

**Online Digital Game-Based Language Learning Environments:
Opportunities for Second Language Development**

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

This dissertation project is an analysis of the language learning processes of 14 learners playing in and interacting with the massive multiplayer online role-playing game (MMORPG) *World of Warcraft (WoW)* in German in order to determine how second language development (SLD) emerges.

The data for this study was collected from the in-game experiences and out-of-game conversations of students at the University of Waterloo over the course of four months. Participants were asked to play the game in an extramural setting without any instructor intervention; the only stipulation was that each participant played a minimum of 10 hours. Three times throughout the course of the study, participants met in small focus groups to discuss their gameplay experiences in German. By doing so, the near transfer of linguistic constructions from the gaming context to the out-of-game environment could be observed as evidence of SLD.

A complex adaptive systems (CAS) theoretical framework was employed to analyze the language learning and gameplay trajectories of the learners. All language that was observed and produced was recorded and transcribed in order to determine to what extent the transfer occurs while playing *WoW*, and which type of language learner and approach to gameplay is optimally suited for extramural digital game-based language learning (DGBLL).

Pairwise comparisons were conducted for which eight participants were studied in detail. Each individual's gameplay and language learning experience resulted in the computation of an efficacy score, representing how much linguistic growth occurred relative to the amount of language production that each individual contributed in the in-person or online conversations. By analyzing the efficacy of the learners' trajectories through a retrodictive qualitative modeling methodology, whereby the process of analysis is reversed so that the outcomes of the system are considered first, each learner's SLD is traced back to determine which factors and experiences emergent in DGBLL influenced change and growth.

The results of this study position MMORPGs as well-suited for SLD in extramural contexts so long as learners are given the opportunity to communicate about the game with fellow players or language learners. If this condition is met, and individuals are given the opportunity to experience the game at their own pace, learners are able to successfully transfer linguistic constructions from the gaming context to the out-of-game environment.

Fundamentally, the analysis of these results reveals that due to gameplay and language learning trajectories being nonlinear, a CAS conceptualization of gameplay for SLD purposes is necessary to understand the many factors and influences which lead to development and change within the system. Each learner's efficacy score proves to be a valuable means by which to gauge the SLD of each learner over the course of the gameplay experience, suggesting that certain factors, such as the amount of time spent playing the game, and the learner's previous experience learning languages and its relation to his or her rationale for studying German, are worth researching in order to best understand the growth conditions which will lead to SLD in DGBLL.

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Dedication

I dedicate this dissertation to my wife Danielle, daughter Charlotte, and son Elliot, for their support and understanding as I completed this Ph.D.

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List of Abbreviations

Acronym	Full name	Definition
DGBLL	digital game-based language learning	“the design and use of a diverse array of digital games for the purpose of learning or teaching a second or foreign language (L2)” (Cornillie, Thorne & Desmet, 2012)
CALL	computer-assisted language learning	“a relatively new and rapidly evolving academic field that explores the role of information and communication technologies in language learning and teaching” (Joint Policy Statement of CALICO, EUROCALL, and IALLT)
MMORPG	massive multiplayer online role-playing game	“immersive, graphically rich 3D environments in which many players from geographically distinct locations can navigate the game space and interact via digital characters known as avatars, thus offering the opportunity for a great deal of informal, contextualized interaction in a learner’s target language, including interaction with native speakers” (Rama, Black, Van Es & Warschauer, 2012)
SLD	second language development	“a theory of SLD describes and ultimately explains the development and use of more than one language in individuals” (de Bot & Larsen-Freeman, 2011)
COTS	commercial-off-the-shelf	“games... developed by companies who know how to build effective, engaging, entertaining games; using them relieves teachers of the need to become game developers and programmers in order to use games in the classroom” (Van Eck, 2009)

Chapter I: Introduction to the Study

Playing Games and Learning a Language

Playing a game and learning a language. These two concepts should not seem disparate. We know from our own experiences that games play an integral role in childhood development as the imagination runs wild and simple games and roleplaying help children make sense of the world, learning not only by doing, but by having fun. Indeed, as Ang and Zaphiris argue, “game playing is a vital educational function for any creature capable of learning” (2006, p. 2).

The Federation of American Sciences, in 2006, stated that “people acquire new knowledge and complex skills from game play, suggesting gaming could help address one of the nation’s most pressing needs – strengthening our system of education and preparing workers for 21st century jobs” (p. 3), signifying that once a taboo subject (see Chik, 2012), gaming has now subverted the general consciousness and is perhaps seen as a beacon of hope, as a way to encourage and motivate learners to invest the extra time that is being arguably stolen by the same savior: technology. Indeed, in the educational context, no longer are games simply an activity used at the start of a class to break the ice or to pass time when there is nothing else planned (Thomas, 2012) – games are pervasive, complex, and increasingly compelling tools for learning. For these reasons, it is worth exploring how playing games in a second language (L2) may exhibit and influence similar opportunities for learning.

Exploring the trajectory which computer-assisted language learning (CALL) in general has followed provides insight into why digital game-based language learning (DGBLL) is now receiving the attention that it is. It is no surprise that this comes with the proliferation of web 2.0 and social media coinciding with the processing and graphical prowess that digital gaming can benefit from. In short, digital games are gradually broadening the ways in which individuals can not only interact with virtual worlds, but also with other players within that world on a global scale. Communication is at the forefront of many digital games, whether that is by playing side-by-side with a friend, or with other individuals online who reside around the world. Furthermore, distinctions between playing and learning are being deconstructed, as both

actions can contribute to the same goal of second language development (SLD) (Cornillie, Thorne & Desmet, 2012).

Language use, in turn, shares many of the same traits as playing a game; just as a player is immersed within a vibrant virtual world that he or she must make sense of through visual and linguistic cues, language itself, as Ellis and Larsen-Freeman explain, “represent[s] the world as we know it; it is grounded in our perceptual experience” (2009, p. 91). Language learners and game players alike navigate, process, and construct the world in which they find themselves immersed in through language. As properties emerge in our language learning and gameplay processes, we make sense of them and they in turn transform subsequent iterations of these same experiences, affecting change in these processes; completing a quest or navigating a new area in the game happen so frequently that each iteration brings to light new avenues to complete the task and further exposure to language. According to Sundqvist and Sylvén, “that there is a relationship between gaming and L2 learning seems indisputable” (2012b, p. 204). While I agree with their claim, there remains a need to do additional research that substantiates this rather bold statement.

With theories of second language development pointing towards the emergent properties of language and the sociocultural determinants involved in learning a language, a newly found emphasis on the communicative potential found in gameplay situations proves intriguing. A number of recent studies have examined the role that digital games can play in the SLD process (see Cornillie et al., 2012a; Rama et al., 2012; Zheng et al., 2012; Holden and Sykes, 2013; Reinders and Wattana, 2012; 2014, for example). These studies all have a similar focus, in that they qualify the level of success that learners have in developing their L2 through the tools and affordances that the digital game employs. The findings are proven to be largely positive in the majority of these studies (which will be explored in more detail in the literature review), but they are constituted by and large through the qualitative perspectives of the players themselves. A longitudinal, empirical analysis examining the actual process of gameplay and SLD is often absent, which is a concern for the validity of DGBLL in future SLD endeavors.

Yet before we delve into discussions concerning the many potential factors that impact DGBLL, it is worthwhile to consider the role digital games have in learning environments.

Why Games?

Blake may have said it best: “[G]ames have the potential to combine the best of what has been developed over recent years in tutorial CALL programs with the attractive affordances provided by social computing” (2011, p. 27). The affordances of digital gaming are therefore not unique – in fact, the primary features and aspects of digital gaming which players find so appealing can be extrapolated from current research of best practices for CALL and SLD in general. The importance of interaction, target language input and output, as well as task-based learning are all common features in massive multiplayer online role-playing games (MMORPGs) (Sundqvist and Sylvén, 2012b). MMORPGs offer game players and language learners alike an immersive, vibrant virtual world in which an individual can reside, simultaneously playing a digital game while also interacting with other like-minded players of the game, all within the L2. The game and its challenging gameplay encourage, and at times necessitate, teamwork and communication between players, making it ideal for play in the target language. As Rama, Black, van Es, and Warschauer state, “from the moment a game starts, players are immersed in a target language context where they have multiple options for engaging in authentic communication via speaking, reading, writing, and listening with a range of interlocutors, often in ways that allow risk-taking and reflection in the target language” (2012, p. 335). It is for this reason as well that language learning is understood as second language *development*, rather than second language *acquisition*; a continual process of development with its many contributing factors, rather than an eventual state of acquisition, should be the focus of analysis. This distinction, and its implications, will be the subject of further discussion later.

Thomas, Reinders, and Warschauer write that “at the heart of social CALL are pedagogies allied to encouraging higher-order critical thinking rather than a narrow subset of discrete skills like grammar, spelling and text decoding” (2013, p. 7). Utilizing online games like MMORPGs in SLD addresses this goal rather efficiently, as the game itself requires much more

than a single skill to be successful, and often requires a combination of at least reading, writing and listening to navigate the game world and communicate with other individuals.

It recognizes the potential of digital gaming, but also understands the struggle that researchers face in emphasizing this potential, arguing that “although, as researchers, we may recognize the learning potential of games, this recognition alone does not change the structural conditions that insist on the bifurcation between entertainment and education and correlate only academic content with education success” (2008, p. 114). While games may seem contrary to what one thinks of as a traditional form of language learning, they need not be, and as Chik maintains, “L2 learning is not completely incidental, especially when gamers apply language learning strategies learned from school to L2 gaming” (2014, p. 96). The question then becomes whether or not the language observed and produced in the game environment can be transferred to non-gaming contexts as a result of near transfer (Barnett & Ceci, 2002), or the process whereby knowledge or skills are able to be transferred between similar contexts. Furthermore, Chik suggests that games can provide learners with the opportunity to take on an instructional role by assisting other game players in a variety of different media, be it within the game environment, or external to the game world on a discussion board or wiki (Chik, 2014). This instructional role is further supported by the game and game environment, and results in a community which Gee (2005) defines as an *affinity space*.

The affinity space is structured due to a common shared interest between individuals interacting while engaged in a mutual activity, whether virtual or physical. It therefore has no set boundaries, and affiliation to the space is a product of a general interest, with no formal qualifications or specifications necessary to gain acceptance in the space. Unique as well to the affinity space is the value placed on experience, rather than power or a perceived hierarchy of individuals who control the knowledge of the space (Gee, 2005). For MMORPGs, this means that due to the individual and unique experiences of each player of the game, all experiences are valued and help to construct knowledge in the affinity space.

The digital game itself is not the sole locus of the affinity space either; online discussion spaces, wikis, informal chat rooms all contribute to the affinity space and aid in further

constructing knowledge (Steinkuehler, 2007). Conceptualizing an MMORPG as an affinity space therefore acknowledges the diverse skills and experiences that each player brings, as well as the dynamic and nonlinear change that constantly occurs as players bring new experiences to the space.

With this considered, and with the proliferation of research in DGBLL and the means by which we can conceptualize the digital gaming experience, especially within the last decade, there still remains an overt lack of empirical research that helps to establish the validity of the field and DGBLL in general, at least beyond seeking learner-reported results. Hays, conducting a meta-analysis of primarily instructional games, notes that very few studies examine the lived-experiences of gamers as they are actively playing the game; out of 270 documents reviewed concerning gameplay for instructional purposes, only 48 studies were found to contain empirical results (2005, p. 43). There are many calls by researchers to explore varied aspects of games for language learning potential: learning patterns and learner orientation emerging from gameplay (Cornillie, Clarebout & Desmet, 2012), and user behavior and game resources (Godwin-Jones, 2014), are clear indications that further research into specific user experiences that can be documented through gameplay are required. Stories and learner-related experiences can only do so much to demonstrate the validity of digital gameplay in education/CALL; what is ultimately needed are empirical studies that can substantiate, in conjunction with learner gameplay experiences and results, what occurs in the game, how learners manifest themselves as game players, and what language proficiency development ultimately occurs.

Sykes, Reinhardt, and Thorne (2010) point to the utility of analyzing digital games as both goal-directed and social activities, and Peterson (2013), in his recent book, *Computer Games and Language Learning*, outlines additional areas of potential future research for DGBLL. These are:

- In-game activities (the specific tasks that learners complete in game, such as role-play and social interaction while completing quests).
- Educator roles (the integration of games in the language classroom and how the instructor acts as trainer and debriefer).

- Modified games (adapting commercial-off-the-shelf ((COTS)) games for the language classroom).
- Gaming in informal contexts (benefits of extramural activities).
- Learner variables (to what extent do factors such as previous gameplay experience and proficiency level impact gameplay success).

My research aims to specifically tackle these last two potential areas, examining the role a MMORPG can play in extramural settings (not as a component of a traditional language learning classroom), as well as how individual learner variables may influence second language development over the course of gameplay. Positioning the DGBLL experience within the game environment, and the emerging interaction which develops, within a complex adaptive system (CAS) perspective allows for a detailed, non-reductionist analysis that will attempt to take into account as many factors and variables as possible to understand the change and SLD that occurs. Johnson describes the emergent features of CAS in relation to games themselves, stating that “emergent behaviors, like games, are all about living within boundaries defined by the rules, but also using that space to create something greater than the sum of its parts” (2001, p. 181). Games can therefore facilitate learning by creating opportunities to go beyond one’s current understanding and attempt new approaches to SLD.

The Study

This dissertation intends to contribute further empirical research to the field of DGBLL. The social stigma (Chik, 2012) attached to gaming culture which has been eroding still certainly exists to an extent (see Steinkuehler, 2007; Rankin et al., 2008; Chatfield, 2010), so in an effort to examine the affordances of DGBLL, its efficacy must be explored in depth and validated appropriately. My research study attempts to do just this – by not only exploring the characteristics of each language learner/player and what attributes affect the gameplay experience and its potential for SLD, but also empirically determining if the participants are able to transfer linguistic constructions from the gaming context to non-gaming contexts – in other words, can they use the language which they were exposed to while playing the game in a non-game context. *World of Warcraft (WoW)*, easily the most successful and probably most

influential of all MMORPGs¹, has localized the game in numerous languages, making it the most appropriate choice to adopt in this research study. Its prominence in DGBLL research is also a beneficial factor for considering its use, as it also has been observed in the literature as having potential for SLD research; Thorne, Fischer, and Lu argue that “*WoW* would seem to present a diverse and linguistically complex social-semiotic environment for L2 learners of English” (2012, p. 298). While they situate their research in the English-speaking domain, *World of Warcraft*’s global nature permits similar claims to be made for learners of other languages such as German, as I will argue.

By tracing each player’s gameplay and SLD trajectory, and then looking back at the individual learner factors and other variables within the process of playing the game that may have contributed to development in L2 proficiency, we can begin to observe that there are certain factors and learner characteristics that lend themselves more appropriately to benefiting from DGBLL. Indeed, Zheng, Newgarden, and Young write that “*WoW* and other MMOGs [MMORPGs] adopted as learning environments bring narrative structure, interactional constraints, drama, fun and challenge that may be critical factors in engagement and learning” (2012, p. 358). I would however approach this even more liberally, removing the learning environment adoption and instead positing that these online game worlds can, with the appropriate support and social context existing both within and outside of the game, provide a beneficial learning environment for players and learners alike.

To substantiate and explore these claims, this dissertation poses the following research questions:

- To what degree do language learners’ trajectories of gameplay interact with their trajectories of SLD?

¹ See https://superdataresearch.com/content/uploads/2014/06/SuperData-Top10SubscriptionMMOs_Worldwide.jpg

- Can the near transfer of linguistic constructions be observed in the language that players speak in contexts that are removed from the online gaming environment? If so, what kind?
- How can complexity theory substantiate and corroborate the nature of online games for SLD?

In many ways, these research questions are a direct result of the current discourse surrounding DGBLL. As mentioned previously, calls have been made for systematic, empirically-founded analyses that take into account more than just introspective learner responses (see Sykes and Reinhardt, 2013), and although research into DGBLL is certainly becoming ever more prevalent, there is a distinct need to understand how gamers actively engage in the gameplay experience for SLD purposes (Chik, 2014). Furthermore, the complexity of digital games is well-documented, and the necessity to understand their implications for SLD is well-established and encouraged (Sykes & Reinhardt, 2013).

Complexity theory provides a meaningful framework in which we can root our understanding of not only what learning an L2 entails, but also the very nature of playing online games in general. Both endeavors – learning a second language and playing an online game – entail many of the same attributes. Both processes are dependent on the initial conditions of the system – who are the language learners/players engaging in the system, and when development occurs, which conditions can be attributed to that change? Each system is interconnected and development within the system is nonlinear too; an individual’s progression will not proceed in a linear fashion as one might expect from a closed system, and rather, there is no way of knowing what trajectory the CAS will take; many factors within the CAS will lead to self-organization of the system as it “continues to change and adapt as its dynamics are ‘fed’ by energy coming into the system” (Ellis & Larsen-Freeman, 2009). We are at a stage however where complexity theory research within the humanities and social sciences is still very much in its infancy (Dörnyei, 2009), and due to the rigor necessary to undertake an appropriate study of this nature, frameworks providing specific guidance as to how to establish a methodology for SLD purposes are scarce.

It is my goal in this research study to ensure that my research acknowledges and appreciates the complexity inherent in SLD and DGBLL, and considers all potential factors as influencing the trajectories of change which occur. A CAS framework, aside from its orientation to the entirety of the interconnected system and the complexity which results from a game like *World of Warcraft* and the interaction in the target language that emerges within the game, is also ideal due to its methodological benefits, such as its focus on detailed, longitudinal, time-series approaches (Larsen-Freeman, 2008b). This suggests that a study which attempts to track, in detail, the development and change of its participants on an individual-by-individual basis is ideally suited to a CAS theoretical framework. As Larsen-Freeman argues with regards to the specific task of analyzing and understanding complex adaptive systems in applied linguistics, “we will want to identify variability around stable modes of behavior in order to know the possibilities for future change” (2008a, p. 56).

To do so, a dual approach, combining both comprehensive data collected from gameplay experiences, as well as participant response data to better understand the learners’ approaches to the gameplay experience and its relevance for SLD, will ensure that the attained results are reliable and can provide an accurate indication of the gameplay process’ effectiveness.

Analyzing participant response data contributes to our understanding of individual language learners, both in terms of what they bring to the study, as well as their perspectives after the completion of the research study. Specifically, I seek to better understand who these language learners are as they begin the process of playing a game for SLD purposes; what experiences do they bring to this process in terms of their previous language learning and gaming experience, and what influence does this play in their SLD while playing online digital games. Assumptions may be made that participants with previous gaming experience will naturally perform better or find this approach to language learning more efficacious, but is that truly the case? Their reflections about the gaming experience before, throughout, and after the completion of the study help to substantiate each individual participant’s trajectory of gameplay and SLD.

This data is further corroborated with empirical results ascertained from the participants playing the actual online game and interacting with the virtual world, whether that comprises the characters that reside within the game, or other players living in German-speaking countries who are playing for entertainment purposes. Regardless of the type of interaction that occurs in the game, all language observed and produced by the participant is recorded and logged for analytical purposes. This is not sufficient, however, as game-based language interaction alone cannot necessarily account for whether or not a language learner has indeed developed increased proficiency in the L2. For this reason, all participants engage in small, in-person (and in some cases, Skype) group conversations evenly spaced throughout the study to discuss their gameplay experiences in the German language. By engaging in such conversations, participants can attempt to employ the language encountered in-game in an out-of-game context, thus demonstrating not only their ability to transfer linguistic constructions in the target language, but also transfer the medium of language use from written reception/production to oral reception/production.

The necessity to share gameplay experiences is in fact a vital aspect of how DGBLL can be effective. The act of playing the game itself introduces the player to the language as it is employed in the game, but the experience of playing the game alone to reinforce the language that was encountered is not sufficient. Gee's (2008) means of differentiating between what we mean when we speak about games helps to understand the relevance of interaction and sharing of experiences. For Gee, games can be understood in the traditional sense, as a vehicle for entertainment purposes; as a digital medium which individuals play either alone or with others, either locally or through an internet connection. This is categorized as a *game*, or the little-g game, and is essentially the physical product itself. This is contrasted to its counterpart, the big-g game – the *Game*². The social implications of the Game are of utmost importance when discussing what a game entails and what affordances accompany the gaming experience. Rather than viewing the game as a piece of technology, produced by developers for the express

² For the purposes of this dissertation, all references to games will be written with the lower-case g for the sake of readability. I utilize the term however with Gee's (2008) understanding of the social importance of the experience, and not the physical product itself.

purpose of entertainment, the Game takes into account the many social venues which are used to construct the gaming experience and its discourse. Rarely is a game played in isolation; a player may want to discuss strategy on a discussion forum or via a social network like Facebook with his or her friends. Some games have dedicated wikis that players contribute to in order to share advice, or have independent chat channels that players can join if invited to. All of these various venues for further discussion about the game contribute not only to the Game's community, but also to the Game itself; often developers read the discussions and input by players which can directly impact future development in the game, implying that the process of playing the game is impacted by the very experience of playing the game itself.

MMORPGs extend the social element of the game even further, allowing and encouraging discussion about the game within the game itself, enabling a meta-discursive environment to exist. While players certainly discuss the current game that they are playing (either in terms of what they want to do or perhaps to barter and trade items with fellow players), the vast majority of time is spent discussing similar topics as are discussed in these external discussion areas. This entails chatting about playing the game in general, basic strategies for competing with other characters, as well as topics removed from the game, such as other digital games or activities in daily life (see Thorne, 2008a). Ultimately, the language encountered within the game is therefore not entirely contextually-driven or oriented, but rather is comprised of whatever topics the players themselves wish to converse about. In this way, MMORPGs provide an environment offering entertainment and driving motivation, allowing players to be immersed in a visually stimulating world while having the ability to construct an avatar whose identity is open to a wealth of possibilities (Koo, 2009).

For these various reasons, DGBLL should not be conceptualized as irrelevant, or worse, unapproachable for the majority of language learners. Reverting back to the assumed social stigma attached to these games (Chik, 2012), all too often are they discredited for not being intended for the majority of individuals who would otherwise be inclined to learn a foreign language. As will be discussed in-depth, the participants of this study with their varying language learning and gaming backgrounds each uniquely approach the game. A game such as

WoW, and other MMORPGs that exist and function in a similar manner, do not have a single focus. The enormous, vibrant game world that the players inhabit can be explored at length, and a player can become easily lost wandering through distant and varied lands. An immersive and engaging economy can consume much of one's time, bartering and wheeling virtual goods with other players. There exists an entire, complex social aspect to the game in the form of guilds – groups of like-minded players banding together to form a tight-knit community. Members of the guild help one another with quests and dungeons, but often spend many an hour just sitting in a virtual pub and chatting with one another about topics completely unrelated to the game.

Yet even with the multimodal strategies of play, there are aspects of this game, and many digital games, that remain controversial. Specifically, issues surrounding the violence that is thought to be central to the game's identity can at times cloud the otherwise beneficial and less-hostile nature of the game. Questions surrounding the treatment of gender and the game's representation of females are often brought up as well. Does the digital game treat women unfairly or sexualize them unnecessarily? The roles of violence and gender are often mulled over by critics and observers, but we should also consider how the players themselves react to these perceived notions of violence and gender-bias. Do any of these factors distract an individual from playing, enjoying, or learning from the game? These notions will be explored to some extent as they too can potentially impact these participants and their ability to develop second language proficiency.

