Selina gossips, 'dulu aku ngan lun selalu main sampai siang lor'

[INFO] Selina has advanced to level 21

[INFO] Nosferatu has advanced to level 10

LuN gossips, 'Selina 21???'

Selina gossips, 'but hebe just 19'

Najib gossips, 'hehe'

[INFO] Sisco has entered the realm.

[INFO] Selina has advanced to level 22

LuN gossips, '22?'

Hebe gossips, 'my exp 4/3'

You have been idle, and are pulled into a void.

[INFO] Rewt has advanced to level 16

[INFO] Nosferatu has advanced to level 11

[INFO] Hebe has advanced to level 20

[INFO] Twin has advanced to level 20

[INFO] LuN has left the realm.

[INFO] Sisco has advanced to level 14

[INFO] Cyrex has left the realm.

[INFO] Glorak has entered the realm.

Najib gossips, 'greeting lord'

Glorak gossips, 'Greetings all'

Selina gossips, 'where Lord?'

[INFO] Demon Gods has entered the realm.

Najib gossips, 'greering'

[(GC) Glorak restores the world.]

Selina gossips, 'ceh'

Najib gossips, 'thank y'

Sisco gossips, 'than'

Najib gossips, 'HELP ME I NEED FIND painted FACE'

You have been idle, and are pulled into a void.

[INFO] Selina has advanced to level 23

[INFO] Demon Gods has left the realm.

[(GC) Glorak restores the world.]

[INFO] Twin has advanced to level 21

[INFO] Hebe has advanced to level 21

Glorak congrats, '!Hebe!'

Twin gossips, 'thanks q la'

You have been idle, and are pulled into a void.

Glorak studies the board.

Selina gossips, 'tata'

[INFO] Selina has left the realm.

[INFO] Twin has left the realm.

[INFO] Hebe has left the realm.

Glorak: bye

Najib gossips, 'lord u there?'

You have been idle, and are pulled into a void.

[INFO] Nosferatu killed by Bermul Castellius.

[INFO] Nosferatu has just entered the realm.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[INFO] Necron has entered the realm.

[INFO] Necron has left the realm.

You have been idle, and are pulled into a void.

[INFO] Xavier has entered the realm.

You have been idle, and are pulled into a void.

[INFO] Necron has entered the realm.

Xavier gossips, 'lambat laa'

Necron gossips, 'iskk..tadih aku dah masuk

dah..ko yang tader..'

[INFO] Nitro has entered the realm.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[Necron killed by a wild cow at On the Field]

[INFO] Necron killed by a wild cow.

[INFO] Necron has just entered the realm.

You have been idle, and are pulled into a void.

[INFO] Nitro has left the realm.
[INFO] Xavier has left the realm.

[INFO] MightyBaby has entered the realm.

[INFO] MightyBaby has left the realm.

[INFO] Necron has left the realm.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[INFO] Necron has entered the realm.

Necron gossips, 'is there any immortal out here that can hear me..???'

Necron gossips, 'if u did hear me..plss give me str...im all alone here...'

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[INFO] Cool has entered the realm.

You have been idle, and are pulled into a void.

[INFO] Cool has left the realm.

[INFO] Cool has entered the realm.

[INFO] Cool has left the realm.

[INFO] Serpico has entered the realm.

[INFO] Sisco has entered the realm.

[INFO] Cool has entered the realm.

[INFO] Cool has left the realm.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[INFO] Serpico has left the realm.

[INFO] Thomas has entered the realm.

Thomas gossips, 'hail'

You have been idle, and are pulled into a void.

Thomas gossips, 'wonder if the new zones in yet'

Necron gossips, 'hello thomas..long time no see..??'

Thomas gossips, 'hail'

Necron gossips, 'where to..??'

Thomas gossips, 'exping'

Thomas gossips, 'trying to get to lv 95 so i be tough again'

Necron gossips, 'can i follow..?'

Thomas gossips, 'sure'

Thomas gossips, 'only 34 mil to go'

Necron gossips, 'hehehe...long way to go..'

Necron gossips, 'where r u..??'

Thomas gossips, 'healer'

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

Thomas congrats, 'necron'

[INFO] Necron has advanced to level 18

You have been idle, and are pulled into a void.

[Necron killed by a small xorn at Bottom of the Dark Pit]

[INFO] Necron killed by a small xorn.