Chapter Outline

I begin this dissertation by examining the research literature of the two theoretical frameworks which form the foundation of this study.

Chapter II focuses on digital game-based language learning and its application within CALL, with specific attention paid to research areas that are directly aligned with the scope of this project, namely: the role of DGBLL in MMORPGs, its potential for vocabulary development, its support for near transfer, and its application in extramural settings. Five core

research studies which examine more than one of these research areas will be analyzed in detail to better understand the current state of research as is applicable to this study. Other prominent and important studies will be alluded to as well in an effort to accurately depict the current state of DGBLL research.

Chapter III reviews relevant research in the field of complex adaptive systems. The core characteristics of CAS will be discussed and related to applications in DGBLL and general education. Usage-based grammar, an insightful theory by which we can understand the emergent properties of language, will also be defined and explained as it will serve to operationalize the phenomenon of near transfer from gaming to non-gaming contexts.

Chapter IV shares the methodology and group-level results and serves two purposes. Firstly, the design of the study will be explained in full, with each step of the research process detailed and the types of questions and data collection methods employed expanded upon. Subsequently, the initial group-level results will be revealed and the selection criteria for the four pairs of participants to be analyzed in detail will be explained.

Chapter V contains the analysis and discussion of these results, focusing on the eight participants and their gameplay experiences. All instances of language use that were observed and produced in-game, as well as in the out-of-game setting, will be analyzed in order to answer the research questions outlined above. This is accomplished with longitudinal data which reflects the complex and non-linear nature of both language learning and gameplay. Ideas for intervention and implementation in other contexts will be shared, and conditions which best lead to success in DGBLL will be suggested.

Chapter VI will offer a conclusion to the study, drawing back together these various results in order to summarize the contributions of this dissertation to DGBLL, as well as discuss which approaches to research are recommended to further investigate the validity of DGBLL in extramural settings.

Summary

Digital gaming is only becoming more ubiquitous and scholarship in CALL has demonstrated the powerful effects of computer-mediation for SLD. If gameplay experiences can be harnessed by the learner/player and be performed in the target language, we must then consider how best to use these experiences so that they are as advantageous to the learner as possible. If we are to truly find utility in DGBLL, we must understand its use in extramural settings as a means to extend the language learning process to environments beyond that of the traditional classroom so that these learners can be immersed in a digital language learning experience.

Finally, I would emphasize that my argument is not for the sole usage of digital games for SLD purposes. Regular instruction in the foreign language, task-based language learning opportunities, and study abroad—all these and others play prominent roles in a language learning experience, and as Reinders cautions, “games are only one element in a much larger ecology of learning and teaching, and they need to be understood and developed as such” (2012, p. 7). Nonetheless, thoughtfully developed digital games and properly substantiated gaming experiences which allow for communication in the foreign language can play a crucial role in SLD, and it is my hope to better empirically explore just how exactly this process functions.

Chapter II: Digital Game-Based Language Learning

The Emergence of Digital Game-Based Language Learning

The emergence of digital game-based language learning can be largely tied to the evolution of CALL in general, which in turn is marked by substantial innovations in technology, allowing for more varied ways of developing a second language through technology-mediated means. These innovations have various implications for how DGBLL has emerged and developed as a field, as well as the ways in which games have been able to capture the imagination of both educators and game designers.

The diversity with which DGBLL has been theorized and analyzed means that there is currently no specific theory that can be applied to the study of digital games for language learning purposes. A similar trend is evident in research in CALL in general, yet CALL has benefitted from ample scholarship applying many theoretical frameworks (Hubbard, 2009) such as the interaction hypothesis (Smith, 2003; Chapelle, 2005), activity theory (Blin, 2004), and sociocultural theory (Thorne, 2008b). DGBLL has yet to be analyzed with this level of diversity; research has focused instead on either the qualities of games which are most relevant to language learning (Gee, 2008, Sykes & Reinhardt, 2012), or on the language learner's self-reported perceptions of the efficacy of gameplay for SLD purposes (Peterson, 2012; Allen et al., 2014).

The field of DGBLL is relatively new (see Morrison, 1984; Culley et al., 1986; Jones, 1986 for earliest examples of DGBLL) and still expanding as researchers' understanding of gaming grows. The path to online game implementation within the CALL context is one which has been met with reservation and reluctance. Thorne, Black, and Sykes reiterate this claim, citing the dismissive impression instructors have of online games as they argue that "it is troublesome...that digital vernaculars remain largely unaddressed within instructed L2 curricula or, worse, are trivialized or vilified as stigmatized varieties" (2009, p. 815). To some extent, this is simply due to a generational shift, whereby instructors have not explored the

efficacy of these tools in the same way that they may have with computers in general; certainly CALL's general acceptance and growth is much more established than that of DGBLL.

The growth of CALL, and more recently, DGBLL, is nonetheless impressive (see Reinders, 2012; Cornillie et al., 2012a; Sykes & Reinhardt, 2013; Peterson, 2013); Levy explains that, “a diffusion effect can be identified in CALL, where ideas tried out in well-funded, large-scale projects have spread over a relatively short period of time to the population at large” (1997, p. 41). Whereas Levy speaks in more general terms about the emergence of new programs and projects designed to engage a learner in language instruction, the focus of this chapter will be on innovations which are game-based in nature, or those which are evidently key tools that have helped to construct the DGBLL landscape which exists today.

What is more, the diffusion effect which Levy referred to in the 20th century currently remains strong. It can be argued that its effect is even more pronounced due to the advent of mobile technology and social-networking, which has had an enormous effect on how games are created, and thus, their implications for DGBLL, as seen with the emergence of synthetic immersive environments (Sykes, Ozkoz, & Thorne, 2008) and MMORPGs in general – two game-based virtual environments that facilitate interaction amongst learners, and which will be explained in more detail shortly.

I will begin by explaining the characteristics of games which are relevant for SLD, and I will then explore four areas of research that are applicable to the study of digital games for L2 learning:

1. DGBLL in MMORPGs.
2. DGBLL and its potential for vocabulary development.
3. DGBLL supporting near transfer to non-gaming contexts.
4. DGBLL in extramural settings.

By focusing on five studies that incorporate a combination of these various areas of research, and by analyzing numerous other studies that reflect the field of DGBLL in individual areas, I will argue that studies which concentrate on these four distinct approaches to research in DGBLL in conjunction with one another will allow for a comprehensive understanding of DGBLL's relevance and efficacy.

Characteristics of Games for SLD

As I begin to analyze the major contributions to the field of DGBLL, it is imperative that the underlying rationale behind studying digital games for language learning purposes is made clear. The majority of gaming-related research and gameplay experiences in general can be classified by one of two primary paradigms: *playing to learn* and *learning to play* (Arnseth, 2006; Reinhardt, 2012). Playing to learn assumes an educational focus and is central to the gameplay experience; the game's goal is to facilitate learning, and playing becomes a side effect or hopeful consequence of the learning process. Educational games are the primary example of this paradigm put into effect, as learners are asked to play a game for a specific learning goal. Play, as a result, becomes secondary to learning. Its counterpart, learning to play, positions play as the focused-upon goal, and learning becomes a by-product or hopeful consequence of the experience. Commercially available games underlie this approach to learning, as such games are produced with entertainment solely in mind, and it is the learner or instructor's task to find ways to appropriate the game for SLD. This can be accomplished, however, either in formal learning contexts (such as the classroom), or informal spaces such as online communities, wikis, or the online gaming environment itself.

The utilization of commercial games presents unique opportunities for the field of DGBLL. Reflecting on the state of what can only be described as the origin of DGBLL, Ito recalls that "a few decades ago, the idea of consumer software designed for the education, entertainment, and empowerment of children was barely a glimmer in the eye of a few innovative educators and technologists" (2008, p. 89). Much has since then been researched concerning elements of good games and good game design that is attributable to good learning; Prensky (2001) offers a

widely-accepted list of qualities that good games offer which lend to the overwhelming popularity of modern-day gaming. These include

- fun,
- play,
- rules,
- goals,
- interactivity,
- outcomes and feedback,
- adaptability,
- win states,
- conflict and competition,
- problem solving, and
- representation and story (Prensky, 2001).

Certainly, common trends can be seen amongst these aspects, such as the social element of gameplay, the provision of feedback, and the inherent fun that is derived from engaging in an experience that combines play and challenge in such a way to reach a state of flow, or a state in which “a person’s skills are fully involved in overcoming a challenge that is just about manageable” (Csikszentmihalyi, 1997, p. 30). Prensky's core attributes can be readily found in literature examining digital game-based learning, but they are admittedly removed from the specific SLD context which may have specific intricacies that are not immediately relatable to general educational contexts. Win states, for example, are difficult to conceptualize within education, as there is no specific point at which a student can claim they have done so well or have learnt enough as to have *won*. Many others, such as fun, play, interactivity, and adaptability, are however likely highly relatable to conducive language learning environments.

Others scholars have looked to literature espousing the benefits of games in various research studies to construct lists of good game characteristics. After reviewing the literature surrounding game-based learning in educational contexts, Vandercruysse, Vandewaetere and Clarebout (2012) proposed a comprehensive list of elements which good games incorporate, while also relating their presupposed benefits (see Table 1). These include:

Table 1

Important game elements and their presupposed benefits (Vandercruysse et al., 2012)

Game elements	Presupposed benefits
fun or enjoyability	<i>enjoyment, pleasure, motivation</i>
rules	<i>structure</i>
goals and objectives	<i>motivation, stimulation</i>
interaction/interactive	<i>being active, interacting with others</i>
outcomes and feedback	<i>learning, informing about progress</i>
problem solving/competition/challenge	<i>adrenaline, excitement, creativity</i>
representation/story/fantasy/context	<i>emotion (enthusiasm), stimulation</i>

These game elements are similar in nature to Prensky's (2001), yet more refined. They also, however, leave out potentially important motivating factors such as win states and adaptability, elements which players with ample game experience would come to expect in a game that is meant to provide lasting entertainment and encourage replayability. This may be in part due to the focus of their systematic review of game-based literature on educational games, games which due to basic financial and computer limitations in their development cannot readily incorporate more advanced aspects such as win states and adaptability. Simply put, the literature surrounding educational games would be hard-pressed to understand how these aforementioned elements relate to learning as these games cannot readily incorporate them in a comprehensive manner, often having to focus on a limited number of game elements.

Other scholars have hypothesized similar lists of characteristics that games embody which lend themselves to learning experiences. Gee (2008) offers a list of five experiences that are aspects of a well-designed game, and as a result, useful for learning. These experiences can be summarized as

- Structured by specific goals.
- Open to interpretation.
- Provide immediate feedback.
- Ability to apply information learnt from feedback to new situations.
- Possibility to learn from both interpretations and other individuals, whether peer or experts (Gee, 2008).

These experiences can be aligned with those developed by Prensky (2001) and Vandercruysse et al. (2012), and accurately portray a set of agreed upon characteristics that researchers need to look for when determining what types of digital games should be recommended in language learning contexts. Prensky (2001) himself states that not all games will incorporate all of these features, and yet, if we want to engage our learners in experiences which will be beneficial for SLD, it is imperative that the chosen game encompasses as many of these features as possible. Gee's (2008) characteristics clearly focus on the learner's learning experience and how he or she interacts with the game, rather than the game itself, examining functions like how a learner might interpret the game and what information from the game world can be attributed to other situations.

Of these multiple conceptualizations of effective game characteristics, both in general and applied to learning contexts, Sykes and Reinhardt's (2013) are most appropriate and applicable to the specific context of DGBLL. Five central concepts are argued to be found in both SLD and DGBLL contexts, and are attributable to aiding the development of a second language. These are

- goals,
- interaction,
- feedback,

- context, and
- endgame (Sykes & Reinhardt, 2013).

Sykes and Reinhardt's core concepts are again largely identifiable when compared to Prensky's (2001), Gee's (2008), and Vandercruysse et al.'s (2012) characteristics, with the addition of the game's endgame being a central concept applicable to good game design. Each of these will be explained in detail and related to specific SLD contexts.

Goals refer to the primary task that the learner must complete in the game, and similar to SLD, the task is central to learning and utilizing the target language in authentic and appropriate contexts. Yet unlike the tasks that learners are presented with in a traditional classroom, Sykes and Reinhardt explain that the intrinsic learner-focused nature of games addresses the lack of agency afforded to the students, providing them instead with a choice as to how to progress; as a result, "goal orientation becomes a dynamic, negotiated, and continuous process, better understood as **goal orienting**, as a player constantly reassesses abilities, risks, challenges, and rewards while playing" (2013, p. 20). The ability to understand these goals and properly decide and evaluate how to accomplish them requires a certain level of proficiency in the L2, and the ability to negotiate meaning even when all aspects of the task are not completely understood.

Interaction is another key element of the language learning process, and in good games, it plays an influential role. Seeking to eliminate the stigma attached to gaming in general, multiplayer gaming (wherein two or more individuals, either in the same location or online, play the same game together) is emphasized for its ability to encourage interaction amongst players in order to succeed and advance in the game environment. Sykes and Reinhardt explain that "interaction is a function of good interactive design and that it can be promoted through immersive experiences, ergonomic interfaces, and discernable and integrated choices, as well as by connecting the game to the outside world" (2013, pp. 42-43). The complexity of the interaction which can occur in a game is entirely dependent on the game's context, as well as the other individuals playing the game. Although all games do not offer the same interaction

possibilities, game genres which are best suited for SLD often do, such as MMORPGs. Many games that can be considered applicable to DGBLL require ample language that the learner interacts with in some way (exceptions can be found in games like *The Sims* (Purushotma, 2005; Miller & Hegelheimer, 2006; Ranalli, 2008) and more recently, *Minecraft* (Kessler, 2013; Bikowski & Kuhn, 2014)), but these are indeed exceptions to the rule and require well-designed language learning tasks that the learner must follow to benefit from the gameplay experience. Kuhn's (2014) example of using *Minecraft* with specific constructivist writing tasks structures the game experience in ways that the game itself simply cannot.

The vital role of **feedback** is well established in L2 learning (see Carroll, Swain, & Roberge, 1992; Hyland & Hyland, 2006), and good games support SLD by providing opportunities to receive immediate and personalized feedback either from the game itself or by facilitating communication between players. In many ways, this feedback encourages scaffolding in the game (see Wood, Bruner & Ross, 1976), providing the player with just enough context-specific and individualized support – a reality that is difficult to replicate in a traditional language classroom – to make meaningful progress. Other artifacts or conditions may act as scaffolding as well, such as the use of a dictionary to uncover the meaning of new words which are encountered, or a player using past gameplay experience to make sense of the feedback received. Notably, the feedback provided by a good digital game must be acknowledged in order to proceed; neglecting to do so will inhibit progression, which does not necessarily occur in the traditional provision of feedback. Holden and Sykes explain that "innovative technologies, including digital gaming environments, offer a solution to many of the challenges of giving L2 pragmatic feedback by offering scaffolded, just-in-time, meaningful, and individualized feedback" (2013, p. 156). The affordances of the game and the automated feedback mechanisms ensure that a learner is given constant and persistent information concerning his or her progress, and if that feedback is provided in such a way that it requires knowledge of the target language (as in the feedback itself is provided in the L2), then it is ideal for SLD. Educational games tend to do this well, whereas only particular vernacular or commercial-off-the-shelf (COTS) games focus on feedback in a meaningful way for SLD, and

otherwise need resources or frameworks to structure the learning experience (Sykes & Reinhardt, 2012).

Context is conceptualized both in terms of the context of the game itself, but also the context of play that a learner brings to the game and how he or she approaches the gameplay experience. In terms of the game's own context, Sykes and Reinhardt (2013) argue that it is through narrative that information is contextualized, and that the narrative of good games is often incredibly immersive and encourages sustained involvement in the game world. Yet beyond the context that the game itself creates, the context of play that emerges as the player constructs his or her own narrative can "become more important than designed narratives, as they provide players with a strong sense of agency" (p. 79). This can be observed in games that provide ample control to the player to modify and impact the game world, particularly in MMORPGs where the learner has ample agency to pave his or her own progress and make a discernible impact on the game environment and other players.

The final aspect, the **endgame**, combines elements such as challenge, goals and outcomes, as well as the story itself to provide a meaningful experience that players will want to eventually reach, implying that they have invested meaningful time into the game. An existing endgame entails an experience that will motivate the player to continue playing the game, thus creating flow (Csikszentmihalyi, 1997); games that are shallow and lack content will not capture the learner's attention, yet if the game has a well-defined endgame that is challenging and results in increased playtime to reach it, players will be more inclined to invest time in achieving that endgame. Endgames must not be conceptualized as the end state of the game; rather, in the case of persistent online worlds such as *World of Warcraft*, the endgame is where players invest the most time and offers the greatest reward. This attribute is considerably different from what other researchers have stressed as important for learning, yet Sykes and Reinhardt argue that "in order to remain motivated to keep playing, players must know what they are doing and believe that they have choice in doing so" (2013, p. 112). As will be explored when discussing DGBLL's emergence and evolution, games which are developed purely for educational purposes and which do not consider the player's motivation to continue playing

cannot as easily attract and maintain student interest, and thus may have a more difficult time encouraging SLD.

The analysis of these game elements and characteristics, and their application to SLD, can be generally focused into two categories: learner/player reflection or learner/player experience. The former relies on learner/player reported data, which traditionally comes in the form of questionnaire data on the efficacy of the gameplay experience or interview data after the gameplay experience has finished. Such data is overwhelmingly prevalent in what research does exist in DGBLL. The latter methodology, focusing on learner/player experience, entails an analysis of the actual gameplay experience – fundamentally, how the game elements that Sykes and Reinhardt (2013) relay are addressed within the game by the learner/player, and what observable results (language or skill development) are attainable by playing the game. This type of research is currently less common in DGBLL research, yet has been continually referenced as a necessary direction to take this field in order to gain further understanding of how digital games can benefit language learning (see Cornillie et al., 2012b; Godwin-Jones, 2014; Sykes & Reinhardt, 2014).

What remains evident is that games are seeing an increasing application in SLD contexts due to these aforementioned characteristics. Although the qualities of L2 classrooms which contribute to effective SLD, and how students themselves interact and learn in these environments, have been researched at length, such research is still in its early stages in DGBLL. The classroom context is indeed the prevailing means of learning a language, yet the continued shift towards ubiquitous and socially-connected technology that pervades our daily lives implies that there are opportunities to extend language learning to extramural domains that are prefaced with fun and entertainment. Chik (2012) argues that learners can embrace the fluidity of the learning experience and take their learning in new directions that are not defined by an institutionalized context. This of course assumes that the opportunities for learning are sufficiently engaging and inspiring to convince learners to utilize the affordances of space to their advantage; if, however, a learner is already passionate about a past-time such as digital gaming, this passion can be harnessed and focused in the target language.

It is these various characteristics and aspects of digital games that are applicable to language learning, and fundamentally integral to DGBLL as a discipline, which will be observable in the literature that encompasses and underlies this field of research, as well as substantiate my decision to adopt *World of Warcraft* for this study.

Research Frameworks for DGBLL

Aside from the general characteristics of DGBLL, another distinction must be made when analyzing the role of games for language learning purposes: the difference between game-based, game-enhanced, and game-informed research (Sykes & Reinhardt, 2012; 2014).

Game-based research. Game-based research is likely the most widely-adopted form of research in the field of DGBLL, examining the use of educational games for language learning purposes. The game-based nature of this research implies that the game itself is the focus of inquiry, and questions how the game can be designed to fit the needs of the environment. Educational games are perhaps the most prevalent means by which learners may encounter a foreign language in a game environment and be expected to engage with it in some capacity. Designed to instruct a language learner on a specific fragment (or fragments) of the foreign language, educational games place the learning potential at the forefront, and then surround it with game elements to improve its enjoyability. On its most basic level, an appealing graphical user interface can improve a learner's retention when navigating through in-game exercises (Chik, 2014). Encouraging feedback prompted by the game or delivered by other players can act as instruction and ensure that the learner stays on track and completes tasks in the designed order and with meaningful progression. As Cornillie et al. argue, "instruction in games does not necessarily sacrifice 'fun', and designers should not shy away from including [corrective feedback] and other forms of instructional support" (2012a, pp. 273-274). While this is indeed true, many educational games do not abide by this principle and cannot adequately address the element of fun which helps maintain student interest and engagement due to the financial costs and programming experience needed to develop an effective game. Filsecker and Bündgens-Kosten (2012) ironically label such games *Edutainment*, due to the *lack* of integration between entertainment and education. Although educational games are still prolific in traditional

language learning contexts (whether they are used in language labs or as mini-games in tools such as *Rosetta Stone*), and can indeed prove beneficial (Ito, 2008), individuals with pre-existing gaming experience tend to not prefer educational games (Chik, 2014).

Synthetic immersive environments are one means by which to improve upon the potential shortcomings of a strict educational game while still remaining within the framework of game-based research. These environments remove the educational game from its traditional computer-to-learner confines and incorporate interaction between learner and learner, learner and instructor, and learner and space (either physical or virtual). *Mentira*, designed by Holden and Sykes (2012; 2013), is one such example, as individuals are able to navigate a real space but be simultaneously immersed in a virtual world through their smartphones. Other synthetic immersive environments are still accessed through the computer and function in many ways like games (see Johnson, 2007; Zheng, Young, Wagner & Brewer, 2009), but their focus is repositioned on interaction, ensuring that through the use of the game-like environment students can communicate with one another. This further distances synthetic immersive environments from educational games, as educational games exist within a tutor paradigm almost exclusively (acting as the means by which to instruct students), whereas these environments function as a tool, providing learner/players the space within which they can practice their language abilities and engage in meaningful communication with one another.

Game-enhanced research. Games which are designed for entertainment purposes first and foremost, and as a result are researched due to the enhancements researchers apply to the game to make it beneficial for SLD, vary widely in contrast to educational games. Whereas when classifying educational games, the language learning-oriented design elements, or lack thereof, determine whether or not the game is educational in nature, commercially-available vernacular games do not explicitly embody a tutorial role, designed to guide the learner in his or her language learning experience, but rather offer an immersive environment that can support language learning, especially if the game is rich with text in the target language (Cornillie et al., 2012b).

A good vernacular game for language learning purposes will draw the learner into the immersive gameplay experience and provide opportunities for self-guided interaction; the game world can provide learners with an engaging context that the player can extract relevant information from to use in their own learning (Filsecker & Bündgens-Kosten, 2012). MMORPGs are likely the most prominent example found in game-enhanced research, as will be argued and explored later in this chapter, yet increasingly different genres of digital games are being explored for their potential usage in SLD contexts.

Game-informed research. The last type of research framework established by Sykes and Reinhardt (2012; 2014), game-informed research, ultimately incorporates those experiences which are not distinctly games, yet which employ and reinforce game-like principles. Gamified social language learning mobile applications are perhaps the most recent example of this type of innovation in CALL, bridging SLD and DGBLL. While not a game in the traditional sense, these web applications attempt to merge the educational domain of games designed for L2 learning with the social shift that is most prominent in today's Facebook and Twitter-centric virtual reality. The desire to formulate an online presence and communicate with other like-minded individuals has now pervaded the online L2 learning environment, as platforms such as *Duolingo* combine elements of gamification (obtaining points for completion of exercises, receiving badges, levelling up and gaining access to new tasks) in an effort to motivate learners to continually seek instruction and guidance from the digital environment. Such applications will not be focused on in this review of the literature, as they are only recent developments and ultimately are not related to the type of game experience found within a vernacular game such as *World of Warcraft*.

Each type of game or tool that these various research frameworks analyze can prove to be beneficial for SLD. Some require the influence of an instructor for guidance, whereas others can arguably function in an unguided manner. Although the contexts vary in which they are most often used, a key to successfully transitioning gameplay to DGBLL is the act of intentionality which can turn informal L2 gaming experiences into actual L2 learning experiences (Chik, 2014). Rarely will a learner stay motivated and engaged in the DGBLL

process, if he or she does not have an outlet through which to discuss the gameplay experiences, whether that be within the confines of a classroom, friends or family, or an online community of like-minded gamers.

And yet, with all of the research that has been conducted, there remain many questions about the actual utility of games. Promise exists – Godwin-Jones claims as much, stating that “the most one can say in general about the utility of games is that in optimal environmental contexts, with appropriately selected and trained groups of users, playing a well-designed game, a number of positive and effective language learning experiences are possible” (2014, p. 10). Possibly on a general, overarching scale this is true, yet research must then begin to explore specific games in specific contexts, analyzing the individual trajectories of gameplay and learning that emerge from the experience.

Core Areas of Research in DGBLL

At this point, I return to the four distinct areas of research that were outlined initially, as each will be explored in greater detail due to their relevance in the expanding field of DGBLL. These are:

1. DGBLL in MMORPGs.
2. DGBLL and its potential for vocabulary development.
3. DGBLL supporting near transfer to non-gaming contexts.
4. DGBLL in extramural settings.

I chose to concentrate on these areas as they are most applicable to my current research study, seeking to empirically understand how *World of Warcraft*, as an MMORPG, can assist in developing L2 proficiency for learners as they play in extramural contexts and transfer the language observed in game to non-gaming contexts. No current study focuses on all four aspects, yet five influential and core research studies do exist that investigate at least two of

these central aspects which are integral to the present study. I will detail these five studies initially and then explore additional studies which explore any one of these core aspects.

DGBLL in extramural settings & supporting near transfer to non-gaming contexts.

Piirainen-Marsh and Tainio (2009) offer an experimental, empirical analysis of gameplay as a fundamentally social activity, seeking to understand how learners playing the digital game *Final Fantasy X* (a fantasy-based role-playing game) collaboratively and communicating with one another about the gameplay experience can transfer the language observed in-game to non-gaming contexts. By recording all gameplay and interaction, and analyzing the players' conversation within a social-interactional approach, which conceptualizes learning as an "inseparable part of social activities and embedded in the structures of interaction in specific settings" (p. 171), the researchers evaluate the resources that learners use when interacting with one another, and the inherent intricacy of these subsequent interactions. Participants were instructed to play the digital game in pairs, communicating informally about what they experienced in the game by repeating the dialogue spoken by the characters, and commenting on the actions undertaken by the avatars, all of which required utilizing the language observed in-game in an out-of-game context, specifically in the home of one of the participants. The language observed, which included spoken and written dialogue, provided the players with the necessary impetus to communicate with each other in an extramural setting; strategies such as repeating and imitating the spoken and written dialogue, co-constructing the narrative, and speaking directly to the in-game avatars, all assisted in reinforcing the language observed in-game; "by repeating, anticipating, and re-contextualizing the avatars' lines, or creating their own lines, the players demonstrate not only their close attention to detailed features of the game language, but also the relevance of language expertise to the competent management and enjoyment of the game" (p. 172). Proficient use of in-game language thus supports the ability of language learners as players to contextualize and use this language in other contexts.

DGBLL in MMORPGs & extramural settings. Thorne (2008a) shares perhaps what is one of the first studies to analyze *World of Warcraft* for its SLD potential, arguing that "engagement in freely chosen Internet environments provides developmentally productive

opportunities for learning” (p. 306). Situating the gameplay in informal, extramural settings, Thorne seeks to understand how learners communicate with other game players within the virtual environment, and what type of language use emerges. A single case study is explained in detail, analyzing the intercultural communication and interaction between a North American and Ukrainian player. Rather than providing specific guidelines that the North American player was to follow, he was instead simply observed as he played the game. Communication between the two players was spontaneous, with the game and its objectives motivating the North American player to communicate with the Ukrainian, sparking a lengthy and deep conversation that exceeded the topical realm of gameplay and covered aspects of language use and identity. Although the interaction was not planned, and was not explicitly focused on language development, both players nonetheless utilized linguistic features that one would expect to be a target of instruction in the L2 classroom, such as the utilization of resources external to the environment (similar to the many layers of the affinity space (Gee, 2005)), utterances in the target language, and comprehension checks. This suggests then that these extramural sites which overwhelmingly focus on the use of language (both receptive and productive) lead to “knowledge production... outside of conventional expert – novice configurations” (Thorne, 2008a, p. 323), speaking to the potential of the affinity space to allow learners and players to both benefit from interaction with one another removed from a strict educational context. Most tellingly, Thorne argues that “for many students across the world, performing competent identities in second and additional language(s) may now involve Internet-mediation as or more often than face-to-face and non-digital forms of communication” (p. 323). Such an approach is integral to the underlying framework of this dissertation and speaks to the need to explore this potential in other studies.

Rama, Black, Van Es, and Warschauer (2012) focus too on gameplay experiences for SLD in *World of Warcraft*, examining six Spanish language learners with varying levels of language and gaming proficiency, interacting in this virtual world over the course of a seven-week period for approximately five hours per week. Players played in their spare-time, keeping data logs of their gameplay and the resulting communication observed and produced in-game. Rather than

being explicitly observed while playing, they recorded their experiences in journal entries. Participants met in one-on-one settings with the researcher to discuss their gameplay experiences and their perceived SLD after the study had completed. Rama himself would act as a participant in the game as well, interacting online with the participants. A number of affordances are discussed that position *World of Warcraft* as beneficial for SLD, such as the facilitation of a safe learning environment, and the encouragement of communicative competence, promoting goal-directed, collaborative action between experts and novices. The results indicate that expert gamers, and those who have played *World of Warcraft* previously, can excel while playing the game and developing language proficiency. Those without ample gaming experience can still benefit, however, as “from the moment a game starts, players are immersed in a target language context where they have multiple options for engaging in authentic communication via speaking, reading, writing, and listening with a range of interlocutors, often in ways that allow risk-taking and reflection in the target language” (p. 335). Learners unfamiliar with the game genre, however, may struggle according to the study, even if their target language proficiency is completely adequate, signifying the need to scaffold the gameplay experience appropriately.

DGBLL in MMORPGs & its potential for vocabulary development. Rankin, McNeal, Schute, and Gooch (2008) elect to study the MMORPG *Everquest II* for its various affordances that support SLD, which include the learner’s virtual identity, social interaction, and the context of the game itself, permitting social interaction to occur in a facilitated environment with specific goals. Focusing on aspects such as how skills learnt in game transfer to non-gaming contexts, opportunities for collaboration, and how gameplay successfulness can be assessed (whether formally or informally), the researchers argue that a purposeful intention behind using games for SLD is necessary; in order to do so, it must be understood how and why players interact the way that they do, and what in-game and out-of-game resources encourage interaction. Rankin et al. compared ESL students who played the MMORPG during a four-hour period and completed various quests, to those who participated in a traditional three-hour class. It was determined that when asked to write sentences based upon vocabulary found

within the game (but not game-specific), students who completed drill-and-kill exercises in a normal classroom environment performed better than those who completed various quests in the game world. This is not surprising, however, as the students completing the tasks used them in sentences, whereas learners playing the game had no opportunity to use the language observed. In a second study comparing two groups of game players – those playing *Everquest II* with no social interaction, and those in a group of four with two native English speakers – it was determined that those who communicated with other native speakers of the target language in the game environment performed significantly better than those who did not, as the social interaction revolved around the completion of quests and therefore required extensive use of the vocabulary. Furthermore, interaction with intelligent non-player characters (NPCs), an opportunity that exists in many MMORPGs, is argued to be able to help learners focus on specific aspects of the language which in turn lead to the gameplay experience being better structured. Novelty of the game experience, as contrasted to Rama et al.'s (2012) study, is not considered an issue and had no statistical effect on the ability of the learners to succeed. Ultimately, the researchers suggest that “MMORPGs show great promise as a second language pedagogical tool, provided game designers leverage the benefits of MMORPGs for SLA” (p. 47).

Bytheway (2014), focusing again on the popular *World of Warcraft*, investigates the vocabulary learning strategies employed by English language learners while playing this game. She argues that the game is a complex learning context and as a result, how the learners develop their L2 proficiency in this context is of utmost importance and is greatly influenced by the culture of the digital game and its social environment. Focusing on the game community as a community of practice (Lave & Wenger, 1991), a Grounded Theory methodology examines the gameplay experiences of six ESL learners/players to determine what vocabulary learning strategies were employed. Each participant was already an expert gamer, having played this MMORPG for over four years. Five hours of observed gameplay with additional structured interviews and texts concerning the game were collected, resulting in 31 codes which provide insight into how learners develop vocabulary through strategies in DGBLL such as: observing players, reading in-game information pop-ups, equating image/action to word, and looking up

words in dictionaries/Google (Bytheway, 2014, p. 5). It was furthermore found that the culture of the digital game is in itself a major contributor to the success of the SLD experience, as the game's culture can promote creativity in language use and reduce anxiety to speak in the foreign language. Other positive benefits of gameplay are closely tied to the demands of the game itself, such as forcing interaction to progress or demanding cooperative learning between players to further advance in the game. Fundamentally, Bytheway argues that "instead of learners affecting their motivation [to choose a strategy to learn vocabulary], the MMORPG context affects learners' motivation removing the need for a motivational learning strategy" (2014, p. 10), thereby suggesting that a good game, such as *World of Warcraft*, provides sufficient motivation to learn language to the extent that learners need not be motivated otherwise to engage in SLD. It is therefore considered critical for the instructor to assist the language learner in understanding how to transfer what was developed in-game to contexts removed from the game by encouraging students to teach others the strategies they employed to learn vocabulary in-game and transfer these strategies to non-gaming contexts.

These major contributions are fundamental to understanding how my own study is situated within the current literature as it applies to these four core research areas. In an effort to provide further clarity concerning the landscape of DGBLL research, I will examine the relevant literature that is applicable to each distinct area of research, returning to these core studies as a means of firmly contextualizing the present study and its contributions to the field of DGBLL.

DGBLL in MMORPGs

Of the vast variety of digital game genres that exist, none is perhaps as well suited to SLD as the massive multiplayer online role-playing game (Peterson, 2013). In its most basic form, an MMORPG is a seamless, virtual, interactive, and social environment inhabited by players from across the world. Each game is played synchronously by hundreds of thousands of players, and in the case of *World of Warcraft*, the potential to play with millions of players simultaneously exists. Due to existing technical limitations, often individual servers house players of a particular geographic area and reduce the load on the virtual world, limiting

players to populations upwards of 10,000, rather than permitting these large groups of players to all play the game within the same infrastructure. Ranging from settings within science-fiction, high-fantasy, and even superhero environments, the immersiveness of the gaming experience is fundamentally structured around an engrossing and malleable online world; the best examples of MMORPGs provide players with agency to manipulate the outcome of the game world and transform the narrative that is presented to the player based upon his or her actions.



Figure 1. A screenshot of *World of Warcraft* as a player would experience it.

Yet more than just providing the environment, and therefore the possibility to interact with others, games such as these explicitly encourage players to communicate with one another to progress in the game-based environment through the completion of quests, dungeons, raids, and other tasks which require interaction between players. As Thomas, Reinders, and Warschauer argue, “learners in today’s CALL environments can potentially improve their technology and digital literacy skills as well as collaborate with language learners from other cultures to improve their understanding of cross-cultural communication in a globalized world” (2013, p. 5).

The majority of MMORPGs are by nature vernacular games, primarily due to the high population of players necessary to ensure an effective gameplay experience and make maintaining the game's physical infrastructure financially sustainable. Although some researchers have argued for the potential of educational games – both before the proliferation of vernacular games in the early 90s (see Morrison, 1984; Piper, 1986; Legenhausen & Wolff, 1990) and afterwards (see Molla, Sanders, & Sanders, 1988; Johns & Wang, 1999; Ang & Zaphiris, 2006; Neville, Shelton & McInnis, 2009) – in reality, educational games have gradually been left to the wayside in favour of COTS games in recent DGBLL research. Ito succinctly describes the rationale behind this, stating that “as the development context shifted from a small, experimental research effort to a mainstream commercial enterprise, the founding impetus of educational and cultural reform shifted to one of catering to existing institutional and market demands” (2008, p. 114). As educational games are primarily focused on specific goals established by curricula and institutions, and due to the comparably limited resources available for educational development, innovation stagnates and is ultimately incomparable to what COTS games can offer. Purushotma (2005) offers a similar perspective, stating that competition from the COTS sector of game development is simply better equipped to produce the kind of high quality game experience that players have come to expect, which in turn is precisely what substantiates the learning potential of MMORPGs.

MMORPGs follow a routinized procedure through which the player is introduced to the game world. First, the player must create a digital avatar which the player embodies while playing the game. At times, this may resemble the actual player in terms of appearance or general demeanour; at other times, the chosen avatar may be otherworldly in nature and completely unlike the individual, yet possibly fulfilling some fantastical desires or a longing to role-play as something entirely different.

Once the avatar has been created, the player is immersed in a vibrant 2D or 3D environment with other players who are all playing the game synchronously with one another. Communication between players occurs typically in the written form, yet some MMORPGs allow oral communication should both players consent. The player is immediately given tasks,

or quests, to complete once immersed in this virtual world. These often involve helping characters in the game, or dispatching monsters that are infesting a town. Each quest completed and monster killed results in experience points which will lead the player to *level up*, or advance in power, thereby allowing him or her to tackle stronger monsters or complete more difficult quests.

This routine continues as new environments open up to be explored, and the player becomes increasingly immersed within the game world, resulting in multiple iterations of the same experiences with minor, but meaningful, differentiations. All the while, the player will be encouraged to team up with other players and communicate with one another to complete the most difficult challenges in the game; rarely can a player reach the upper echelon of the game without collaboration with other game players. This systematic model of progression, which is approached differently by each player, results in complex trajectories of gameplay which require detailed examination.

Scholars have highlighted many of the benefits that MMORPGs can bring to language learning experiences. Examining the findings of major research conducted on MMORPG usage for language learning purposes, Peterson concludes a number of positive benefits of MMORPGs, many of which are likely apparent following this description of MMORPGs. These include:

- The viability of commercial and modified MMORPGs for DGBLL in intermediate and advanced language learners in formal and informal settings.
- MMORPGs can encourage intermediate and advanced language learners to produce the target language and interact with other players socially.
- The importance of training and debriefing learners to support participation.
- Some evidence to support vocabulary acquisition.
- An improved reading comprehension.

- Increased motivation.
- Enjoyment (2013, p. 93).

Peterson also acknowledges the negative findings of these studies as well, and while there are fewer, they do speak to common complaints that even native speakers playing MMORPGs would admit to, including

- beginners finding the MMORPG challenging,
- cognitive overload,
- variability in the quality of language that is produced,
- lack of error correction.

Although such negative characteristics of MMORPGs do indeed exist, they can be mediated through good instructional practices, such as providing players with sufficient instruction and training beforehand, and providing an opportunity for players to communicate outside of the game about their gameplay experiences, as a means to process these variable experiences and make sense of them, rather than become completely lost in the game environment. These strategies will be explored in the Analysis and Discussion chapter of this dissertation.

Of all the benefits that Peterson addresses, the interactive nature of MMORPGs incites perhaps the most intrigue in language learning, as fundamental tenets of effective language learning are facilitated in the design of the online game. Cornillie et al. explain that “*World of Warcraft*, as well as other MMORPGs, are game worlds that are populated by individuals representing increasingly diverse social strata, ages, and linguistic backgrounds” (2012b, p. 245), implying that like any typical communicative setting, language learners must be able to negotiate meaning with their use of the language and interaction. This applies not only to players, but artefacts in the game as well, such as quest texts and large-scale battles between players and non-player characters. Rama et al. (2012) further emphasize the role of

communicative competence, stressing that grammatical accuracy is much less important than contextualized meaning making.

To understand the origin and development of the MMORPG genre for SLD purposes, we must first turn to its precursor: the *multi user domain – object oriented*, or MOO. In its first iteration, the word *domain* was originally *dungeon*, revealing its game-based origins as a way for individuals to play together online while engaging in an interactive story-line, often with fantastical elements such as exploring dungeons and fighting evil, magical creatures. Unfortunately, due to the multi user domain's focus on these mythical, violent elements, they were often not permitted in educational contexts (Shield, 2003).

MOOs allow players to interact with one another in a virtual environment (Peterson, 2010b). They function like a chat room in many respects, permitting synchronous communication between individuals using a basic graphical user-interface indicating what each user said. Yet MOOs have the added functionality of allowing players to construct their own digital landscape and objects by typing in words that correspond to in-game actions (Shield, 2003). Shield explains that, "as participants' skills in using descriptive language and, in some cases, programming the MOO itself, develop, they can refine, redesign, enhance and expand their environment" (p. 98). By simply learning to play the game then, the individual begins to become more accustomed to how the game works; his or her own SLD emerges through the observation and construction of language and meaning, a concept which will be returned to later.

The MOO's early success can be largely attributed to the digital environment that it allows players to reside within; "it is the potential to support learners in taking responsibility for their own learning and using their imaginations that makes MOO such an exciting tool for language learning and teaching" (Shield, 2003, p. 99). The first MOO, *LambdaMOO* (1990), placed players in the game creator's Californian home to explore and interact with as they saw fit (see Figure 2). At the time of its inception, the MOO was revolutionary in that it gave the player authorship within the game world, but the MOO's limitations were realized when games

with brighter – and especially 3D – graphics were introduced that could similarly allow this sense of freedom.

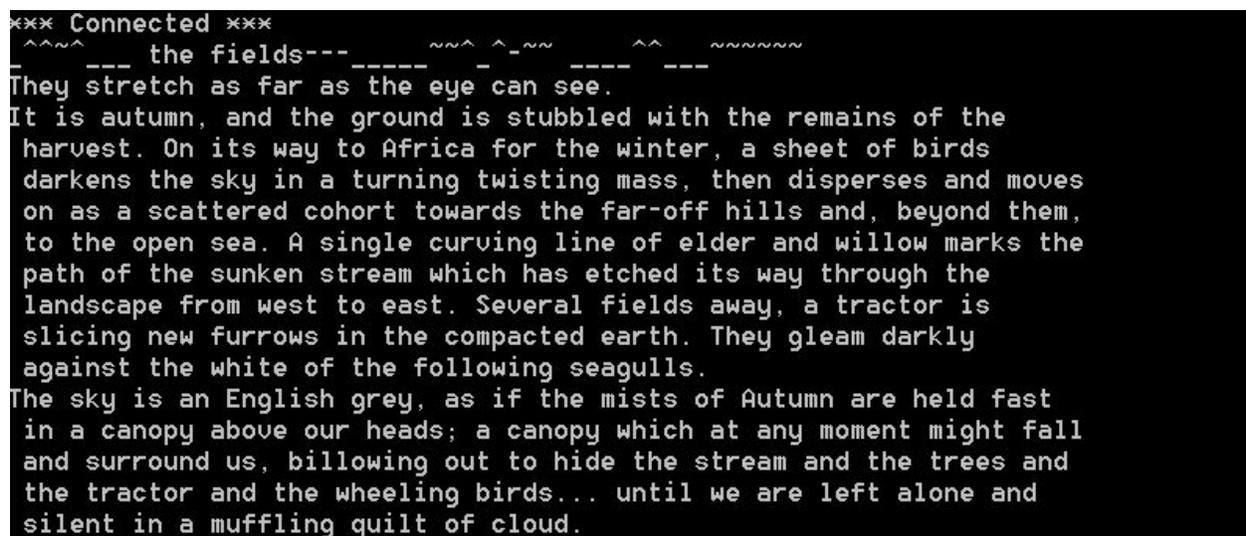


Figure 2. The graphical user interface of LambdaMOO (1990)

MOOs, and the MMORPGs which followed, began to be researched for their potential for SLD and providing language learners with an environment in which they could communicate with other individuals, not just with the computer in a tutorial role. The majority of discussion today still revolves around simply this, however – potential, with few studies positioned to examine actual results from the perspective of the learners playing these digital games (Peterson, 2012). Cornillie et al. agree with this analysis of the state of DGBLL research, stating that “there is substantial anecdotal evidence and numerous self-reports by players of COTS games, especially of the massively-multiplayer genre, that describe high levels of L2 learning as a result of their game-based interactions” (2012b, p. 247). Both Thorne, Black, and Sykes (2009) and Zhao and Lai (2009) make claims that MMORPGs provide excellent opportunities for interaction in the target language, with Thorne et al. arguing that “the prevalence of goal-directed collaborative play generates attendant social activity of all kinds, from phatic communication and passing acts of generosity to serious friendships and romantic bonds, often with people from around the world in multilingual contexts” (2009, p. 811). Peterson, in his overview of theoretical frameworks underlying CALL work, cautions against the current scope of MMORPG research, stating that “although current research on MMORPGs

has provided encouraging findings, it is limited in scope and shares many of the issues associated with other areas of CALL research" (2013, p. 102). Clearly, potential does exist when exploring MMORPGs, as will be observed in the following studies, yet it is imperative that we look beyond its potential to observable empirical results.

There exist two distinct trends in terms of the types of MMORPGs that have been the focus of research: those that are vernacular in design and intended for entertainment purposes, and those that are educational and therefore synthetic immersive environments.

Vernacular MMORPGs. Widely considered the most well-known MMORPG of all, *World of Warcraft* has received much attention in CALL due to its impressive subscription numbers (at its peak, the game had more than 10 million individuals playing it across the world, although currently the subscription numbers are at 7.1 million³), and overall polish that lends itself well to adapting a COTS game for DGBLL purposes. The fact that three of the aforementioned core studies root their analysis in *World of Warcraft* is then no surprise. Rama, Black, Van Es, and Warschauer's (2012) insight into what makes the game beneficial for SLD is helpful, with its ability to foster a safe learning environment which in turn allows *World of Warcraft* to function as an affinity space where players feel comfortable communicating with one another and learning from one another. The methods employed as well allow for a comprehensive and thorough understanding of the gameplay experience of each learner.

Thorne (2008a) assumes a different perspective, analyzing the MMORPG for its potential to provide meaningful communication opportunities between players in a setting that is external to the traditional classroom. In his experimental study, it is the MMORPG game environment that Thorne describes as spawning a serendipitous encounter between two players resulting in a conversation focusing on both aspects of language and game-related objectives. In this sense, it was an entirely organic conversation that was not enforced by an instructor for specific learning objectives, and yet it led to the English speaker wanting to potentially start

³ See <http://www.businesswire.com/news/home/20150506006466/en/Activision-Blizzard-Announces-Better-Than-Expected-Quarter-2015-Financial#.Vb5O6PIVhBc>

studying Russian. This suggests that the online game can indeed encourage “active participation in developmentally constructive Internet-mediated discourse” (p. 323).