[INFO] Necron has just entered the realm.

Thomas gossips, 'blah'

Necron gossips, 'haiya...too exausted..sorry...'

Thomas gossips, 'it's ok to many of them'

You have been idle, and are pulled into a void.

[INFO] Ronan has just entered the realm.

Thomas gossips, 'hail little one'

[INFO] Cool has entered the realm.

[INFO] Serpico has entered the realm.

Thomas gossips, 'hail little ones'

Serpico gossips, 'greetings'

Cool gossips, 'hail alll'

You have been idle, and are pulled into a void.

[INFO] Ronan has left the real

[Serpico killed by a woodworm hatchling at A Shaft In The Woodworm Tunnels]

[INFO] Serpico killed by a woodworm hatchling.

Thomas gossips, 'set up wimp'

[INFO] Serpico has just entered the real

Thomas congrats, 'necron'

[INFO] Necron has advanced to level 19

You have been idle, and are pulled into a void.

[INFO] Serpico has left the realm.

Thomas gossips, 'rent don't dc'

[INFO] Sisco has left the realm.

[INFO] Cool has left the realm.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[INFO] Necron has advanced to level 20

Thomas congrats, 'necron '

Necron gossips, 'thanxx..'

[INFO] Necron has advanced to level 21

Thomas congrats, 'necron'

Necron gossips, 'anxx..'

You have been idle, and are pulled into a void.

Thomas congrats, 'necron'

[INFO] Necron has advanced to level 22

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

Thomas congrats, 'necron'

[INFO] Necron has advanced to level 23

You have been idle, and are pulled into a void.

[INFO] Necron has advanced to level 24

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[NormalBobSmith [ip address edited out] new player.]

[NormalBobSmith advanced to level 1]

[INFO] Necron has advanced to level 25

Thomas congrats, 'necron'

Necron gossips, 'thanxxx..'

You have been idle, and are pulled into a void.

[INFO] Necron has advanced to level 26

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[INFO] Necron has advanced to level 27

Thomas congrats, 'necron'

You have been idle, and are pulled into a void.

[INFO] Necron has advanced to level 28

Thomas congrats, 'necron'

You have been idle, and are pulled into a void.

[Necron advanced to level 29]

[INFO] Necron has advanced to level 29

You have been idle, and are pulled into a void.

Thomas congrats, 'necron'

You have been idle, and are pulled into a void.

[INFO] Necron has advanced to level 30

[INFO] Antugile has entered the realm.

Antugile gossips, 'greeting thomas'

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[INFO] Nimitz has entered the realm.

Nimitz gossips, 'greeting'

Thomas gossips, 'hail'

Nimitz gossips, 'where r u thomas'

Thomas gossips, 'coming back to town in 2 secs'

Nimitz gossips, 'ok'

Nimitz gossips, 'wait u at priest'

Nimitz gossips, 'lol'

Thomas gossips, 'k'

Nimitz gossips, 'lagging'

Nimitz gossips, 'arghh'

Nimitz gossips, 'what r u doin at dump?'

Thomas gossips, 'changing to gain'

[INFO] Thomas has advanced to level 94

Nimitz congrats, 'thomas'

Necron congrats, 'thomas'

Nimitz gossips, 'u gain at dump? lol'

Thomas gossips, 'nope just stopped to change'

Nimitz gossips, 'come take me here.. me oso wanna level'

You have been idle, and are pulled into a void.

[INFO] Zeo has entered the realm.

Zeo gossips, 'hail all'

Thomas gossips, 'hail'

Nimitz gossips, 'hail remort'

[INFO] DaNiaz has entered the realm.

Thomas gossips, 'hail daniaz'

Nimitz gossips, 'pat daniaz'

DaNiaz gossips, 'hail all'

Nimitz gossips, 'lol'

DaNiaz gossips, 'dang ya Nimitz. wanna die'

Nimitz gossips, 'pat nimitz,, hail remort'

Nimitz gossips, 'geez lag'

You have been idle, and are pulled into a void.

[INFO] Necron has advanced to level 3

Nimitz congrats, 'Necro'

 [INFO] Zeo has advanced to level 59

DaNiaz congrats, 'Zeo'

Thomas congrats, 'zeo'

Necron congrats, 'zeo'

Zeo gossips, 'Thanks all'

You have been idle, and are pulled into a void.