Bytheway (2014)'s research, examining six ESL learners/experienced gamers via case studies and semi-structured interviews, explores the culture of *World of Warcraft* and the affordances learners experience when playing. The game itself is hypothesized as being the prime motivator behind learners choosing varying vocabulary learning strategies, based upon the responses and observed play experiences of the six participants in her study, which in turn is affected by aspects related to the game world such as its encouragement of collaborative task completion and the trading of virtual items. As a result, “MMORPGs as second language learning contexts must take into account MMORPG culture and MMORPG language use” (p. 11), suggesting that a well-chosen and appropriate game can have as much influence on a learner's SLD as the approach to gameplay or motivation to engage in this type of language learning process.

The other core study by Rankin et al. (2008) studies the MMORPG *Everquest II* for its various affordances that support SLD, which include the learner's virtual identity, social interaction, and the context of the game itself, allowing for social interaction to in fact occur in a facilitated environment with specific goals. The researchers highlight the benefits of digital games as making clear the language that is immediately relevant to succeed in the game environment, while also suggesting that conversations with NPCs can result in guided discussion. As a result, MMORPGs are claimed to “provide sufficient motivation and opportunities for second language students to increase in proficiency in a target language” (p. 43).

Aside from these four core studies, others have been conducted which don't necessarily address more than one of the four distinct areas of research as outlined previously, but nevertheless provide additional insight into how MMORPGs have been employed for DGBLL purposes. Zheng, Newgarden, and Young (2012) investigate the language activities and coordination strategies which emerge as players interact with one another while playing *World of Warcraft*. Playing the game for 47-minutes, participants interacted with one another in the

target language as they worked together to complete introductory quests as a communicative activity type, which positions the social situation as being entirely relevant and contributing to the interaction that occurs between players. Communication was facilitated through in-game chat functions, as well as the external use of Skype for spoken interaction amongst students and for feedback provision by the instructor. Identifying numerous communicative activities that emerged through gameplay (such as coordinating, gameplay knowledge distribution, seeking help, etc.), Zheng et al. found that the values players pursued changed as they navigated the online environment, leading to complex and nonlinear trajectories of L2 development. At times, players would focus solely on actions within the game, and at other times, on communicative tasks with fellow players, yet all experiences ultimately led to development in the L2.

Other commercially-available and vernacular MMORPGs have been researched for their SLD affordances as well. Rankin, Gold, and Gooch (2006) examine the aforementioned *EverQuest II*, the sequel to the genre-defining MMORPG *EverQuest*, for its potential to immerse language learners in a virtual world where language permeates all aspects of the game environment and is crucial to advancement. Rankin et al. specifically determine whether or not playing *EverQuest II* may lead to increased English language proficiency, and whether the game itself can provide language learning support for prospective players. After an initial tutorial session to ensure participants understood how to play the game, learners played in pairs over the course of four weeks, after which the researchers used natural language processing tools to analyze all conversation logs from the game in order to present students with the words they would have seen most often. Their analysis determined that frequently occurring words in the game were recalled 55% of the time or more, and advanced students reported an increase in confidence when speaking the language.

Steinkuehler (2007) looks to the MMORPG *Lineage* as a literary practice, in the same vein as one would analyze a novel, employing a cognitive ethnography methodology. Specifically examining the gameplay experiences of the participants from a sociocultural perspective over a two-year ethnographical study, Steinkuehler observes that the digital game requires players to engage in *sense-making* by ascribing meaning to playing the game and making sense of the many

components of the digital environment which impact the potential for interaction and progression. Noteworthy are the literary practices that players engage in which then lead to applicability in non-gaming contexts, such as observing in-game text conversation, written letters, oral narratives by NPCs, and what he refers to as *metagaming practices* – experience that are not directly related to the game, but still reside within the same affinity space. Steinkuehler argues that MMORPGs allow learners to migrate from merely passive modes of learning and consumption to active play occurring outside of the traditional language classroom.

Reinders and Wattana (2012; 2014), studying English language learners' willingness to communicate while playing the COTS game *Ragnaros Online*, found the lack of educational content in the game inappropriate for their classroom context, and therefore the game itself was modified to include quests that focused on elements of the curriculum. Comparing in-class and computer-facilitated communication settings, Reinders and Wattana found in both studies that students did indeed communicate both orally and in writing more while playing the game, seeing increased interaction after each subsequent gameplay session; language output while playing was however neither necessarily complex nor accurate, which the researchers associate with the cognitive strain required to play and communicate at once (as seen in de Haan, 2005 and de Haan et al., 2010). Self-reports from these learners, however, indicate that they felt they had improved their language skills over the course of three gameplay sessions, and could communicate more freely and with less anxiety, ultimately encouraging collaboration in order to solve problems in the game. While the results are intriguing, empirical studies such as this should be utilized to lend further credence to learners' self-reported results.

Peterson (2012; 2013) examines the vernacular MMORPG *Wonderland*, in which players assume the role of a shipwrecked traveler and must complete quests with other players to survive, for its ability to encourage SLD. Seeking to understand whether or not language learners as players employ strategies which assist in interaction management, and whether any collaboration that occurred between players was beneficial for SLD, six Japanese language learners were observed playing the game over four 90-minute sessions. The participants had the opportunity to speak with actual players, and it was found that in order to mediate the

interaction, participants transferred strategies such as positive politeness in the form of greetings, leave-takings and small talk (Peterson, 2012). Peterson also examined the socio-affective side of DGBLL, seeking to understand learner attitudes with regards to MMORPG, and found that participants actively chose to communicate and collaborate with one another using the target language in the digital gaming context. Adaptive strategies such as the use of emoticons, suspension dots (or ellipses), quotation marks to denote emphasis, and turn splitting all contributed to successful interaction between participants. In order to analyze learner attitudes, Peterson supplied a post-study questionnaire composed of 15 Likert scale items (2012, p. 85). The results were largely positive, as learners emphasized that it was enjoyable to interact in the game and communicating within the game environment was beneficial for improving English language proficiency. This questionnaire is adapted for this study as well, with its questions (as will be seen in *Chapter IV: Methodology and Group-Level Results*) being entirely useful for any learners playing an MMORPG for language learning purposes.

Peterson's (2013) follow-up study applied a longitudinal approach, examining 10 university students learning English as they played *Wonderland*. Like other MMORPGs, communication between players is a core function of the game and assists them in advancing further. Over the course of six gameplay sessions, all interaction in the game was recorded and parts were transcribed for analysis purposes. The study primarily reinforced the findings of previous research into MMORPGs – by playing the game, participants used the target language in communicative ways with other players and were highly motivated to do so due to the entertaining and innovative way in which the language was structured. The learners themselves indicated that playing the game was entirely useful for improving English reading and writing skills.

Turgut and Irgin (2009) take a somewhat different perspective, examining English language learners in Turkey playing online games in internet cafes. Students in primary and secondary school were observed over the course of two hours playing online games such as *Knight World Online* and then interviewed to ascertain the players' own perspectives on gameplay for DGBLL purposes. The researchers found that playing in these informal settings

led to transfer of vocabulary items from gaming contexts to non-gaming contexts, and increased both motivation to invest time in SLD and a general awareness of digital games and their benefits and drawbacks. Motivation specifically was found to be of primary importance when playing these games; the participants indicated that the encountered tasks require understanding the language to proceed, and thus, provide the necessary motivation to play the game over a period of time.

It is perhaps unsurprising that the majority of research examining MMORPGs has focused on games which are commercially available. The potential for construction of meaning through authentic interaction and task completion with other players is enhanced simply due to the entertaining nature of these games and the number of individuals who play them. There is, however, a contingent of social digital games that emphasize the educational value of the experience in the form of a synthetic immersive environment.

Synthetic immersive environments (Educational MMORPGs). Although not as *massive* in scope as the conventional, vernacular MMORPGs, synthetic immersive environments with MMORPG features have been studied for their potential benefit to SLD as well.

Suh, Kim, and Kim (2010) study the game *Nori School* to examine whether students receiving their instruction through the game differed from those in the traditional face-to-face classroom, and which variables may have played a role in how students interact and engage in the MMORPG environment. Over the course of a two-month experimental study, students were presented with tasks such as reading fairy tales with an e-book, as well as more traditional game-oriented elements like hunting monsters, acquiring new items, and creating guilds of like-minded individuals with whom a player can converse. The researchers determined that students playing the game scored higher on listening, writing, and reading exercises than their counterparts in the control group who took part in the face-to-face instruction. A primary factor that contributed to students' motivation in playing the game was having a guide or leader who would communicate with them as they played, effectively mediating the gameplay experience and implying that the instructional aspect of the game had a greater influence than the gameplay itself.

Johnson (2007), examining the synthetic immersive environment *Tactical Iraqi*, studies how players use both gestures and locutionary acts to conduct themselves in a virtual military environment which functions as an authentic training experience, focusing primarily on the learner's ability to use the Arabic language. Using a speech recognizer, the game is able to give specific and timely feedback to the players as they learnt Arabic, resulting in improved performance as compared to other marines lacking this experience.

Zheng, Young, Wagner, and Brewer (2009) explore *Quest Atlantis* and ask their learners to complete co-quests, or tasks which are designed to be completed with a partner, with a native and non-native English speaker. Their focus is not only on vocabulary and grammar, but also pragmatics when a native and non-native speaker must communicate with one another to complete a task. By employing methods such as computer-mediated discourse analysis, it was found that virtual environments like *Quest Atlantis* can function as spaces to practice intercultural interaction, as the native speaker was able to assist the non-native speaker in understanding the objectives of the task and correct any misunderstandings.

The well-known synthetic immersive environment *Second Life* incorporates many of the features that are found to be beneficial in MMORPGs. Liang (2012), using a custom modification of *Second Life*, had learners role-play a martial arts scenario using in-game tools and costumes. The learners were required to act out their various roles in the game, and their portrayals were then recorded and analyzed. Liang found that there were ample and complex forms of language being used in these role-plays, demonstrating the motivation to participate in the virtual environment even without prior experience. It is recommended that environments such as this work best for SLD purposes with collaborative gameplay, the creation of unique avatars, encouraging hybrid codes and utilizing all of the available resources that the simulation provides.

Summary. These various studies examining both vernacular MMORPGs and their educational variety, synthetic immersive environments, have common themes throughout that speak to the current state of research into this specific genre of DGBLL. In the majority of these studies (Rankin et al., 2006; Peterson, 2012; 2013; Renders & Wattana, 2012; 2014; Suh, Kim &

Kim 2010; Zheng, Young, Wagner, & Brewer, 2009; Zheng, Newgarden, & Young, 2012), players are being observed by researchers while playing the game. This potentially detracts from the authentic and traditional experience of playing these games from the comfort of one's home, or preferred location, while simultaneously limiting the amount of time a player could potentially want to play (see Bytheway, 2014); Rama et al.'s (2012) research is one exception to the majority of these studies, allowing players to play the game at their own discretion. With gameplay session lengths being restricted by the amount of time the researchers can afford, or the amount of scheduled time in the classroom, it is challenging to determine how much time and attentive behaviour these learners would invest in the gameplay experience. This merely recognizes the need to explore research that examines DGBLL in contexts beyond the classroom.

Furthermore, the methods employed by many of these studies, and the data and results obtained, result in only a snapshot of how the gameplay experience may affect SLD. The recall of vocabulary items, for example, may be impacted by having fewer play sessions in general, and without analyzing the game with a longitudinal time frame, the differing trajectories of gameplay that each player experiences are difficult to accurately understand. Case studies and ethnographies, while beneficial, only capture part of the learning process for the individual. Peterson (2012) calls for studies removed from the classroom to be conducted – when the majority of studies take place within the classroom environment, however, it is challenging to dedicate sufficient time to engage in a longitudinal analysis, which lends further credence to the value in encouraging language learning to occur outside of the classroom. It is for these reasons that this present study is longitudinal and situated external to the classroom setting so that an authentic as possible analysis can be conducted and presented to understand what role these online social games play in SLD.

DGBLL and its Potential for Vocabulary Development

When determining how to operationalize the development of a learner's SLD while playing games, the amount of vocabulary acquisition has routinely been the focus of much literature. Research has primarily taken one of two approaches when determining the role digital games can play for vocabulary development: games can be unmodified and used in their

intended state to observe vocabulary acquisition, or instructors/researchers can modify or adapt digital games for more explicit vocabulary practice. Relevant literature pertaining to each of these approaches will be discussed.

Unmodified games for vocabulary development. Returning first to the core research studies addressed as they relate to vocabulary development, Rankin et al. (2008) compare ESL students who played *Everquest II* during a four-hour period to those who participated in a traditional three-hour class, determining that the students in the classroom were able to write better sentences than those who completed various quests within the game environment. This suggests that guided instruction by instructors in a classroom setting was meaningful, especially when compared to the lack of instruction for the game players. Yet when analyzing the success of learners while playing the online game and the varying approaches to gameplay that can be assumed, those players who communicated with other native speakers in the online environment did significantly better than those who did not, as the social interaction revolved around the completion of quests and therefore required extensive use of the vocabulary. Developing new vocabulary must therefore be more than just observation of language in the game, but the active use of it with other game players in some capacity.

Bytheway (2014), while not focusing on the development of specific vocabulary, finds that numerous vocabulary learning strategies are employed by players while playing *World of Warcraft*, independent from any instructor intervention to explain how best to approach playing an online game such as this in the target language. The many vocabulary strategies employed by language learners, such as using Google and other websites to look up new words, reading pop-up messages, and associating new words with visual contextual cues, all utilize the affordances of a motivating digital game to support vocabulary development removed from the traditional classroom. Although she does not touch on actual results pertaining to how much vocabulary was developed by the six participants, she does state that two of the participants continue to use the developed vocabulary outside of the game, emphasizing the role a dynamic and engaging online game environment can have on long-term SLD.

Apart from these two core studies, many others have examined the potential vocabulary development as facilitated by digital games. Research detailing games' vocabulary acquisition potential began to be conducted in the late 1980s as digital gaming was used more readily in classroom contexts due to the advent of the personal computer. Palmberg (1988), having learners play the game *Pirate Cove* over three sessions, the latter two being spontaneous, determined that language learners playing games designed for entertainment, yet where the use of language is required to progress, were able to successfully recall numerous vocabulary items related to the game's context even a month after the completion of the study. Palmberg claims this is due to the motivational qualities of games to a specific demographic of learners who would willingly invest time in gameplay, but he also stresses the role of the instructor, stating that he or she should select appropriate games for language learners so as to find those with relevant vocabulary that can be focused on in subsequent recall activities. To this end, Palmberg argues, "any receptive vocabulary activated in the pupils during the computer session can in this way be practiced and reactivated in class and gradually become part of their productive vocabulary" (p. 251).

Other text-based adventure games, such as *Colossal Adventure* and *Bone* have received similar analysis. Cheung and Harrison (1992) found that the Chinese learners of English in their study developed a number of linguistic constructions which were related to items and commands necessary to succeed in the game, rather than more nuanced grammatical features of the target language. This was due to the saliency in which these game-related vocabulary items were featured in the game, requiring a detailed understanding of their meaning in order to progress. Chen and Yang (2011) explored *Bone* for its potential to improve listening and reading skills, and help learners acquire new vocabulary. The player must understand the story – both its written and oral language production – in order to make appropriate choices and advance. The audio capabilities created new affordances for learners to practice their listening comprehension as well. The participants claimed that by playing the game, they improved general reading and listening skills, and developed an increased vocabulary. These results were however self-reported, and no empirical evidence substantiated the learners' claims.

Coxhead and Bytheway (2015) speak to the efficacy of *TED Talks*, and more importantly for the purposes of this research, MMORPGs, as tools to support SLD beyond the classroom by focusing on vocabulary development while playing *World of Warcraft*. The emergent nature of gameplay that evolves over time provides learners with a highly motivating experience that encourages vocabulary development. A number of vocabulary learning principles are detailed with regards to their relation to MMORPGs, such as: the wealth of observable language players are exposed to and the amount of time they willingly invest in playing the game (upwards of 30 hours a week); opportunities for repetition and language in use, with specific learners reflecting on the frequency of observable language as the primary factor leading to development; the importance of meaning-focused language production that the player uses to progress and speak about meaningful in-game experiences; and, opportunities for fluency practice, in the sense that players can communicate fluently without worrying about accuracy due to the rapid pace of conversation and the association of spelling mistakes on typing errors. The authors propose the utility of having learners share their experiences in-class, with the instructor otherwise assuming the role of a facilitator of conversation. Concerns educators have about the utility of vocabulary observed in game are addressed as well, as the authors argue that “players must be able to understand high frequency words that are used the same way as they are in everyday usage” (p. 71), suggesting that although games do contain heavily contextualized language, learners are still presented with ample vocabulary that is entirely relevant to a wealth of experiences.

Miller and Hegelheimer (2006) found *The Sims* facilitated vocabulary learning when students were provided supplementary language learning materials as a required component of a course, in comparison to students who either could voluntarily make use of these resources, or were provided no resources at all. Post-tests and post-surveys substantiated these results. Ranalli (2008) builds on Miller and Hegelheimer’s work with the same game, focusing more on the affective reactions of the players to the game, as well as the potential vocabulary acquisition that may occur both while playing the game and using additional learning materials referencing the game. Ranalli found that a combination of gameplay and supplemental materials can

indeed lead to vocabulary acquisition, although it is difficult to say whether one of these tools had a stronger influence than the other. Playing with partners was considered to be effective as well, helping not only to discuss the game in the target language, but also to figure out how to play the game.

Finally, Peterson (2010b), analyzing a number of the previously mentioned studies (see Thorne, 2008; Rankin et al., 2006; 2008), suggested that MMORPGs may prove to be a “valuable tool for vocabulary learning” (p. 436), and that these learning environments encourage interaction and negotiation between players, thus providing excellent opportunities for the emergence of SLD through communication between players.

Modified games for vocabulary development. Cornillie, Jacques, De Wannemacker, Paulussen, and Desmet (2011) examine the potential of adaptable COTS role-playing games for vocabulary development. The researchers used methods which provided the players opportunities to notice, or short periods of time in the gameplay process to focus on formal aspects of the language. Listing the features of DGBLL that make vocabulary learning beneficial – such as the visual contextual cues players observe while completing quests, and the multimodal ways in which players are exposed to the target language – the researchers suggest that by instituting an intelligent tutoring system that prompts the learner to explain the choices made during gameplay will improve the possibility that the language learner notices new vocabulary.

Purushotma (2005) looks at ways in which a commercially-available game, such as *The Sims*, can be modified to better facilitate SLD, by accessing the language files for the digital game and modifying them so that more complicated words (as per the instructor’s discretion) are provided with a written translation to help scaffold language learning. In this experimental study, it is argued that providing the learner with some explicit linguistic or grammatical instruction either during or after gameplay (which by nature is more content-focused), can help encourage students to pay increased attention to the L2 and better combine content and language instruction.

Although not specifically concerning gameplay, Sockett and Toffoli (2012) determined that English language learners engaging with various online activities (such as watching television, listening to music, or participating in online chats) were able to develop new vocabulary items, primarily in the lexical realm, yet also some syntactical structures as well. These new linguistic constructions were mainly conversational (such as 'see you soon' or 'wait a minute'), yet they were able to recall them after the study had finished, and importantly, all participants indicated self-reported development in the four primary skill areas due to their involvement in online activities.

Summary. Although vocabulary development has been analyzed often and in a multitude of ways, the retention of any gains or improvement in SLD has still yet to be truly analyzed. The studies which have purported actual improvement in vocabulary knowledge have either been conceptualized within pre-test/post-test methodologies, or are based upon student perceptions indicating an increased knowledge of vocabulary in the target language. Furthermore, the recall of these various vocabulary items has been limited to rather superficial contexts, such as in immediate recall scenarios that do not productively use the language in meaningful conversation contexts. Yet nonetheless, there is specific evidence that vocabulary acquisition occurs incidentally in these games, and can be further facilitated through instructor intervention.

DGBLL Supporting Near Transfer to Non-Gaming Contexts

Second language development that occurs while playing and interacting with a digital game need not be only useful in the game itself and its accompanying experience; rather, the extramural setting and the learner-centric nature of game-based learning can facilitate the near transfer of linguistic constructions. This transfer of skills or abilities aided by digital games has been observed since the early days of game development, with game skills leading to better mastery of scientific simulations (Prensky, 2001).

Separated into two distinct categories, transfer can be defined as far transfer (transfer to a dissimilar context/topic) or near transfer (transfer to a similar context/topic) (Barnett & Ceci,

2002). Brown (1989) claims that for transfer to be successful, knowledge concerning the area to which the principle is being transferred is necessary. DGBLL lends itself well to near transfer, as although the environments vary, the ability being developed – second language proficiency – is applicable regardless of the context. As Tobias and Fletcher state, “transfer of knowledge, skills, and attitudes from games to tasks in school or training contexts, or to activities in life generally, is of central significance for the effectiveness of games in delivering instruction” (2011, p. 161). To argue for the significance of DGBLL is therefore to argue for the necessity of transfer from the game environment to various external contexts. Transfer is, however, ultimately difficult to substantiate and is multi-determined: “although various forms of transfer occur... success depends on certain aspects of the situation, including the content to be transferred and the context to which it is transferred” (Barnett & Ceci, 2002, p. 632).

Gee (2003) initially considers the role of transfer within games, hypothesizing what he refers to as the *transfer principle*, or the fact that in games, players are given ample opportunity to try out new skills and conventions in various settings. At times, these previous acquired skills will require slight adaptation to meet the new standards required of the player, yet at a fundamental level, the skill that was initially developed now can be transferred to a new context and subsequent iterations of the same task in the game.

In his later work, Gee (2008) expands upon this transfer principle when describing the aforementioned five experiences which are representative of good games (see Characteristics of Games for SLD), discussing the need for players to be able to apply the experiences encountered in game to similar, new situations, either within the game itself, or outside of the game environment. Using game and computer programming terminology, he claims that this allows learners to *debug* their experiences, or test out the knowledge developed in the game context to other similar contexts, ultimately utilizing the game environment as a testing ground where trial and error does not have lasting negative consequences. Of course, transfer can occur within the game as well, as experiences encountered in early parts of the game are likely to be repeated in multiple iterations of similar experiences, thus setting the player up for success in more challenging tasks. This basic level of scaffolding can also have implications for transferring

these learnt game experiences to those outside of the game environment. In this sense, although Gee is not necessarily referring to the transfer of linguistic constructions, he does reiterate that the knowledge or skills developed in digital games can be transferred to non-gaming contexts if appropriately guided.

Theories of near transfer have been applied to DGBLL research with encouraging results, as the domain/context for language practice within the game environment is primarily a sociocultural setting that encourages communication and interaction, as is often the case for the context to which this interaction is being transferred external to the game. In examining vocabulary transfer in DGBLL, Piirainen-Marsh and Tainio suggest that “the language used by players is characterized by frequent borrowing of game vocabulary and hybrid or mixed language forms that are embedded in or alternate with utterances formed in their first language in sequences where they comment on the game” (2009, p. 179). Due to the fictitious themes which are often rooted in fantasy or science-fiction in these MMORPGs, the input the player receives is largely contextualized in these environments, with vocabulary being reflective of this setting. Yet although the vocabulary may be contextualized, the underlying grammatical structures still have relevance in authentic communicative situations (see Coxhead & Bytheway, 2015). Communication occurring with both NPCs and other individuals playing the game are largely comprised of asking for and giving assistance, and comprehending the instructions of a task to successfully complete it, or in some cases, the focus of conversation may be completely removed from the game itself (see Thorne, 2008a).

Progressing from a more abstract level to research which has operationalized transfer in various ways, we can observe a number of studies which analyze digital gaming’s potential for SLD through this phenomenon of transfer. Again, we turn to two general trends in the research that has been thus far conducted: the near transfer of language, and the near transfer of skills.

Near transfer of language. Piirainen-Marsh and Tainio (2009), one of the core studies that lend credence to the theoretical framework chosen for this study, focus primarily on how learners playing digital games and embodying the game characters can transfer the language

from the game environment to in-person conversations with one another. Specifically, “by repeating, anticipating, and recontextualizing the avatars’ lines, or creating their own lines, the players demonstrate not only their close attention to detailed features of the game language, but also the relevance of language expertise to the competent management and enjoyment of the game” (Pirainen-Marsh & Tainio, 2009, p. 172). These iterations are found to be integral to the success of the transfer between contexts, reinforcing the co-construction of meaning by players. What begins as repetition is found to extend to actual transfer through multiple iterations, as players frequently borrowed the in-game language in subsequent conversations with one another removed from the synchronous gameplay experience.

Neville, Shelton, and McInnis (2009), in their development of the educational game *Ausflug nach München*, sought to understand what knowledge transfer and retention occurs after interacting with and playing their game. Approaching the phenomenon of transfer from a constructivist perspective, the researchers argue that environments which allow for the construction of meaning, such as interactive fiction in digital games, allow students to engage in a new experience, while simultaneously considering how new insights are applicable to what is already known, or how they may enhance and reinforce prior knowledge. It was determined that when compared to learners who participated in reading texts in print, those who played *Ausflug nach München* performed better in vocabulary retention, which may be due to the amount of work required to engage with the game, as opposed to just reading a text. Ultimately, Neville et al. argue that “although students may generally feel more confident about traditional pedagogical paradigms and consider these sufficiently satisfactory for their learning needs, our study seems to suggest that these approaches manifest lower levels of both knowledge transfer and retention” (2009, pp. 419-420), signifying the potential role of DGBLL for transfer. Although this dissertation does not conceptualize transfer within a similar constructivist framework as the one applied to Neville et al.’s research, the insight gathered by their results nonetheless assists in understanding the role of transfer.

Jakonen (2014) explores how secondary school students in Finland transfer language observed and encountered in informal contexts like popular culture – specifically digital games,

yet also film and music – into the classroom context. In discussions held in-class, yet related to the game *Runescape* (another example of an MMORPG), students used vocabulary encountered in the game and turned this vocabulary into future learning opportunities, discussing the meaning of words such as *dagger* with one another by contextualizing the word within the game environment. Similar situations occurred when discussing films or music, as the learner with the contextual knowledge of the vocabulary had to extend and transfer that knowledge to other individuals when communicating. Jakonen does warn that the experiences that students attend to outside of the classroom must be recognized, and although in the context of this study this is done in an integrated content and language classroom, this could extend to the digital game's affinity space as a means of allowing players to utilize the language meaningfully.

Kobayashi, Kobayashi, and Fujimura (2014) depart from the realm of digital games and look to the possibility of using physical board games for SLD and the resulting transfer that can occur through gameplay. Like the many digital games that have been analyzed in the last decade, the researchers explore the utility of a non-educational board game, *Monopoly*, in the target language. After having played the board game over the course of two days in the classroom, it was determined that players had transferred some expressions spoken by other players of the game to non-gaming contexts, yet this was primarily possible due to the players' actively reading aloud instructions and other textual elements while playing and ultimately trying to negotiate meaning amongst one another.

Near transfer of skills. Not all studies exploring transfer in language learning contexts focus on the actual language or vocabulary that is being transferred. Delwiche (2006) chooses to approach the phenomenon of transfer by examining two online environments, *Everquest* and *Second Life*, for their ability to help learners develop research methods and game design knowledge within the game environment, skills which can then be transferred to non-gaming contexts. Delwiche specifically encourages games such as these to be reflected upon, considering how participation in the game environment can be understood in the domain of professional practice, and how the skills developed in a virtual gaming environment can be transferred beyond that environment to real-life, professional contexts.

Peterson (2010a) explores the transfer of strategy use when interacting in virtual online worlds such as *Second Life*. After providing the research participants with three varied tasks to incite interaction amongst one another, Peterson found that many participants transferred communicative strategies which would be typically employed in non-gaming contexts (for example, general technology use or the traditional language learning classroom) to these gaming contexts, such as splitting turns with one another and using polite forms of address. Although such strategies may not seem necessarily foreign to the virtual environment, it is nonetheless encouraging, as Peterson states that these online CALL environments are indeed an appropriate setting for SLD and skills and strategies developed elsewhere can still be employed in these virtual online environments.

Turgut and Irgin (2009) discuss the phenomenon of transfer within the context of online digital games played in internet cafes in Turkey. The researchers argue that educational games which lack a contextualized practice of language are not ideal for authentic SLD. The language encountered in sports, role-playing or simulation games, however, which is highly contextualized, is ideally situated for this form of authentic SLD, due to the ability to transfer unknown encountered words to different settings and tasks. The researchers further distinguish digital games from other forms of media, such as film or books, which do not reuse the same vocabulary as often as some digital games do, signifying that repetition may lead to increased chance of transfer to occur.

Summary. In these various studies, near transfer is operationalized through a variety of means, although overwhelmingly is it through strict vocabulary gains. The studies which examine other transferable aspects from gaming to non-gaming contexts, such as strategy use (Peterson, 2010a) and more general skills within an educational setting (Delwiche, 2006), are more challenging to explicitly define and observe within the span of a research study, especially when the gameplay is confined to a classroom setting without the possibility for extended gameplay sessions. We may also observe the transfer of the medium of language use, which although is not focused upon in these studies, can be observed in the data accompanying this dissertation.

The research nonetheless positions DGBLL environments as contributing to near transfer, particularly when the language that is encountered in the game is either observed through multiple iterations within the game context, or emerges in non-gaming contexts. Reinforcement can assume a variety of forms, whether it is instructor-supervised or led, or if the reinforcement comes from the other participants in the affinity space which the game encompasses. Research methods that encourage longitudinal results, demonstrating the ability of learners to transfer language from the game to non-gaming contexts beyond in situations immediately following the gameplay experience, remain needed.

DGBLL in Extramural Settings

A final noteworthy domain of research relevant to this dissertation explores extramural SLD, or learning that occurs beyond the classroom (Benson & Reinders, 2011). This is an important distinction to consider as the very nature of gameplay in its purest form is an experience that does exist outside of traditional learning environments, as is evident by its roots in the entertainment sector, as opposed to the educational games which dominated the early stages of development in CALL. While these educational games, and ultimately most vernacular games in game-enhanced research environments, are analyzed within educational contexts, there is still room, and I would argue, a necessity, to explore how games are played in contexts removed from the foreign language classroom, as a number of studies explore.

The literature surrounding this out-of-classroom context has been studied under a variety of terms, including extramural (Sundqvist & Sylvén, 2012a; 2014), informal (Stevens, 2010), and beyond the classroom (Benson & Reinders, 2011). These terms can be largely used interchangeably, but for my purposes, I elect to adopt Sundqvist and Sylvén's terminology to express the potentially educational characteristics of this form of learning, even though it is removed from the classroom context, primarily due to their own extensive research on DGBLL – including *World of Warcraft* – and other forms of media in these extramural contexts. Extramural in this context implies that language is encountered or observed outside of the school, but does allow for both intentional and unintentional learning to occur (Sundqvist,

2009). This distinction separates it somewhat from Stevens' definition of informal learning, which is:

Learning resulting from daily life activities related to work, family or leisure. It is not structured (in terms of learning objectives, learning time or learning support) and typically does not lead to certification. Informal learning may be intentional but in most cases it is non-intentional (or 'incidental'/random). (2010, p. 12)

I would argue that extramural learning can be intentional more often than not, as the learning that is implied does not have to be necessarily rooted solely in language learning, but rather, can be related to intentionally learning how to play the digital game. This may then result in the development of second language proficiency. Furthermore, as McGarry and Schmenk (2013) argue, autonomy and lifelong learning of the variety that extramural contexts may encourage do not assume that the learner is removed from the benefits of the social dimension of learning; in fact, as they suggest, "language education ought to help learners discover and explore other words, worlds, and worldviews" (p. 72). To this extent, the extramural context of language learning that still promotes intentional learning through social interaction with other learners can be beneficial.

The affinity space model (Gee, 2005) is helpful to understand why these online spaces and the learning that occurs within an extramural space such as *World of Warcraft* is effective. The affinity space operates by giving like-minded individuals interested in a digital artefact (like an MMORPG) an online space to participate in and communicate with one another. Squire details the founding of the online site Joystick101.org as an (at the time) emerging affinity space due to the "potential for learners to self-organize and use learning communities to further their interests and passions and to make a demonstrable impact on the world" (2011, p. 75). While making such an impact within the confines of *World of Warcraft* is difficult, simply due to its enormous population size, players and participants still self-organize within this digital space and the learning that results occurs in a multitude of dimensions, whether game-oriented or language-focused. The self-organization that occurs within a MMORPG invites a culture that operates on its own, with emergent properties and learning potential rooted in the very needs

of the individuals and wider-community. If an individual wishes to become a great game player, he or she will scour third-party resources online (wikis, discussion forums, FAQs, etc.), interact with fellow players of the game, and simply figure out how to play the game through experiential play. These self-guided practices then result in the formation of an affinity space.

Although the majority of studies examining DGBLL situate the learning experience within a structured academic context (see the many examples above), in reality, a large population of individuals are playing digital games in their spare time, and it is therefore imperative that the implications of playing these games for SLD purposes outside of the classroom are explored. Sykes and Reinhardt (2013) point to the inhibiting constraints of the traditional classroom as being unable to provide the sort of extensive feedback and scaffolding that students require to excel in learning a language. Toffoli and Sockett (2010) explain that upwards of 60% of university students in France will take the time to explore online resources (videos, games, social networking) in the English language. Even when digital approaches such as these are applied in the classroom, there is seldom sufficient time to invest in the digital experience while still adhering to the curriculum.

However, these common classroom challenges can be mediated within the extramural digital gaming environment. The immediacy of feedback and individual goal-oriented nature of a digital game, and especially an MMORPG such as *World of Warcraft*, encourages the learner and helps scaffold the SLD process. This may not be a complete replacement for the traditional interaction found within a language learning classroom, yet if we are seeking new means and methods for students to develop their L2 proficiency outside of the classroom (beyond administering homework and other assignments), then it is advantageous to look towards extramural learning activities that capture the attention of students by embracing the ludic experiences which are already common-place. Cornillie et al. observe a similar possibility for digital gaming, claiming that “gaming environments, MMOs in particular, seem to present useful sites for investigating whether learners are oriented towards outperforming themselves and/or others, whether they are driven by mastery goals, and with which learning patterns these goals are assessed” (2012b, p. 250). Of course, such an area of analysis is difficult to

capture due to the complicated nature of extramural activities in general, but it remains an area of interest that requires further investigation.

Thorne and Reinhardt (2008) offer the idea of bridging activities as a means of understanding how technology can function in such a way as to connect the traditional L2 classroom with the multiliteracies existing in the outside world. They argue that "advanced foreign language learning can be served by combining the best of the analytic traditions of schooling with the life experiences and future needs of today's foreign language students" (p. 562). In their framework, all activity is teacher-mediated to some extent, which may not be a reality that all language learners can afford; possible mediation may also be served by a wider social community, as defined by the Gee's (2008) *Game* distinction. Although this may be arguably less conducive to language development, the motivational factors inherent in the sense of belonging that comes with an online game community may encourage learners to become even more heavily invested in not only the game, but by extension, the language rooted within the game.

Good games have particularly compelling benefits for encouraging and motivating learners to play with language in a freeform setting, removed from any explicit learning objectives; Godwin-Jones emphasizes these inherent benefits, claiming that "game playing can be a powerful agent for learner autonomy, a potential resource for long-term language maintenance, and an entry-point for gaining interest in learning new languages" (2014, p. 11). It is for these reasons, and the wealth of reasons related to the general population of university students who have now grown up surrounded by digital games, that their utility as aiding SLD should to be examined in their most natural and unobtrusive state – beyond the language classroom.

Admittedly, this is less common for a variety of reasons, chief amongst which is the difficulty to conduct an analysis that is not concentrated in the classroom. Technological, space, and motivational issues challenge, and in some instances impede, the possibility of research existing beyond the language classroom. Yet nonetheless, if we are to analyze vernacular games in their natural element and understand how learners engage with games in their free time, it is

necessary to explore them in this original context to see how players then appropriate the affordances that the game offers into authentic learning experiences. Returning then to the core studies detailed initially, three focus on the affordances of the extramural learning environment and its benefit for DGBLL.

Piirainen-Marsh and Tainio's (2009) research is perhaps the most widely cited in its effort to empirically demonstrate the effectiveness of DGBLL in contexts removed from the classroom. Their study looks at DGBLL as a social practice, analyzing the means by which language learners attend to semiotic resources made available by the game while engaging in collaborative play with other game players. The oral nature of the gameplay, which encourages learners to repeat, recontextualize, and borrow linguistic constructions heard in the game, provided the requisite impetus to motivate students to practice using the target language without the direction of an instructor.

Thorne (2008a) makes the argument as well that online environments, which are external to the classroom and chosen by the learner, can be incredibly productive and worth encouraging students to engage in. After examining the conversation that occurs organically between two players of *World of Warcraft*, Thorne speaks to the unique benefit of these extramural language learning encounters, stating that "certain developmental trajectories occurring in informal learning environments may only be possible in self-selected activity marked by the establishment of relatively egalitarian, and situationally plastic, participation structures" (p. 323). To this extent, had the language learner been told expressly how to play the game and who to interact with (or who not, as some may still be wary of the other habitants of these online spaces), the resulting opportunities for natural communication in the target language would not have been able to manifest as constructively as they have here. The experimental nature of this study, however, cannot address what aspects of the extramural setting may have contributed to these developmental trajectories.

In the last of the three core studies which consider the role of extramural DGBLL, Rama et al. (2012) provide learners the opportunity to play *World of Warcraft* outside of the classroom, free to play at their own pace and for the length of time which they choose. With few

restrictions placed on the students, beyond the fact that researcher himself participated in gameplay with the learners, it was discovered that players wanted to invest time in the digital game due to the enjoyment of the gameplay experience and the resulting social interaction. The in-depth research methods employed by the researchers, including observation, transcription, and journal entries written by players, indicated that social presence proved to be vital, as it was determined that should players be unable to find other individuals to play with, their experiences will not be as beneficial, and therefore the instructor – should he or she have a role – should try to structure formal groups in the virtual environment so that all players can feel this sense of belonging to the affinity space.

Other studies explore the utility of extramural learning, but do so in contexts removed from MMORPGs and other digital games.

Sockett (2011), exploring how individuals learn by watching English television programs, suggests that when learners engage in online learning in informal settings, what matters primarily is the desire or intention to communicate with others; any SLD that occurs is a by-product. This perspective is largely reflective in the ways in which extramural language learning functions, as by default, there is likely no instructor-driven motivation that guides the learner to participate and potentially learn; rather, a stimulating and motivating experience must be at the forefront of the learning, and if structured appropriately (by establishing opportunities for reflection), then learning can occur.

Sockett and Toffoli (2012), expanding upon the earlier work by Sockett (2011), follow English language learners over the course of eight weeks as they document their encounters with English in online environments, indicating the amount of time spent and any insight garnered from these various encounters. Many learners interacted in online communities in the target language, communicating with other people both synchronously and asynchronously. Here too the participants speak of the vocabulary acquisition that took place while engaged in these online environments, particularly when watching television shows, as they were able to pick up on vocabulary which was frequently observed and directly related to the media they were interacting with. The researchers found that virtual communities play an integral role in

establishing a community between learners, a similar result as was seen in Rama et al. (2012) as well.

In a later study, Sockett (2013) analyzes nine English language learners who were encouraged to maintain blog entries concerning the development of their language proficiency outside of the classroom, particularly in the online environment, arguing that “language development takes place as the informal learner uses tools such as categorization and pattern detection to make sense of the situation and compare the messages received with his or her own world and linguistic knowledge” (p. 60). Numerous strategies were determined to assist in this process, such as: a limited focus on form, instead emphasizing the meaning of communication and the task at hand; understanding topic specific categorizations of language; detecting patterns that are rooted in specific contexts in the setting or task that the learner is engaged in; and, imitating other speakers of the language who are encountered either while playing a game or interacting online in various discussion boards.

Prominent researchers in the field of extramural language learning, Sundqvist and Sylvén (2012a) explore three separate studies which in various and meaningful ways analyze the effect of transfer in L2 learning. Examining children learning English as a foreign language and the various extramural activities which they engage in, the studies continually reference the fact that boys playing computer games in their spare time perform better on language tests than those who do not. The three studies point to similar and succinct results: that gaming is related to vocabulary acquisition in the target language (Sundqvist & Sylvén, 2012a). Specifically, the authors claim that “what a learner learns in the autonomous, self-regulated context of gaming seems to be transferred into useful knowledge and proficiency in the language classroom and lead to improved learning outcomes” (p. 204).

In her earlier work, Sundqvist (2009) examines the nature of what she defined as *extramural English*, or out-of-class SLD. By examining a group of eighty 9th grade Swedish students studying English and interacting with the English language in a variety of extramural situations, she discovered that the activities that assisted most in language learning were those that required productive skills (i.e. playing computer games and surfing the internet).

Furthermore, the boys in the study scored better on vocabulary acquisition tests, which Sundqvist attributes to their increased time spent engaging in these productive skill-based activities. Interestingly, the game the boys played most often was in fact *World of Warcraft*.

Finally, Holden and Sykes (2013) explain the development of the game *Mentira* using the ARIS (Augmented Reality for Interactive Storytelling) platform, which allows players to explore a physical space while simultaneously being immersed within a virtual space using their phones. By navigating to specific locations in the community, players are presented with virtual dialogues between themselves and fictional characters in the target language. The researchers found that players were motivated to play and spent time actively reading the narratives they were presented in order to progress in the game, primarily due to the place-based approach to language instruction that removed them from the confines of the classroom and engaged them with the local community.

Summary. It is evident when exploring these various studies that the practice of analyzing SLD in an extramural setting is challenging due to the complexity and wealth of data that should be collected and analyzed. Most studies elect to capture only part of the process that learners undertake in settings removed from the classroom (with the exception of Rama et al.'s (2012)), or study only a limited amount of gameplay. This is however entirely understandable, as the games chosen to be analyzed either lack the technology necessary to record all interaction learners have with and in the game, or the demanding nature of observing all gameplay would be unsustainable. This dissertation study attempts to overcome these obstacles by utilizing *World of Warcraft* due to its interaction recording capabilities, as well as simply investing the time in a longitudinal analysis that can sufficiently monitor and track the SLD of language learners.

Chapter Summary

The proliferation of digital gaming is undeniable, however its perception amongst educators removed from the field of CALL remains pessimistic. Chik (2012) explores the perspectives of English teachers toward digital gaming, which were found to be largely

negative and skeptical. The inappropriateness of typical digital game content and the inferiority of game-text to print-text were cited as major impediments to the reception of DGBLL (Chik, 2012). Furthermore, the only digital games found moderately acceptable were those that mirror the tutor-based view of CALL, promoting grammar accuracy through drill and kill exercises. Instructors with previous gaming experience could see the benefit of DGBLL, whereas those without could not.

Yet, as Peterson writes, “the dramatic growth of the Internet has enabled individual language learners to access, both inside and outside of the classroom, an ever expanding array of software programs, communication devices, and online resources” (2013, p. xiii). The instructor does not need to ultimately be the sole provider of instruction in the target language, and specifically does not need to police or control the use and application of DGBLL; rather, he or she can speak to the benefits of DGBLL and point the learner in the appropriate direction if need be. To return to Thorne et al.’s (2009) position that online games remain dismissed in the context of L2 education, it is advantageous to approach DGBLL from the perspective of the affinity space, rather than the traditional L2 classroom. As instructors or self-motivated language learners, we can benefit from the passionate individuals who reside within these affinity spaces to provide an appropriate and meaningful language learning experience through the gameplay experience.

As was alluded to above, with the growing number of research studies exploring DGBLL, there is still a need to more thoroughly understand the learners’ experiences when playing these games. The methods employed by many of these studies do not address the learner/player experience empirically. Beyond simple learner reflection or snap shot approaches of gameplay, longitudinal studies that follow the entire gameplay experience are beneficial in their ability to better understand how the process of playing a game and the language learner’s interaction within and about the game substantiate meaningful SLD. To understand this, however, requires a theoretical framework that not only accepts the complexity of the gameplay and SLD process, but embraces it. Analyzing gameplay through a complex adaptive systems

lens generates this perspective and facilitates a thorough investigation into DGBLL, as will now be explored.

Chapter III: Complex Adaptive Systems

Understanding Complexity in Second Language Development

A fundamental difficulty in studies analyzing the potential of digital games for SLD has been to determine what is occurring throughout the gameplay experience, and how the experiences that do occur impact the language development process. The very nature of DGBLL, especially in settings external to and beyond the classroom, suggests that a theorization of language which can accommodate the ostensibly unstructured nature of MMORPGs and the myriad of possibilities for progression and interaction is necessary. Whereas some theories of second language acquisition may emphasize language learning as a social process and thereby position elements such as division of labor, social actors, and various rules for interaction as the primary focus, and others adopt a more cognitive stance and emphasize the role of the mind, a complex adaptive systems (CAS) theory strives towards acknowledging and understanding how the two relate to and impact one another. Larsen-Freeman argues that "we should be looking for how to connect cognitive acquisition and social use... Forcing us away from reductionism and towards holism" (2002, pp. 40-41). This means analyzing the language as *langue*, or the rules of the language system, such as its syntax, lexis, and semantic properties is arguably insufficient, as it necessitates a view of language that ignores the disparate usages of language by its actual speakers. Complex adaptive systems, however, aim to understand the individual use of language in its context, and thereby more accurately analyze language as *parole*, or language in use by real speakers and as influenced by other factors, human or environmental. To understand the way in which a complex adaptive systems framework conceptualizes and positions the process of learning a second language, a simple distinction detailing what is implied when we discuss this process is helpful.

Typically, the term second language acquisition (SLA) is employed in the vast majority of research concerning this phenomenon to imply the process of learning a second language. Although it may not be utilized as such, the very term second language *acquisition* implies (intentional or not) an end goal of having acquired a language, thus at least theoretically acknowledging that a language can be fully acquired. Although these studies may not make this

assertion – as de Bot et al. (2007) maintain, researchers not only would agree SLA is complex, but that many factors attribute to the learning process – the nomenclature itself signifies that to be so, and results in a teleological representation of language. And yet, even assuming that the term SLA is used without this intention in mind, much research in SLA is still largely defined by assuming a clear linear development of language skills with a proposed end state, such as how learners acquire new grammar or vocabulary. This neglects the chaotic and complex reality of language learning – that is, what is learnt one day does not necessarily result in it being remembered the next. Instructors teaching two sections of the same language class may prepare and teach the same lesson to each section, but the learning outcomes of these distinct groups of students can be drastically different due to a multitude of factors. Two students investing equal time studying vocabulary too will not result in identical acquisition. As instructors and language learners, we know this to occur, and as such, the nonlinearity and lack of proportionality between cause and effect lend credence to the decision to employ a theory of language learning that embraces nonlinear trajectories of development.