[INFO] Nimitz has advanced to level 41

Zeo congrats, 'Nimitz'

Necron congrats, 'nimitz'

DaNiaz congrats, 'Nimitz sial la~'

Nimitz gossips, 'daniaz ahaha acidburn'

DaNiaz gossips, 'hehehhe where is FBT'

Nimitz gossips, 'not ere'

DaNiaz gossips, 'sorry la last night the Yong tau foo close la'

Nimitz gossips, 'thats why'

Nimitz gossips, 'haha'

Nimitz gossips, 'wasting my money'

DaNiaz gossips, 'why wasting?'

Nimitz gossips, 'ya la no yong tau foo'

DaNiaz gossips, 'lol...'

Necron gossips, 'good day everybody...'

Necron gossips, 'thanxx thomas...'

Nimitz gossips, 'buhbye'

Necron gossips, 'bubyeee...may the force be with u'

[INFO] Necron has left the realm.

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

Thomas gossips, '****RRRRROOOOAAAAARRRRRRR***'

Thomas gossips, 'mighty ogre almost back BEWARE'

Zeo gossips, 'lol..what'sup'

Thomas gossips, 'almost back to power hitter status'

Antugile gossips, 'heheh thomas r u roaring to invite HUGE TIGER to town?'

Zeo gossips, 'oh it's u?'

Thomas gossips, 'nod'

Thomas gossips, 'tell him to come '

Antugile gossips, 'hehehe'

Zeo gossips, '95 wield the exca'

Zeo gossips, 'hahaha'

Thomas gossips, 'i'll show him something'

Thomas gossips, 'grin'

[INFO] Zeo has advanced to level 60

DaNiaz congrats, 'Zeo'

[INFO] Thomas has advanced to level 95

Nimitz gossips, 'lagg.. argGhHH'

Zeo gossips, 'easier to die'

Thomas gossips, 'erk they lower excalibur big time?'

Thomas gossips, 'erk n/m'

Nimitz gossips, 'yea'

Zeo gossips, 'huh? is it?'

Thomas gossips, 'was fighting sanc mob lol'

Zeo gossips, 'hhehee'

Thomas gossips, 'wow a destroyt'

You have been idle, and are pulled into a void.

[Thomas killed by the aurumvorax at Lair Of The Aurumvorax]

[INFO] Thomas killed by the Aurumvorax.

[INFO] Thomas has just entered the realm.

Thomas gossips, 'nod'

Zeo gossips, 'lol'

Thomas gossips, 'sec'

Nimitz gossips, 'whoa'

Nimitz gossips, 'how come'

Zeo gossips, 'hehe Nimitz hiding urself?'

Nimitz gossips, 'kind of'

Nimitz gossips, 'ahah'

Nimitz gossips, 'damn this creature scary'

Thomas gossips, 'careiful it seen invis'

Zeo gossips, '*shake* Nimitz is scarier'

Nimitz gossips, 'Thomas die on the spot'

Antugile gossips, 'sum me'

Thomas gossips, 'can't summon we aren't cleric'

Nimitz gossips, 'pat antu'

Zeo gossips, 'keh keh keh'

You have been idle, and are pulled into a void.

Zeo gossips, 'who wanna sum?'

Zeo gossips, 'gewbar'

Zeo gossips, 'gewbar'

Master Kalten auctions, 'Thomas puts a long strip of Shuvanna bark up for sale, minimum bid 50000

coins.'

Master Kalten auctions, 'a long strip of Shuvanna bark is going once to no one for 50000 coins.'

DaNiaz gossips, 'lol'

Master Kalten auctions, 'a long strip of Shuvanna bark is going twice to no one for 50000 coins.'

Master Kalten auctions, 'a long strip of Shuvanna bark is going for the last call to no one for 50000 coins.'

Master Kalten auctions, 'a long strip of Shuvanna bark is SOLD to no one for 50000 coins.'

DaNiaz gossips, 'heh!'

[INFO] Nitro has entered the realm.

Thomas gossips, 'nitro u missed necron'

Nitro gossips, 'haaa?? he's my twin!'

Thomas gossips, 'hehe'

Zeo gossips, 'hahhaa'

Zeo gossips, 'brothers i c'

Nitro gossips, 'ahakk'

Nitro gossips, 'yah.. actually there r 3 of us..'

[INFO] Leperkorn has entered the realm.