Second language development, contrastingly, signifies that the process of learning a language is indeed a *development*. Development, in turn, implies that this process is fundamentally nonlinear, and can take many deviations from what may be expected if a language learner participates in a set curriculum with expected learning outcomes. De Bot and Larsen-Freeman (2011) explain that the term development, rather than acquisition, is broader, and more accurately describes how languages spoken by individuals with more than one language develop. This should be rather self-explanatory – as a learner hears or reads a new lexical or syntactic item in the L2, this may trigger a cognitive association with another item in the L1 or another language, which may consequently reinforce or hinder its acquisition. More specifically, phenomena that would otherwise be classified as noise in the process of language learning, or at the very least, as not being directly conducive to acquisition, such as transfer from the L1 or code-switching, are instead considered natural aspects of SLD. Furthermore, the central concepts of acquisition *and* attrition are both simply elements of SLD, as linguistic proficiency grows and declines in a nonlinear fashion.

In this sense, SLD as a theory is explanatory rather than predictive. Because of their nonlinearity, development trajectories or possible end states can often not be predicted. SLD does not try to simply describe what is occurring or has occurred, but instead explains in detail what causes the act of language learning to occur (Verspoor et al., 2011). To do so, however, requires a theoretical framework that provides the researcher with sufficient means of analyzing the inner workings of a process such as second language development. Complex adaptive systems are one such means. They permit an analysis of otherwise seemingly unrelated phenomena by giving appropriate credence to each (potential) variable through a rather sophisticated and detailed study, resulting in unified approach of the system as a whole, rather than a singular variable or aspect of the system (Beckner et al., 2009).

At times referred to as dynamic systems theory, complex adaptive systems can simply be understood as an overarching term for this theory (Larsen-Freeman, 2008b). Some researchers refer to this phenomenon as an *ecological* perspective (Kramsch, 2002; 2009; van Lier, 2002; 2004; Casanave, 2012), which, like CAS, emphasizes the relationships between individuals and their environments, where context is fundamental to understanding these relationships. Distinguishing theoretical frameworks such as these from others applied in SLD studies, complex adaptive systems make time and change its primary unit of analysis (Larsen-Freeman, 2008a). Our goal then is to determine what happens to a CAS as it develops and its properties emerge, and which factors would have contributed to or drove that change. This process-orientation of the system is fundamental to our understanding of how it functions, and the external factors which influence the open nature of the gaming process as a CAS – including the interaction and communication between individuals, both human and computer-controlled – are given specific attention in the analysis.

We can understand change as a process which is occurring throughout life, at every moment of one's life. Larsen-Freeman situates change within CAS, stating that "complexity theory embraces complexity, interconnectedness, and dynamism, and makes change central to theory and method" (2008, p. 1). One can further envision this as Blythe and Croft (2009) do, in that language change is in many ways similar to Darwin's evolutionary theory – usages of

language that survive in a social and historic sense are adopted by other users of not only the same language, but other languages as well (as is evident by the number of English words adopted by many European languages). Due to the nonlinearity of change that does occur, it is impossible to determine the exact outcome or result of the variation that may be expected (de Bot et al., 2007); rather, we must attempt to understand as best as possible the trajectories of change that do occur by analyzing the system retroactively. If we determine the current point of the system at the time of our analysis, we can attempt to trace it back to its initial conditions and argue based upon the many variables that comprise the system, what conditions may have led to the emergent change. Dörnyei (2014) refers to such an analytical approach as retrodictive qualitative modeling, reversing the process of analysis so that the outcomes of the system are considered first, and then their development is traced back to determine which system components influenced the change. Put another way, in the context of SLD the goal of CAS research is to understand how language in the system emerges, and the myriad factors which play a role in the development of L2 proficiency that ultimately occurs. De Bot, Verspoor, and Lowie define a CAS theoretical framework within SLD studies as intending to “describe and ultimately explain how language as a complex system emerges and develops over time, both as a social instrument in groups and as a private tool in individuals” (2005, p. 117). Emergence, which is central to how a complex system functions and indeed adapts, can be largely attributed to the system’s ability to self-organize due to the numerous factors which are at play. This self-organization implies a certain sense of self-adaptation that the system itself undertakes; as the system undergoes change and adaptation, it is constantly adjusting to its new parameters. Although this may then seem to imply a lack of agency for the learner and his or her ability to impact the language learning process, it rather infers that the system itself is taking into consideration the many contextual factors that ultimately play a role in SLD, such as the environment, other interlocutors, amongst other various aspects. Fundamentally, the learner’s experience, and the experiences of all other contributing factors to the system, exert change on one another and result in the dialectical development and co-construction of the system.

Unlike other theories which attempt to be predictive, offering a singular and reproducible truth, complexity theory welcomes the diversity in which agents within a system interact with one another, and the change that result from it. Davis and Sumara explain that “given the idiosyncratic characters, recursively elaborative, and ever-divergent possibilities of complex phenomena, accounts of complexity-informed research can never be offered as events to be replicated or even held up as models” (2008, p. 42). Rather than separating the psychological and the social aspects of an individual and language, complexity theory attempts to interconnect them and understand them as they impact and affect one another in unison. This offers more holistic and comprehensive views of complex systems such as SLD, or the interaction which occurs in a MMORPG like *World of Warcraft*, which ultimately serves as a useful framework then for the analysis in this dissertation.

To engage in a study of this magnitude, it is imperative to adopt a set of CAS characteristics that can facilitate the analysis. To do so, I adopt the characteristics put forth by de Bot and Larsen-Freeman (2011), which will be explained in detail; their relevance to SLD as well as their application in DGBLL (and in particular, MMORPGs) will be highlighted.

Characteristics of Complex Adaptive Systems

A CAS theoretical framework has many avenues of potential analysis, but to first understand why we use the terminology complex adaptive systems, and what that implies for how a phenomenon such as SLD functions, we must understand what each term encompassing its name signifies.

It is beneficial to begin with the core component of this theory, which is the system itself and the way in which that embodies what language learning or playing online games is comprised of. The system aspect of CAS refers to the interworking nature of the components which work together as a whole. Larsen-Freeman and Cameron further explain that the system is “produced by a set of components that interact in particular ways to produce some overall state or form at a particular point in time” (2008a, p. 26). Systems, whether complex or simple, have multiple parts which work in conjunction with one another. Simple systems have routine

and predictable outcomes that can be defined; one may imagine a traffic light with only three options (red, yellow, and green) and a defined pattern from which the system will not deviate (Larsen-Freeman and Cameron, 2008a). These individual points or phases within the system are known as the state space of the system, incorporating all potential parameters for the system. For a simple system, these are rather easy to map out, but for a more complex system, such as SLD or the process of playing a massive multiplayer online role-playing game, there are numerous components that play a role. Furthermore, just because various points exist within the state space of a complex system does not mean that each point will be accessed as the CAS functions; just because a language learner *can* learn the subjunctive mood, does not mean that he or she will, even if the subjunctive mood is the primary topic of a lesson in which the learner participates. The lesson is just a competing resource in the system with many other internal and external resources also contributing to the complexity of the system.

Complex adaptive systems too rely on multiple agents to interact within the system; simple systems can function on their own, but the inherent complexity in a CAS assumes that interaction between individuals or agents is constantly occurring and resulting in often unpredictable change within the system. It is for this reason that simply understanding learners with respect to their individual differences is not sufficient, and ultimately neglects to consider the many contextual factors (both due to interaction, as well as the environment in which the learner resides) which play a role. In reality, a wealth of factors contribute to how the CAS functions, such as cognition, consciousness, experience, embodiment, brain, self, human interaction, society, culture, and history (Ellis & Larsen-Freeman, 2009, p. 91). Kramsch (2002) notes too that variation is a given, and Davis and Simmt (2003) ponder where complexity and emergence even originate, as learning can and does occur when taking into account the many potential factors such as the environment, other learners, and cultural differences, amongst others. Examining a single variable, even if it is the learner, does not result in a comprehensive picture of the process of developing a second language.

These multiple factors speak to the variety of agents which play a role in the understanding of a CAS and how it must be analyzed. Although all agents may not receive

equal attention in an analysis of a specific CAS, these are simply potential factors to consider; indeed, attempting to analyze everything that occurs within a complex system may be challenging (see Marek and Wu, 2013) and this issue has yet to be fully resolved, beyond admitting that it is an issue (Larsen-Freeman, 2008a). We can, however, emphasize that it is the goal of researchers working within a CAS framework to reject reductionist analyses which attempt to ignore or exclude factors which are hypothesized to not play a role, instead embracing and considering tendencies, patterns, and contingencies (van Dijk & van Geert, 2002; de Bot et al., 2007; Larsen-Freeman, 2008b). Applying the metaphor of trying to identify whether a single pebble could potentially trigger an avalanche, Larsen-Freeman explains that simple pre- and post-tests cannot identify whether the analyzed pebble is ordinary or indeed the trigger of a much larger reaction, and thus, “we cannot rely on simple pre-test/post-test research designs to measure language gains” (1997, p.158). CAS analyses must simply choose something to focus on while understanding the potential influence of the remaining agents or variables to as high a degree as possible.

The other components of the CAS, the complexity and adaptiveness of the system, help distinguish it from simple systems. These components are expanded upon in the following characteristics which comprise a CAS. As Larsen-Freeman and Cameron (2008a) argue, all that is needed for complexity to occur is sensitivity to initial conditions, openness within the system for contextual and environmental factors to influence it, and the context itself which encourages adaptation, change, and the emergence of various factors.

There are however, more than just these conditions that can be analyzed in detail when considering a complex adaptive system. There exist eight key characteristics of complex adaptive systems (de Bot & Larsen-Freeman, 2011) which may be considered when analyzing a system. These characteristics will be related to the digital game world and the interactions which exist within it as a means of explaining how this unique means of SLD can be analyzed. While the immediate connection and association to DGBLL and MMORPGs may not be apparent, it is a result of the unique interactional and communicatory setting of the game environment that I would argue necessitates such an analysis to be conducted; the many means

by which individuals encounter language and communicate with one another suggests that a single variable alone cannot elucidate the role that language plays. In many ways, the game acts as a cultural artifact, and the player or language learner interacts with that artifact. The way the two then interact with each other will in itself form a complex adaptive system, as the learner must navigate the complexities of the game environment and the game environment itself is consequently modified by the player's interaction with not only the environment but the other players within the environment. This can be seen when analyzing the impact that the systems of language teaching and language assessment have when they interact and form a new complex adaptive system (Larsen-Freeman & Cameron, 2008a). Larsen-Freeman and Cameron (2008a) relate play in language development as the fringe of chaotic behaviour in a system, utilizing the language in ways which would perhaps not be expected, which is exactly what individuals playing online games in extramural, unregulated settings are doing.

I adopt the nomenclature employed by de Bot and Larsen-Freeman (2011) to describe these eight characteristics. It should be noted that other theorists have presented similar, yet ultimately different characteristic naming conventions than these by de Bot and Larsen-Freeman (see for example Sockett, 2013, and earlier research by Larsen-Freeman & Cameron (2008)). The characteristics are:

- Sensitive dependence on initial conditions,
- Complete interconnectedness,
- Nonlinearity in development,
- Change through internal reorganization and interaction with the environment,
- Dependence on internal and external resources,
- Constant change, with chaotic variation sometimes, in which the systems only temporarily settle into "attractor states",

- Iteration, which means that the present level of development depends critically on the previous level of development,
- Emergent properties (de Bot & Larsen-Freeman, 2011, p. 9).

I will dedicate space to each of these variables, explaining their relevance to not only SLD, but how they can be understood within the interaction between players, other players, and the environment in the SLD while engaged in DGBLL.

Sensitive dependence on initial conditions. When Gleick (1987) and Lorenz (1993) describe the phenomenon behind the butterfly effect, they are explaining the **sensitive dependence on initial conditions** which is present in complex adaptive systems. Lorenz was the first to refute hardened claims that small influences in systems could be neglected as they would not cause exponentially greater effects. His research documenting changes in weather patterns concluded that a complex system could be unstable to the extent that a small change at a critical point in time could cause immense change in the system's composition at a later stage. Although the sensitivity of these initial conditions must be considered when analyzing the change which occurs in the CAS, it must also be noted that the initial conditions are being reflexively altered as the system changes (Larsen-Freeman & Cameron, 2008a). This suggests that we cannot rely on the initial conditions alone to explain all changes at all times, as the very conditions that triggered initial change will themselves reflexively change as the various components of the system continue to interact.

In the context of SLD, two language learners who are otherwise similar in experience and proficiency can still see their development bifurcate due to minutely different conditions that impact the CAS. Although one may expect that two students with similar backgrounds who are participating in the same L2 classroom with the identical instructor would have similar learning results, the overwhelming similarity of these conditions can still be impacted by other conditions that change the system. These conditions may be external to the classroom, or one student may have simply had a concept resonate more with him or her, and therefore the trajectories of these two otherwise similar language learners will bifurcate and result in very

different learning experience. Regardless of how their language learning progresses, however, the end result is nonetheless second language development. There are specific examples of this phenomenon explored in SLD research, such as the belief that phonological awareness and L1 literacy are potential initial conditions leading to success in L2 development (see de Bot et al., 2007 for a more detailed discussion of this research).

The initial conditions of a complex system such as playing *World of Warcraft* and communicating with other speakers of German may provide insight into what trajectories of development and change we may expect as a player progresses in the game. Due to the immense variety of gameplay experiences which are dependent on how a player decides to play the game (such as the creation of his or her avatar and the choice of starting locale), certain opportunities may or may not be available to each player. Learners who are immediately greeted by other players or asked to join a guild will be presented with opportunities for continued interaction that learners in more solitary situations cannot as easily acquire. These situations, however, are largely dependent on variables such as the time at which a player starts playing the game, and how populated the starting locale is when the player enters the virtual world. The learners playing the game also bring their own initial conditions to the complex system, with factors such as sex, age, previous language learning and gameplay experience, as well as rationale for playing the game, all influencing the means by which learners interact in the game and the change that transpires as a result.

According to Larsen-Freeman, “a slight change in initial conditions can have vast implications for future behavior” (1997, p. 144), and this applies to the internal game structures as well which can present variable gameplay experiences depending on how the player/learner approaches the game environment. These changes continue to occur as the system undergoes repeated iterations, which is evident in occurrences such as the completion of quests multiple times. The quests themselves remain the same, yet the manner in which the quest is completed changes as a result of factors such as previous experience completing the quest or the group members with which the quest is completed. The iterative nature of the quests which learners repeat, and many of the gameplay experiences themselves, are genuinely engaging and

maintain player interest despite the otherwise repetitive nature of the task; the same cannot necessarily be said for in-class learning activities.

The challenge therefore arises when attempting to determine which initial conditions may be relevant, as the researcher's goal is to understand the change that occurs in the system by first examining the change, and then attempting to discern which conditions may have caused said change to occur (in effect, analyzing change through retrodictive qualitative modeling). For this reason, it is advantageous to understand the initial conditions of the system as best as possible in order to account for the change that may occur; as de Bot and Larsen-Freeman mandate, "for our research... we need to have detailed information on the initial conditions if we want to be able to explain differences and similarities in learning outcomes" (2011, p. 10). This implies that it is not our goal to determine immediately which conditions are important; rather, we must establish strong learner profiles of all language learners engaging in the system in order to argue which aspects may have caused change to occur.

Complete interconnectedness. A complex adaptive system is **completely interconnected**, meaning that the various aspects which comprise the system are connected to one another – if one changes, the others will be impacted to some degree. This impact may not necessarily be immense, but it will have an effect on the system as a whole.

Within the scope of SLD, this means that the lexical, phonological, and syntactical systems are all interconnected (de Bot and Larsen-Freeman, 2011), and as such, playing an online game such as *World of Warcraft* will promote SLD in a variety of ways. Written language is the predominant form of language that is encountered and observed in the game, whether it occurs through accepting quests from other characters in the game, or viewing specific goals that are often detailed with simple imperative commands directed specifically at the player. Phonologically, computer-controlled characters will speak to the player as he or she interacts with them, or even just passes by. The language heard through these short utterances is often reflected in the quest text that accompanies them, or in the overall narrative of each area in the game. All pre-designed language (that which is built into the game) is then further compounded by the authentic language spoken by other players of the game. Although this

language is dynamic and unpredictable, it too often is contextualized within the domain of the game, or at the very least, within online gaming domains in general. This has implications for research as well then, as it is challenging from a theoretical standpoint to analyze only one linguistic aspect, such as the syntactical system, as SLD is the result of the interaction of these various systems. Furthermore, as was explained previously, the very concept of SLD embraces fluidity in learning, and as such, these interconnected factors may promote or inhibit one another; the extent to which they interact will change as the system progresses, yet nonetheless, these factors will continue to interact with one another so long as the system itself exists.

These considerations must be observed when analyzing a digital game and the interaction that occurs within the game environment as a CAS as well. With many interrelated aspects in a MMORPG (such as the communication between players and other players, the written text that the player observes while completing quests, the immediate feedback messages that are provided when the player inputs an incorrect command, amongst others), there is much that needs to be considered when examining trajectories of change amongst learners. For example, learners who choose not to communicate with other players are interesting to consider when understanding a learner's development, yet this factor alone is not representative of what actually occurs while playing the game. To understand that, we must also consider the other forms of interaction that the player may have engaged in, and the language that would have been encountered and observed as a result.

Nonlinearity in development. In order to understand how SLD as a complex adaptive system functions, and how interaction within the game and the game itself emerges, **nonlinearity in development** of the system must be observed. The name itself signifies the importance of development, rather than acquisition, in language learning; it portrays language development as a sustained and dynamic process with no true state of complete acquisition (de Bot and Larsen-Freeman, 2011), in which to predict or precisely state which point a learner's development should be at is challenging (Dörnyei, 2009). Furthermore, development assumes that language learning is not linear, and learners can transition through varying stages of development, rather than always striving toward acquisition; "there is no goal or direction in

development; there is only change" (de Bot and Larsen-Freeman, 2011, p. 13), which ultimately results in complex or web-like relationships between the various states of development (Casavane, 2012). This characteristic is closely linked then to the complete interconnectedness of the CAS, as when one variable impacts another (such as the syntactic system impacting the phonological system), the development of the target language may deviate from what is intended in the learning outcome.

This is not to imply that a learner's L2 will not develop at times in the order in which the learner, or an instructor teaching the learner, intends; there are ample instances where a well-taught lesson with the same instructor in the same situation, yet with different students and at a different time, will result in the instructor's learning objectives being met and the students having learned particular linguistic items or structures, but what is less certain is how well a learner will retain the language that was learnt. This result cannot be based solely upon what happens in the classroom, but on a myriad other conditions that deserve to be analyzed as well, such as the amount of work spent reviewing the material taught in class, or how much time was spent focusing on other courses at the time. From an analysis standpoint, this implies a shift away from affirmative stances of expecting things to happen, and instead embracing the uncertainty in what could or might happen (Davis and Simmt, 2003).

The process of playing a game such as *World of Warcraft* and the many opportunities for observing language and communicating with other players functions in largely the same way; interconnected systems will spur or inhibit language learning in other areas, all of which is related to SLD. Simply because the goal is to learn language by playing online games does not necessarily mean that language learning *will* occur. Numerous variables play a role, thereby affecting the supposed linearity of development and ultimately resulting in nonlinearity; affective factors such as motivation to learn the game, play the game, participate in new experiences, or interact with other players may impact the SLD process. We know that different language learners, even though they are in the same environment with the same language being heard, will develop differently over time. This is comparable to SLD while engaged in DGBLL, as similar general game and fantasy-related language is encountered throughout the game, but

various resources, both internal and external, will result in nonlinear trajectories of change. We also cannot assume that these interacting variables develop proportionally. Time spent playing the game does not necessarily equate to the ability to observe more language or communicate more often with other players; such factors are more complex than this and need to be observed in conglomeration with one another, yet without assuming inherent proportionality.

It must be stated however that regardless of the negative or positive effect these factors have, SLD will still emerge, and certainly does not imply that the development process cannot change its trajectory yet again, thus amplifying nonlinearity. Variability should be appreciated, and ultimately, “intra- and interindividual variability are important features that should be treated as data and be analyzed” (van Dijk et al., 2011, p. 62).

Change through internal reorganization and interaction with the environment. Due to the continual process of change throughout a complex adaptive system, the system itself will **reorganize** as its many constituent pieces influence one another, especially in conjunction with the environment that contextualizes the system.

Dörnyei (2009) discusses the nature of language acquisition and the function that the environment has, arguing that it is the interaction between the learner and the environment that ultimately plays a crucial role in this process. He states too that “complex, dynamic systems are in constant interaction with their environment, so much so that the context is seen as part of the system” (p. 239). It would indeed be problematic to neglect the context within which the learner interacts, and to a large degree, that context is represented by the environment within which the learner resides. Context ultimately becomes “the landscape over which the system moves, and the movement of the system transforms the context” (Larsen-Freeman, 2008, p. 68), further speaking to the interwoven nature of the system itself and its contextual and environmental underpinnings.

We can observe this phenomenon in any classroom as well, where despite the best intentions of the instructor to create a specific learning environment, the presence of other agents in the system – the students and the many artifacts of learning – will ensure that the

system reorganizes itself constantly as new classroom rules and standards of practice emerge (Davis and Simmt, 2003), resulting in the process of co-adaptation.

Co-adaptation is a fundamental aspect of the reorganization and interaction with the environment too, as variables will, through this reorganization, begin to adapt to one another and evolve with one another. This results in what are known as conglomerate variables⁴, or variables which have over-time become reliant on one another for future development within the system. This is the very nature of a CAS, where the system is interconnected and its function is fundamentally reliant on the interaction of individuals and various artefacts within the system and its context. Furthermore, a conglomerate variable “that describes a system’s trajectory must be observable from the data and may need to be quantifiable depending on the methodology being employed” (Larsen-Freeman & Cameron, 2008a, p. 208; Thelen & Smith, 1994). Van Geert (1991) recognizes the conglomerate nature of lexical and listening development when learning an L2; as a learner recognizes and develops new vocabulary items, he or she is able to understand more of the spoken language, and vice-versa. Hirsh-Pasek et al. (1999) detail how the dynamic and interconnected nature of complexity (both syntactic and phonological) and frequency may be from a theoretical standpoint separate variables, but interact with one another dynamically in actual SLD. Work on the *MOCHA* project (Schulze, 2008; Schulze & Penner, 2008) looks at measuring the complexity of texts written by language learners by analyzing form-meaning mapping in conjunction with complexity, accuracy, and appropriateness, and is a prime example of how conglomerate variables can be formulated to assist in better understanding how SLD emerges.

Discussing change through internal reorganization and interaction with the environment accentuates the dynamic nature of these MMO games with their various task components and possibilities for interaction. The system itself self-organizes and reorganizes accordingly – it provides the impetus to interact with both non-player characters and real players through tasks and quests, offering varying goals with different social requirements to

⁴ Often referred to as collective variables in the literature, conglomerate variables are used instead and are henceforth interchangeable

complete these tasks. Yet the individual's interaction with the environment influences how successful these tasks are. Gee describes this dialectic relationship between player and environment as a trajectory in its own right through the game space; when analyzed in online gaming environments, the trajectory becomes personal and social as the two systems interact (2006, p. 3). Gee further elaborates on this process, writing that "this proactive production by players of story elements, a visual-motoric-auditory-decision-making symphony, and a unique real-virtual story produces a new form of performance art coproduced by players and game designers" (p. 4). The very nature of coproduction in online gaming signifies the adaptive relationship between player and environment, able to use language to make decisions and influence the story. Zheng too speaks to the relevance of technology and the game's ability to "provide learners with social, historical, and cultural materials to augment action and interaction across space and time" (2012, p. 557).

Co-adaptation can also occur between players. As two individuals communicate with one another with varying levels of proficiency, those with higher proficiency will often try to communicate in such a way to ensure that they are understood (Sockett, 2013). Especially in games like *World of Warcraft*, written communication is but one means by which to communicate, as gestures and on-screen visuals can also serve as tools to ease and adapt communication standards between players. As groups of players continually play with one another and complete multiple quests or dungeons together, each serving as an iteration in the CAS, individuals will begin to adapt to one another and develop their own systems of communication to ensure success – designating certain roles to one another and subsequently identifying one another by these roles is one means by which players adapt to the needs of the current iteration in the system. Other MMORPGs, such as *Star Wars: The Old Republic*, allow co-adaptation between players and non-player characters in the game. In this sense, the computer acts as a tutor, providing feedback and adapting to the choices the player makes by adapting the response the player receives based upon his or her input, and thus engaging in authentic and meaningful communication.

Internal and external resources. The **internal and external resources** of a CAS are required to construct and maintain the system. The internal resources are those that are within the language learner, such as motivation and time to learn, ability to solve problems effectively or use a computer, and so on (de Bot & Larsen-Freeman, 2011). These are not specific to the online game, but certainly do affect the process of a language learner playing a digital game – individuals who are less motivated to learn German initially may be subsequently less motivated to play *World of Warcraft*, or an individual's enjoyment of online games may boost an otherwise low motivation to learn German. The external resources are not directly related to the individual learning within the CAS, and can include items such as the spatial environment being explored or the material artifacts with which the learner interacts (de Bot & Larsen-Freeman, 2011). One might consider the development of a young child; as he or she learns new cognitive and motor skills as internal resources, the function of the external world around him or her will change and both will adapt to one another (de Bot et al., 2007), or the student who must deal with extenuating circumstances external to the classroom, such as sickness in the family. This may cause him to miss class and be unable to study, resulting in long term implications on future employment opportunities in his desired field (Marek and Wu, 2013). Teaching too is an external resource in a CAS, as an instructor can modify the internal resources that the language learner contributes, such as encouraging extra motivation to continue studying and learning the target language, and combatting potential debilitating internal resources such as fossilization. Regardless of the applicable internal and external resources, the interaction between these two resources is fundamental to how the CAS functions.

Specifically for MMORPGs, interaction between non-player characters and live players are examples of the integration of internal and external resources. How the language learner's internal resources (such as willingness to communicate with other players, time at which he or she plays the game, general understanding of how communication in the game functions, etc.) interact with the external resources (the interlocutor can either be computer or player controlled, the demands of the task at hand, the power differential between both players' in-game avatars) will determine how the CAS develops, and in this case, whether or not the

resulting opportunity for communication is beneficial for the language learner. Further compounding these language learning opportunities are other resources external to the system, and even the game itself, such as discussion boards and wikis. These resources construct the affinity space which all players have access to, and can be contributing factors which will in turn modify the internal resources of the CAS – open and active participation on a discussion board may increase the learner’s knowledge about the game or a specific quest, which in turn may provide an opportunity to assist another player in the game and create a new friendship, all of which may lead to increased motivation to play the game with that individual.

Sockett (2013) reflects on the role of imitation when learning informally and communicating with other speakers, as students learning English through media-based applications would attempt to mirror the actors on film or musicians singing, resulting in a learning experience which looks to the external resources which are available (and for English language learners, there are many) to further develop proficiency in the L2. Language learners playing games for SLD purposes also use the affordances of the game itself to facilitate this process, such as when specific buttons on a controller correspond to communicative functions which encourage communication between players while simultaneously reinforcing the terms which the game employs to perform the associated utterance (Sockett, 2013). Casanave (2012), in her informal Japanese language learning pursuits, also conceptualizes her internal self as interacting with the external environment, which was comprised of watching Japanese TV and other daily tasks which incorporated the Japanese language to various degrees. Her ability to self-study and learn Japanese while abroad, requiring ample motivation and other contributing factors, function as internal resources which are then supported by the external resources of the system (such as the many tasks which she engages in which lead to opportunities to use her developed second language proficiency).

Attractor states. The notion of **attractor states** in CAS is essential to SLD, the game environment, and the associated player interaction. According to Larsen-Freeman and Cameron, “in the topological vocabulary of system landscapes, states, or particular modes of behaviors, that the system ‘prefers’ are called *attractors*” (2008a, p. 49, emphasis in original;

Thelen & Smith, 1994). As complex adaptive systems are nonlinear, there will be certain states within the system that it can attract itself to and exert force from. We can think of these states as those which the system simply prefers, and this preference could be due to a number of reasons, such as the state being relatively easy to reach, or the subsequent state being challenging to develop. Likewise, repeller states exist too wherein aspects of the system repel the individual away from the system state. Attractor states vary as well in terms of how easy they are to transition out of, with some being extremely difficult and ultimately resulting in fossilization. Others, however, may be less confining and pose only rudimentary challenges at a specific point in the system until that system changes and some variable causes change to occur and the attractor state to be overcome.

In SLD, this may be a particular grammatical concept that was learnt, such as regular verb conjugations, that influences learning irregular verbs at a later date. Initially, all verbs may be understood to be conjugated in a similar way, and this behaviour will be reinforced over time until the attractor state can be overcome and new linguistic constructions can be learnt. In more severe terms, fossilization can occur where an attractor state has no additional external resources employed or energy exerted; if the language learner has no discernible reason or opportunity to further improve his or her L2 proficiency, or a barrier exists which makes progression impossible (such as challenging instructions in a digital game or the conclusion of the study itself), then continued improvement in the L2 may be very difficult to attain and the CAS itself may be in an attractor state. Dörnyei (2009) reflects on the role of attractor states in an individual's development of an L1 as the rationale behind why understanding SLD as a complex system may be difficult to comprehend, as an individual's L1 development largely consists of attractor states that seemingly exhibit a lack of complexity or variance, yet this does not mean that developing one's first language is any less complex; this complexity, however, is much easier to see in an individual's L2 development, yet it remains challenging to trace the trajectory of such a development. Dörnyei further explains that "L2 development is far more exposed to the impact of system complexity than mother-tongue learning, which is reflected in the heterogeneity of the (typically limited) end state of adult learners' language attainment"

(2009, p. 240). Although one can argue the extent to which heterogeneity truly exists in adult L1 speakers, it is certainly true that the process through which an individual develops an L2 is anything but heterogeneous, despite the best efforts of instructors, textbooks, and curriculums.

If we apply the online game to this metaphor, there are various attractor states that could influence SLD. The myriad tasks and quests available to the player are typically structured around set-phrases that instruct the player how to proceed and accomplish the task, and are observed in multiple iterations. Even relying on subtitles or other L1 cues in the game world can act as an attractor, being at once useful, but also potentially hindering the learner's progression at a later state (Sockett, 2013). It should be questioned however whether attractor states such as these can be utilized as sources of syntactic and lexical input which can then be transferred to authentic and meaningful language for the language learner. Such a concept relates back to the paradigm of analyzing the process of learning to play, not playing to learn, where SLD occurs simply by playing the game (Arnseth, 2006; Sykes & Reinhardt, 2013).

Attractor states can also be useful when trying to better understand the parameters of a system. The potentially chaotic nature of a CAS can make it difficult to understand the system, but attractor states can provide useful confines within which a system can be analyzed, as well as allowing a brief respite in order to determine at least one result of the system, thereby providing some clarity to the otherwise complex nature of the system. It must be noted as well, however, that although a CAS may find itself occupying an attractor state, this does not signify that there is no longer any variability or change occurring, but rather, the degree to which the system is changing is as of yet not able to transition the system beyond the attractor state.

Iteration. The role of **iteration** is crucial in a CAS too – in the same way as the system is sensitive to initial conditions, the changes that occur within the system will impact the development of the system itself. Each instance of language use will result in (minute) change within the system, which as a result, transforms the system in its entirety. De Bot and Larsen-Freeman (2011) explain this transformation as not being necessarily a fundamental alteration of what we understand as SLD, but rather, this could be as simple as a linguistic construction being more likely to uttered again in the future due to its initial usage. Greater changes to the

system, such as learning a new grammatical case, may be possible as well, and these too will result in the system experiencing new iterations that change the system in unpredictable ways. Larsen-Freeman and Cameron (2008a) and de Bot et al. (2007) both refer to the iterative process of the parent or care-taker and the infant learning how to communicate with one another as an example of iteration in language development as a complex adaptive system. A baby is initially unable to communicate with an adult, but through repeated interactions, means of communication emerge that are meaningful and understandable, and ultimately, this process continues for the remainder of both their lives. Schoenemann describes this process in detail, stating that “the adaptiveness... of an individual’s particular behavior at any given moment in time depends crucially on the flexible responses of others in the group, who are at the same time attempting to behave in an adaptive manner in response” (2009, p. 164).

In the context of *World of Warcraft*, similar iterations occur in every aspect of the game. On a fundamental level, each quest the player accepts, each time they go to a shopkeeper to sell items, or each time they enter a new area of the game, iterations exist within the system that are often repeated and self-similar with slight differences so as to affect change in the CAS. These iterations can be more profound as well. As new quests are completed, the game assumes the player has amassed a new level of power that will consequently open up new types of quest content. While initially a player may be tasked with mundane quests such as delivering letters or packages within a town, more complicated quests will inspire new vocabulary and more sophisticated instructions that the player must follow. Similarly, each new player that is encountered by the learner opens up new opportunities for communication that did not exist before. Larger shifts in the system, such as when a player joins a guild, mean that subsequent iterations will now be affected to some degree by the recurring presence of this individual. Due to the myriad ways in which individuals can interact with a game like *World of Warcraft*, iterations within the system are constantly occurring, and every iteration will alter the system to at least some degree. The researcher’s goal is to appreciate and acknowledge each change and iteration to the system that could have occurred.

Emergent properties. Finally, the **emergent properties** of a system imply that the most basic components of a system will lead to the emergence of higher level properties. De Bot and Larsen-Freeman (2011) allude to the example of a car which emerges from its many interconnected parts. The parts themselves on their own may seem minor or inconsequential, but when combined they make a vastly complicated and impressive product. Ellis and Larsen-Freeman describe this process as emergentism, explaining that "the patterns of language development and of language use are neither innately prespecified in language learners/users nor are they triggered solely by exposure to input" (2006, p. 577). They go on to argue that the language that emerges is impacted by interaction with other individuals, societies, cultures, amongst other factors. In many ways, such a view of language as being emergent contrasts generative theories of language which assume an innateness in which language is learnt due to rules that inform language production. Emergentism, however, evokes the very essence of SLD, as the development which emerges through repeated receptive and productive language use will be unique for each individual. Beckner et al. write that "language and culture are emergent phenomena of an increasingly complex social existence" (2011, p. 3). Attractor states, although relatively stable, are examples of emergent properties of the system.

Emergent properties are natural components of MMORPGs and everything which they embody. Individual items may be components of a larger quest, which in turn may have drastic consequences for the progression of a player and the individuals he or she will meet, all of which lead to opportunities for interaction. The various texts players encounter, be they quests, commands, strategies, or lore, all act as properties of the system out of which emerges new instances of language (Thorne et al., 2012). If we assume that language is symbolic (Kramsch, 2011), it therefore takes on new meanings as it is used with other speakers of the language. Larsen-Freeman further explains that "meaning is not located in the brain, in the body, in the environment or in a particular linguistic form: it is a function of the global state of the system, and it emerges in interaction" (2008, p. 109).

With these various characteristics of CAS, it can be overwhelming to attempt to analyze all of them simultaneously, but this is not necessary, and may prove simply impossible due to

the myriad potential factors that could play a role. For this reason, it is emphasized that choosing some characteristics to focus on, while still not discounting the other factors, can still result in an in-depth and rich analysis. It is important to understand, however, that the emergent properties of the system may be initially expressed by an individual or group of individuals, but these properties are fundamentally a product of the system and belong to the system (Davis and Simmt, 2003).

When considering the many characteristics of a CAS, we continually see that language is conceptualized as being emergent and influenced by many factors beyond simply the cognitive ability of the language learner. In order to better understand how language functions in this way, I turn to usage-based grammar theory to substantiate the view of language that complexity theory assumes and language use as a complex adaptive system.

Usage-Based Grammar

Usage-based grammar posits that as individuals use and encounter language, they begin to associate its usage with previous experiences and construct a taxonomy of various instances of use. As a result, all language and grammar fundamentally is undergoing change, albeit at a gradual pace (Beckner & Bybee, 2009). The development of a language therefore occurs on a localized level, either with other individuals or the immediate tools that employ the language, such as a digital game. As Blythe and Croft relate, "speakers replicate linguistic structures they have heard previously in their utterances, albeit in novel combinations and sometimes in altered form" (2009, p. 48). This reinforces the notion that grammar is usage-based and is influenced by social interaction between individuals. Important as well is the notion that form, meaning, and lexis, as well as context, structure, and usage are all inextricably linked together, and one cannot be analyzed without taking into account the other aspects of language. Larsen-Freeman (2008) explains that as words are produced to make meaning, the word itself may adapt a new meaning for the interlocutor who used it, and this meaning is ultimately constructed both by the environment in which it was used, and the meaning others give to it.

Rather than thinking of language as rule-based, we instead conceptualize language as being a collection of patterns that are observed through repeated use; speakers of the language notice these patterns and then use them themselves, rather than learning new “rules” which are fundamentally destined to be broken due to the uniqueness of language and the emergent properties of language use. Usage-based grammar is ultimately “epiphenomenal, a by-product of a communication process... it is not a collection of rules and target forms to be acquired by language learners” (Larsen-Freeman, 2002, p. 42). The nature of many digital games is such that language expressly fulfills the function of meaning making; grammatical accuracy can be at times less relevant as individuals are instead focused on understanding both what the game tasks the player with doing (such as various quests or routes by which to travel), and communicating with other individuals, either through basic commands (such as *annehmen* when accepting a quest) with NPCs, or with simple utterances to come to an agreement in a group of players playing together.

Usage-based grammar also allows for analysis of language development and various trajectories of change on a much wider scale than other theories of language, as we can analyze entire corpora representing the contextualized and situational language that an individual encounters and make distinct claims about language use based upon this real data. Blythe and Croft explain that “speakers track the frequencies with which variants are used by members of their community and they base their own production frequencies by aggregating this information over many successful interactions” (2009, p. 60). This is especially true in digital games, where the language that is encountered may be somewhat obscure, or various loan words, typically derived from the English language, are adapted for the purposes of the game, yet they still must be understood in order to effectively communicate with other players. At the same time, however, due to the iterative nature of these games and the various tasks that are completed time and time again, learners may begin to develop an understanding of the language that is employed due to its emphasis in the game.

The basic unit in usage-based grammar is the construction, which varies widely in its complexity and abstraction (Ellis and Larsen-Freeman, 2009). A construction can be thought of

as a combination of form-meaning-use (Ellis and Larsen-Freeman, 2009), and is therefore examined without a singular focus on either form or use – a construction examines the phonology and morphology of a linguistic item (the form), as well as the meaning and use of the item (meaning) (Lakoff, 1987; Fischer & Stefanowitsch, 2006). Language learners who are then developing new linguistic constructions will find their knowledge and understanding of the construction on a continuum between form and meaning. A verb like *schreiben* may be understood by the learner in terms of its syntactic structure or grammatical declination, or by its use in a sentence and its meaning as a way to express the act of writing. Learners may of course understand both its form and meaning well, and thus fall squarely in the middle of the spectrum, or may feel more comfortable with one property of the item. Regardless of the language user's familiarity of the linguistic item, it nonetheless exists on this spectrum and its form is inherently connected to its meaning. The means by which we can further classify constructions are primarily through three levels of distinction: fixed, item-based, and abstract (Tomasello, 2003, 2006).

Fixed constructions signify the lowest level of knowledge and understanding of a construction for a language learner. This doesn't suggest that the language learner cannot use the construction, but simply that his or her use of the construction is necessarily limited. In this sense, the actual meaning of the form-meaning-use mapping is fixed: the learner's use of its syntax or pragmatics is not fully understood, and as a result, often act as a phatic expression and conveying no actual information. A fixed construction implies that the learner has developed the construction, but has not yet analyzed how its form and meaning are connected. Meaning is often understood before the actual form of the construction, especially in the context of DGBLL.

In *World of Warcraft*, the verb *kämpfen* – to fight or combat – is observed very early on as a player begins to play the game. Due to the frequent iterations through which the player encounters the construction, he or she will eventually likely be able to recognize the construction and identify its meaning within the context of the game. Being able to translate the construction into the learner's first language is another means by which we can determine

whether or not the learner has begun to develop knowledge and understanding of the construction, but without having fully analyzed its form-meaning-use mapping, it remains a fixed construction in terms of its development for the individual learner.

Item-based constructions emerge as fixed constructions become better understood by the learner, accomplished by the learner experimenting with language and actively trying to concatenate elements of a fixed construction to express new meaning. These types of constructions indicate that the learner can connect form-meaning-use more closely and begins to understand how various items within the construction can be “slotted in” to extend its meaning. It suggests that a learner begins to piece together the grammatical insight necessary to understand the form of the construction, and as a result, can identify what element of the construction can be replaced, or how the construction itself can fit within a number of other more complex constructions.

Returning to the previous example of *kämpfen*, after encountering and observing the construction multiple times while playing the game, the learner may start to associate the other tenses of the verb with the original construction. Being able to conjugate *kämpfen* appropriately in order to say, for example, “ich kämpfe gegen die Kobolde”, suggests that the learner understands the meaning of the construction to the extent that he or she can link it with its appropriate prepositional object and use it to describe a situation experienced in game. The learner is able to concatenate this construction and others to formulate a sentence (which itself is a larger construction), but the formulation of the sentence alone does not yet signify that the learner is able to use a construction such as *kämpfen* in wholly unique and abstract ways. To do so requires a more complete understanding of the construction as abstract.

Abstract constructions are the most difficult in terms of how speakers of the language are able to fully utilize the form-meaning-use mapping of the construction in, as the name implies, abstract ways. For example, understanding the inflectional morphology of a weak verb in German like *kaufen* and being able to use it accurately in a variety of sentences suggests that the learner has developed an abstract construction. Rather than just knowing and identifying the construction, or being able to insert the requisite language to complete a sentence as would

be expected for an item-based construction, abstract constructions demonstrate not only complex understanding of the language and its form and meaning in the construction, but the ability to apply the construction in varied and unique sentences. This type of construction is challenging to observe within the confines of a study if the researcher is looking for evidence of the development of new abstract constructions, due to the possible influences (both internal and external resources in the CAS) that can aid in developing an abstract construction. Furthermore, even with longitudinal studies such as this, there is scarcely sufficient time to progress from fixed to abstract constructions. To accurately describe a construction as abstract, multiple instances of its use in varying contexts and with related yet different form-meaning-use mappings are required, making it idealistic to assume the development of one can be easily observed over the course of a single study. Nevertheless, researchers must strive to account for the required frequency and variability of the construction in order to accurately label it as an abstract construction.

Considering an abstract understanding of the construction *kämpfen*, should the learner be able to now take his or her understanding of the prepositional phrasal verb and use it with its contextually appropriate preposition *gegen*, while also correctly using a varied tense of the verb to form a construction such as “ich habe gegen die Kobolde gekämpft”, provides the initial indication that the learner is able to use the construction in an abstract manner. Of course, repeated use of *kämpfen* in other contexts would be necessary to state that it is definitively an example of abstract construction usage, but nevertheless such a construction would provide the initial evidence of the learner having developed an abstract construction.

Not all constructions that a learner develops will necessarily progress through these stages. Beginner language learners lacking internal or external resources in a CAS to continue studying the foreign language may only develop a rudimentary set of fixed constructions with which to communicate. Certainly communication can still occur (having a set of greetings and ways to order food which act as fixed construction can help when navigating a foreign country), but the meaningfulness of the resulting conversation will be limited. Language learners who however invest the time, which could occur in a language class, or an immersion setting, or

even while playing a digital game, can likely observe the development of many abstract constructions over the course of time.

This classification of constructions will be the basis of the type of SLD that occurs while engaging in DGBLL, as will be seen in the following chapters. Before we analyze and determine the effect of CAS and the underlying theory of usage-based grammar in this study, a number of studies which have analyzed CAS within online and educational environments will be explored in order to gain a more accurate understanding of how this dissertation is situated within the current literature.

Complex Adaptive Systems in Online Environments

Due to the early stages of research concerning complex adaptive systems in SLD, and the ever-growing field of CALL, it is perhaps no surprise that there is relatively little research which analyzes the two (Liou, 2012). Polat and Kim (2014) further explain that there are no studies which have applied complexity theory to untutored, or informal, learning contexts. While this may not be entirely correct (the very nature of the term untutored can invite a multitude of associations and understandings), it is nonetheless clear that informal, online environments could benefit from additional research. Zheng, Newgarden, and Young do argue that online games such as *World of Warcraft* allow players to “define their own trajectories for learning, achievement, and participation” (2012, p. 357), yet the extent to which this has been documented in research through a CAS lens is indeed quite limited.

Bridging research into CAS with that of extramural language learning, Sockett and Toffoli (2012) adapt the characteristics initially presented by Larsen-Freeman and Cameron (2008a) and their theorization of CAS in order to highlight four primary aspects which are particularly relevant to informal, or extramural, language learning, particularly in the online context: sensitive dependence on initial conditions; attractor states; co-adaptation as a result of the internal reorganization of the system; and, nonlinear development. In this study, they situate social learning technologies as CAS, transitioning away from a model of learner autonomy to one which considers the social roles other members of the online communities

may play. The informal learning which occurs while university students learning the English language browsed the internet in their spare time is understood to be emergent in nature and thus representative of a CAS. Listening, reading written interaction, and vocabulary building were all focused on as elements of SLD that were enhanced by participating in informal online environments in the target language, yet the development gains of each participant varied due to the frequency and types of interaction that emerged within the various online environments.