Zeo gossips, 'plus Leperkorn?'

Leperkorn gossips, 'greeting all'

Nitro gossips, 'nope..'

Zeo gossips, 'hail Leperkorn'

Nitro gossips, 'lep is my very old friend'

Zeo gossips, 'bow Migthy warlord'

Leperkorn gossips, 'smile'

Zeo gossips, 'ur on candid camera'

Zeo gossips, 'hahhaa'

Nimitz gossips, 'hehe'

Zeo gossips, 'resident of the town, beware of Leperkorn'

Leperkorn gossips, 'hahahaha'

Leperkorn gossips, 'you think i'm a criminal?'

Zeo gossips, '*shake* just a reminder..coz u like to hunt MOB at the town'

Zeo gossips, 'hahaha'

You have been idle, and are pulled into a void.

Up since Fri Jun 14 19:51:22 2002: 2 days, 14:51

Leperkorn congrats, 'thomas'

Thomas gossips, 'nod'

Nimitz congrats, 'Thomas otai'

[Thomas advanced to level 96]

[INFO] Thomas has advanced to 96 level.

Zeo congrats, 'Thomas The Mighty'

Nitro congrats, 'Thomas'

Zeo gossips, 'Fear Thomas'

Thomas gossips, 'thanke'

[INFO] Valantriel has entered the realm.

Valantriel suddenly appeared from a swirling vortex!

Valantriel bows deeply.

Valantriel pats you on your head.

Valantriel studies the board.

Valantriel winks suggestively.

Valantriel leaves south.

[INFO] Zeo has advanced to level 61

Thomas congrats, 'zeo'

DaNiaz congrats, 'Zeo'

Nimitz congrats, 'zeo'

Zeo gossips, 'thanks'

[Thomas killed by the knight at Market Square]

[INFO] Thomas killed by the knight.

[INFO] Thomas has just entered the realm.

You have been idle, and are pulled into a void.

[Nimitz killed by the knight at Market Square]

[INFO] Nimitz killed by the knight.

[Nitro killed by the knight at Market Square]

[INFO] Nitro has just entered the realm.

[INFO] Nimitz has just entered the realm.

Zeo gossips, 'ALL Banzai'

Zeo congrats, 'Knight'

You have been idle, and are pulled into a void.

Zeo gossips, 'hahaha the Knight'

Leperkorn gossips, 'thomas'

You have been idle, and are pulled into a void.

Leperkorn gossips, 'too lagging'

Nimitz gossips, 'lag'

Zeo gossips, 'lol I think this MUD lag'

[(GC) Valantriel restores the world.]

Leperkorn gossips, 'thank'

[Antugile [209.132.070.078] has reconnected.]

Zeo gossips, 'tq'

Nimitz gossips, 'thanks'

Nitro gossips, 'ermm.. aahhhh'

DaNiaz gossips, 'thanks'

Leperkorn gossips, 'priest nitro'

[INFO] Hox has just entered the realm.

[(GC) Valantriel transfers Hox]

[INFO] DaNiaz has advanced to level 75

Zeo congrats, 'daNiaz'

Thomas gossips, 'hail hox'

You have been idle, and are pulled into a void.

[Nitro killed by the knight at Market Street]

[Nimitz killed by the knight at Market Street]

[INFO] Nitro has just entered the realm.

[INFO] Nimitz has just entered the realm.

DaNiaz congrats, 'Knight'

[Thomas killed by the knight at The Weapon Shop]

DaNiaz gossips, 'lol..my connection terrible'

Leperkorn gossips, 'come priest'

[INFO] Thomas has just entered the realm.

[Thomas killed by the beggar at Grubby Inn]

[INFO] Thomas has just entered the realm.

Zeo gossips, 'lol'

Nimitz gossips, 'where the beggar come from'

Leperkorn gossips, 'darn'

[Thomas killed by the knight at The Entrance Hall Of The Grunting Boar Inn]

[INFO] Thomas has just entered the realm.

Leperkorn gossips, 'lagging'

Thomas gossips, 'christ this laggg killing me'

DaNiaz gossips, 'me too'

Antugile gossips, 'nope'

Leperkorn gossips, 'arghh'

Leperkorn gossips, 'lagging'

You have been idle, and are pulled into a void.

You have been idle, and are pulled into a void.

[Vulrag has quit the game.]

Goodbye, friend.. Come back soon!

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