Following up on this initial study, Sockett (2013) observes a group of nine students learning English online through informal means over the course of three months, all of whom maintained blogs to document their experiences, which were then employed for data collection purposes. These students were graduate students in applied linguistics, in effect providing a very knowledgeable group of participants which could speak to the role informal online learning played. Sockett acknowledges that informal online learning of English has been researched to great lengths, but the actual underlying development of language proficiency requires additional research, primarily due to the difficulty in determining what occurs in a setting that isn't the traditional language classroom. Analyzing the 35,000 word corpus which was derived from their introspective writing, Sockett purports that the English language learners' strategies can be expressly connected to Larsen-Freeman and Cameron's (2008) characteristics of CAS, with strategies such as attempting to understand the communicative intentions of other players in online gaming, and being exposed to language in authentic contexts that pertain to everyday life, albeit in the digital environment.

Transitioning to CAS frameworks within DGBLL contexts, Thorne, Fischer, and Lu (2012) investigate the role that game texts within online multiplayer games have on forming what they refer to as *complex semiotic ecologies*. By analyzing the complexity of specific texts which are produced by playing online multiplayer games, *World of Warcraft* can be better understood as a CAS in its own right. Players used external resources, such as discussion boards and wikis about the game, to modify the internal resources of the CAS. Interaction in the game was analyzed using various measures of linguistic complexity (such as lexical sophistication and diversity, syntactic complexity, and readability) and compared to the

complexity of text found in these external resources, finding that these external resources were just as rich as the language found within the game, leading Thorne et al. to conclude that “external websites function as keystone species within *WoW*’s broader semiotic ecology” (2012, p. 296). The researchers note the validity of analyzing MMORPGs through a CAS lens, stating that “the reading of texts and the associated action sequences of players form complex and adaptive systems that reorganize themselves based on the contingencies of the immediate goal-directed activity at hand” (p. 298).

Liou (2012) conceptualizes the virtual world *Second Life* as a CAS too, understanding how the learners residing within this environment interact with the environment itself and its many tools (*Second Life* allows almost unlimited modes of content creation) while taking into consideration the affordances of the system, in particular, the presence of an internet connection providing them means of accessing and interacting with this community. 25 EFL students were instructed to perform specific tasks within *Second Life* such as orienting themselves to the environment and doing peer review. Methods employed such as interviews, questionnaires, as well as analysis of the task all contributed to the understanding of the CAS. Although the game environment was identical for each student, the external resources of the system, such as unstable internet connections, were alleged to have impacted the development potential of certain students who were either frustrated or could not participate at all, leading to communication breakdowns and the inability to complete tasks. Learners modified the external resources of the system too, creating new objects within the game world that were employed by other players, which in effect modified the internal resources of the CAS and facilitated new opportunities for learners to interact with each other due to these newly constructed game artifacts.

Zheng (2012) discusses the affordances of virtual worlds, also examining *Second Life*, and how the online environment espouses a conceptualization of CAS, encouraging what Zheng calls *eco-dialogical interaction*, whereby “values guide the selection and revision of goals across diverse time-space scales, under which the sociocultural norm ‘we’ (laws or rules of phonology, syntax, or semantics) are nested” (p. 545). Using this a multimodal analysis and examining

avatar embodied movement through video observation, Zheng situates the movement of the player within a virtual environment as being directly related to coordination and cooperation amongst players, which in turn leads to communication and SLD. The various and diverse means by which players can complete tasks in the online environment, and the ability to interact with other players in an effort to determine how to complete these various goals, speaks to the emergent characteristics and the nonlinearity of SLD within the online environment. Zheng specifically notes that “the meaning-making resources are distributed in virtual spaces, including the macro layout of the physical space, the static clue notes that were designed into the virtual space, dictionaries, and learners’ own notes that were collected in their inventories” (p. 555). While some of these aspects are specific to *Second Life*, such as collecting learners’ notes in a virtual inventory, the remaining are applicable to any online gaming environment, and demonstrate the many game-specific external resources of the system that construct it.

Zheng, Wagner, Young, and Brewer (2009), although not positioning their study within a CAS framework, analyze the interactions of their participants, specifically the concept of negotiation of action, as emerging meaning-making behavior. Using computer-mediated discourse analysis and other ethnographic methods, participants engage in conversations with other players and NPCs while playing *Quest Atlantis*. As quests are undertaken, new goals emerge that are directly related to the internal and external resources of the system; as learners hear the short form *temp*, thereby relating to temperature, the goal of determining the meaning of this condensed word emerges and results in interaction between learners as they engage in meaning-making processes.

Approaching complexity theory from a more generalized CALL perspective, Colpaert (2013) argues for an ecological paradigm shift within CALL, emphasizing that any single technology cannot alone be responsible for language learning, but rather, from the various interacting components that exist in unison with one another. He claims that “no technology possesses an inherent effect on learning, nor on our brain” (p. 275), and indeed, rather than assume the technology itself has this potential, we should instead investigate the role of the technology within the complex adaptive system and the many other potential influences.

Finally, Marek and Wu (2014) claim that a CAS theoretical approach should be assumed in CALL instructional design decisions. Employing an experimental case study design and taking into account as many factors as possible which could influence teaching and learning English as a foreign language (including student and school influences, both internal and external), a CALL ecology model is conceptualized, situating instructional design in CALL as being dependent on internal and external resources so that “technology used for CALL is not an end in itself, but a means to an end that is based on fully understanding the educational ecology, determining the desired outcomes, and selecting technology that is most likely to achieve those outcomes” (p. 571).

Many of these studies are predominantly descriptive in nature (Thorne et al., 2012; Zheng & Newgarden, 2012), are experimental (Marek & Wu, 2014) or examine learner-reported results (like blogs [Sockett, 2013]), and thus do not account for the actual, objective experiences of the learners, nor do they employ methods which can empirically obtain this type of data, thereby necessitating research that takes into account the actual experiences of the learner in-depth (such as what we can observe in Zheng et al. [2009]). Sockett and Toffoli adapt an approach similar to mine, stating that “qualitative longitudinal studies of a few learners are more likely to yield insights into the dynamics of these complex systems” (2012, p. 141). Aside from these CALL and DGBLL-based analyses using complexity theory, there are a number of studies which describe educational contexts using CAS which further help us understand the potential of complexity theory and the scope of its research.

Complex Adaptive Systems in Educational Contexts

Although removed from the context of DGBLL or CALL, there is still much to learn from studies conceptualizing the educational experience as a complex adaptive system. Davis and Simmt (2003) share a descriptive analysis of the emergence of a collective of mathematical teachers sharing resources as a CAS, as well as the varying ways in which students within a math classroom can approach an identical problem, lending credence to the nonlinear development of a system and the co-adaptation which exists where members of the system interact with one another and ultimately learn from one another.

In another study, Davis and Sumara (2008) present a theoretical critique that complexity theory itself may be understood as an educational theory due to its transdisciplinary character, as the interactions between student and instructor are emergent in nature and therefore dynamic and nonlinear in their development. Complexity theory is understood for them as the study of learning and learning systems, which in turn encompasses “individuals, social groupings, bodies of knowledge, cultures, and species” (p. 36). The researchers focus on the concept of the idea as an interacting agent in complex systems such as the classroom and in education in general, thereby implying that having a single authority will lead to an inhibition of the emergence of collective knowledge being produced.

Cvetek (2008), reflecting on descriptions provided by teachers of problematic classroom situations, approaches complexity theory from the foreign language classroom perspective, noting that characteristics such as the sensitivity to initial conditions and the nonlinear development of the system are especially poignant in student teacher experiences; despite the best intentions to prepare adequately for teaching, there are so many dynamic factors that cannot be taken into account and which cause the lesson to deviate in myriad ways. It is, according to Cvetek, necessary then to “combine the logical and orderly nature of traditional lesson preparation and planning effectively with the uncertainty and complexity (unpredictability) of the language classroom and delivery” (p. 250).

Some studies have examined the entire SLD process on a longitudinal level for a single individual to track as accurately as possible the many growth conditions which encourage change in the CAS. Polat and Kim (2014) follow a Turkish immigrant over the course of a year as he lives his life in an English-speaking country, and demonstrate how his SLD in an untutored, informal context, can be represented and understood with complex systems theory. Bi-weekly interactions ensured that the nonlinear development of the participant could be accurately recorded, and the lag between data ensured consistent timescales for analysis. Looking at his lexical diversity, accuracy, and syntactic complexity of his interactions over the year, it was determined that all three variables are indeed complex and show no distinct sign of clear acquisition, but rather, are distinctly natural SLD processes where development is simply

nonlinear and impossible to predict. It was found, however, that of the three variables, grammatical accuracy most resembled an attractor state in that development was fairly consistent, yet this too applies to the general CAS theorization of the work.

Finally, Casanave (2012) recalls her eight years of working as an English instructor attempting to learn Japanese informally, and having kept diary entries throughout that length of time, postulates that her experiences can be conceptualized as an *ecology of effort*, intended to reflect the complex nature of motivation to engage in informal learning of a second language. Various external resources such as her quality of sleep and the weather interacted with the system's internal resources, primarily her motivation to learn Japanese and her desire to become a fluent speaker of the language, constitute the characteristics of the CAS that both impeded and facilitated her development of second language proficiency. She stresses that her rationale behind engaging in informal Japanese SLD was to have an environment with no tests, competition, stress, or an enforced schedule; many of these factors can be found in MMORPGs such as *World of Warcraft* as well.

Chapter Summary

Complexity theory and its application to DGBLL is evidently quite relevant due to its focus on change and the many interacting factors that contribute to this change occurring within the CAS as has been described. The many characteristics of a CAS, such as the sensitivity to initial conditions, influence of internal and external resources, attractor states, and its emergent properties are all integral aspects of the DGBLL experience, and assist us in explaining the nonlinear trajectories of gameplay and SLD that learners experience.

Conceptualizing language with a usage-based grammar theory also contributes to the overall understanding of how the CAS functions and how SLD emerges as a result of interaction in, with, and about the digital game. Due to the emergent nature of language that players observe and encounter while playing *World of Warcraft*, it is appropriate to conceptualize language in such a way that acknowledges and lends credence to the unique gameplay processes that each learner will undertake. Both the experiences that the learner

participates in, and the degree to which he or she understands the linguistic construction – it may be fixed, item-based, or abstract, depending on the knowledge and ability to use the construction – serve to further distinguish the SLD process as being complex and ultimately requiring an analysis of the language as used by the language learner, not as a set of agreed-upon grammatical rules that all learners understand identically.

As can be observed, however, little research in the field of CALL, and especially DGBLL, has been analyzed using a complexity theory framework (Liou, 2012). The challenging and complicated nature of collecting data that accommodates the complexity of using technology for SLD purposes makes such studies indeed difficult to conduct, yet this deterrent should not dissuade future research as this approach is beneficial for understanding the nature of DGBLL and leads to better analyses.

The two discussed theoretical frameworks – digital game-based language learning and complex adaptive systems – will provide the foundation for the subsequent discussion of the study's methodology and preliminary discussion of group-level results, as well as the analysis of gameplay and learning trajectories and their relevance to SLD.

Chapter IV: Methodology and Group-Level Results

An Overview

The research conducted in this study was done using a number of data collection methods to ensure rigorous and detailed understanding of the complex adaptive system. A wealth of information concerning the participants was collected through background information questionnaires, in-game and in-person group communication, and concluding interviews at the culmination of the study. This information was utilized to help better understand the initial conditions of each participant, and how their approach to DGBLL had changed over the course of the research study. A computer-aided textual analysis, accompanied by a retrodictive qualitative modeling (Dörnyei, 2014) approach, was employed to investigate what change occurred in the CAS, and specifically, what language may have been developed through gameplay experiences both in- and out-of-game.

Due to the relative lack of empirical results which currently exist, examining how precisely L2 learners navigate DGBLL environments, the methods employed as part of this dissertation strive to make this process transparent for analysis purposes. The computer-aided textual analysis permits analysis of all productive and receptive German language, and the other methods taken in this study, as will be described in detail, are employed with the similar intention to make what has traditionally been dominated by learner-perception more empirically-founded with supporting data to substantiate the claims made by the language learners/players themselves.

In order to provide this empirical perspective, the background information questionnaires and individual gameplay data were coded to perform pairwise comparisons between participants. This procedure resulted in a more comprehensive analysis to determine which participants were most similar initially and at the end of the study, and then determined how their individual trajectories changed over time. Furthermore, the communication observed and produced in-game and during in-person group conversations by the participants was transcribed and analyzed to account for frequency of linguistic constructions found in each

context in an effort to determine to what effect near transfer occurred. Concluding questionnaires to determine the students' perception of the gameplay process, as well participants' perceived knowledge of game-specific linguistic constructions, contributed to the empirical aspects of this study. Utilizing both approaches ensures that this analysis is non-reductionist; no piece of data or contextual information should be neglected, as any aspect of an individual's profile as learner/player could influence the change that occurs while developing an L2 and engaging in DGBLL.

The study and its administration will be discussed in detail, as well as who the participants are as a group. The operationalizing and coding procedures will be described which assist in determining specific participants for the in-depth analysis of near transfer from gaming context to non-gaming context, and how similar language learners develop their own L2 proficiency. The results of these various stages of the research study will be introduced to lead us to the in-depth individual analysis of each pair of learners.

The Study

The research study conducted can be divided into three distinct phases. Research ethics approval was obtained (ORE # 18445) before beginning the study. The first phase was designed to better understand each participant as an individual. Background information questionnaires were administered and an hour-long orientation to *World of Warcraft* was provided before the gameplay portion of the study commenced.

The second phase of the study involved playing the online digital game and engaging in three in-person conversations with fellow participants in the study. The gameplay portion was completely self-directed, with participants being able to choose when, where, with whom, and how they played the game; the only requirements being that they play the game a minimum of ten hours (and no more than 75 hours)⁵ over the course of a four-month long semester, and that

⁵ According to Dr. Michael Fraser, a clinical psychologist, playing 24-30 hours a week is classified as addiction, and I wanted to ensure that these participants come nowhere near that number for their own safety and ethical reasons (<http://www.michaelfraserphd.com/ProblematicInternetVideoGameUse.en.html>)

they play the game in German. Harrigan, Collins, Dixon, and Fugelsang (2010) discuss some of the qualities of games, which are shared with gambling devices, which make these games potentially addictive, such as the intrinsic nature of rewards and the reinforcement schedules that keep players coming back for more, and in particular, the aspects of flow (Csikszentmihalyi, 1997) that ensure that competition increases as skill develops. For these reasons, it was important to ensure that although learners should enjoy playing the game and want to continue to do so, that it does not impede their lives to a detrimental extent.

The in-person conversations which were also a part of this second phase of the study were directed by the researcher and provided the participants with an opportunity to discuss their experiences playing the game, with each participant asked to contribute to all questions posed. In these instances, the vast majority of conversation was held in German.

The final phase of the study consisted of a questionnaire with Likert scale items and a concluding interview, both of which were conducted in English. The participants were asked to freely describe their impressions of the game and the study in general, in an effort to determine the self-reported efficacy of DGBLL and what, if any, enjoyment can be extracted from the experience, specifically relating to the aforementioned learning to play paradigm. Participants who successfully completed the study were given modest remuneration for their efforts (\$50.00 in total), with additional incentive provided for those who played more than the required ten hours.

These three stages will be explained in detail, with all questions and questionnaires detailed in full.

Phase one – Background information questionnaire and orientation. The initial phase of this research study was intended to provide a detailed depiction of each participant, as well as prepare them sufficiently for the gameplay experience in *World of Warcraft*. It was necessary to gather information about each individual before he or she started exploring the game world and contributing to conversations about these gameplay experiences in order to establish the initial conditions which contribute to each participant's complex gaming and learning

trajectories. Although one may surmise that individuals interested in playing online games for the sake of language learning are already well-versed in the gameplay mechanics necessary to succeed, this was not the case, and basic gameplay interactions (i.e. how to create a character and start a quest), as well as technical questions (i.e. where to download the game and how to ensure it is localized in the target language), proved necessary to explain in detail to ensure all participants could satisfactorily begin playing the game.

The background information questionnaire was designed to focus on four primary factors which were hypothesized to potentially impact a language learner's approach, reaction, and ability to make use of language learning opportunities in the digital space. These factors were: rationale for studying German; current and previous experiences with the German language and its usage; experience with offline and online gaming; and, proficiency with computers and prior general CALL experiences (such as using other forms of digital media for SLD purposes).

Data pertaining to general demographics were collected too (age, sex, current level of academic study), as well as the languages each individual speaks and his/her perceived proficiency level in each of the four major productive and receptive linguistic skills (writing, speaking, reading, and listening) (see Appendix A).

The responses composed by the participants were sentence-length (with the exception of the initial questions pertaining to demographical information) and formulated uniquely according to the participant answering the questionnaire; some chose to add ample detail to their responses, whereas others were decidedly pithy in their answers. In order to make the variable written responses more easily analyzable, which in turn helped to establish the individual learning and gameplay trajectories, responses were categorized and clustered. These clusters followed the four themes (rationale, language use, gaming proficiency, and computer proficiency) established initially, but were coded and afterwards empirically analyzed (as will be explored later in this chapter).

After all background information questionnaires had been submitted – this resulted in a total of 24 submissions – three orientation sessions were scheduled (of which students would choose one) in order to introduce the participants to the basics of the game and ensure that everyone would be successful in orientating themselves to the game environment. Due to MMORPGs being potentially complicated games it was essential to demonstrate not only how to interact with the game world, but also how to find the game client online and download the appropriate localization (whereas the website automatically will try to counterproductively encourage the player to download the North American localization which does not allow the German language to be selected).

The orientation session provided each participant with paper and digital documentation of how to progress from creating a game account to controlling the digital avatar. Each participant was guided through the process as it was shown on a projector screen, allowing for questions and explanations of certain technical jargon in German. Once orientation was completed, each participant was free to begin playing the game and record the language that they were exposed to and produced.

Phase two – Gameplay and conversations. The interaction and engagement in the second phase of the study was primarily done autonomously, in an effort to replicate the traditional experience of playing games: a leisure activity that is done in one's free time. For this reason, the only guiding instructions to the participants were that they were required to play a minimum of ten hours (if they wanted to qualify for the remuneration offered for taking part in the study) over the course of four months, or the length of a semester of study at the University of Waterloo. Questions of when they played were irrelevant – when a participant has free time and is looking for something entertaining to do, they could choose to invest their time in playing *World of Warcraft*. This sense of freedom with regard to playing the game is again integral to recreating the normal game experience – gameplay should be fundamentally a leisure activity, not an activity that is forced upon an individual. How each participant played was also not a concern of the study – if he or she spent the majority of time alone, with a friend, or in random groups with native German speakers, it was inconsequential to the goals of the

study. This was not done simply for the sake of facilitating the research project efficiently; a good game-based learning environment should be interest-driven, so that learners can choose how, when, why and how they play (Squire, 2011). Simply playing the game and being immersed in the German language is sufficient for how DGBLL is conceptualized for this study and the learning to play paradigm (Arnseth, 2006; Sykes & Reinhardt, 2013); how each participant progressed and interacted with the game world, and what sources of change occurred over the course of the study, is integral to the analysis. The emergent nature of SLD and the complex system underlying the gameplay process necessitates a need to focus on change, rather than hypothesizing that participants will reach a certain point in the game, or level of proficiency, if the game is played in a particular fashion.

As a result of the substantial freedom afforded to each participant, individual gameplay trajectories that emerged by playing the game over the course of the semester were incredibly complex and demonstrated the validity behind theorizing the game world and its interactions as a CAS. Participants' experiences varied wildly: some began playing intensely from the beginning of the study, investing an extraordinary amount of time in the game world, whereas others began much later and struggled to complete the ten hours of playtime. Some utilized every opportunity they had to interact with other players and others kept to themselves, engaging with the German language primarily through observation and the reading of quest descriptions. These diverse experiences are however identical to those of players who interact and engage in these digital games purely for entertainment purposes, thereby maintaining the authenticity of the experience in its extracurricular setting. These various trajectories will be explored in more detail in *Chapter V: Analysis and Discussion*.

To account for these complex trajectories, all communication observed in these conversations was recorded and transcribed through a computer-aided textual analysis (see *Computer-Aided Textual Analysis*). The resulting transcriptions were used to determine to what extent the near transfer of linguistic constructions occurs for each participant. This, along with the list of linguistic constructions which are found in the game context, were used in

conglomeration to assess how language learners SLD changes over the course of playing *World of Warcraft* within a game-enhanced environment.

The process of recording and having access to all language seen by the participants was facilitated by *World of Warcraft*'s built-in conversation logging system. By entering a simple command into the chat interface of the game – */chatlog* – the game begins to automatically record all instances of language use and exposure which appear on the computer screen, making it simple to maintain a complete and accurate transcription of each participant's in-game experiences. Every quest the player completes, every utterance a non-player character speaks, and every conversation held or seen by other players – on a fundamental level, all language that occurs in game – is recorded, and therefore available for analysis. It must be noted here as well that participants began by playing a free version of *World of Warcraft* which limited their progression and imposed minor restrictions on their ability to communicate with unknown players. After the first month of play, however, each participant was given a full version of the game that removed these restrictions.

Three times throughout the course of this longitudinal study, participants were brought together in self-selected groups to discuss their experiences playing the game and specific game-related topics. Each participant was encouraged to speak as much German as possible; those with higher proficiencies would find it easier to discuss their gameplay experiences, but even those with lower proficiencies were given ample time to express themselves in the target language and often spoke at great length to describe what occurred in the game world or to answer the specific questions they were given.

Each conversation was thematically situated to encourage participants to discuss a variety of themes. These themes cover aspects of the game or MMORPG environment that are not only worthy of discussion, but also that are designed to elicit responses that participants can engage with due to their experiences within the digital game (see Table 2); no aspect of these conversations requires a deep understanding of DGBLL or language learning on a more comprehensive scale, and all questions can be discussed by reflecting on their in-game experiences.

Table 2

In-person conversation themes and questions

	Conversation 1	Conversation 2	Conversation 3
Theme	Learning to play	Videogame stereotypes	Gaming for SLD
Questions	<p>Was für einen Charakter hast du?</p> <p>Welche Stufe hast du erreicht?</p> <p>Konntest du die Ereignisse im Spiel verstehen? Was war klar?</p> <p>Hattest du schon Möglichkeiten, mit anderen Spielern zu reden?</p> <p>Worüber hast du gesprochen?</p> <p>Gefällt es dir, mit anderen Spielern zu reden? War es manchmal ärgerlich? Warum?</p> <p>Wenn du irgendwas im Spiel nicht verstanden hast, was hast du gemacht? Welche Mittel hast du benutzt? Wörterbuch? Übersetzer? Wiki? Diskussionsforum? Waren sie hilfreich?</p>	<p>Was hast du in den letzten zwei/drei Wochen im Spiel gemacht?</p> <p>Gab es irgendwelche neue Möglichkeiten, mit anderen Spielern zu reden?</p> <p>Denkst du, dass es zu viel Gewalt in Computerspielen gibt?</p> <p>Gibt es zu viel Gewalt in World of Warcraft?</p> <p>Ist die Gewalt ablenkend?</p> <p>Gibt es ein Gender-Bias in World of Warcraft?</p> <p>Sind Frauen unterrepräsentiert in diesem Spiel?</p> <p>Würdest du einen Charakter spielen, der ein anderes Geschlecht hat?</p>	<p>Was für Charaktere hast du am Ende des Spiels?</p> <p>Macht es Spaß, diese(n) Charakter(e) zu spielen?</p> <p>Welcher Aspekt des Spiels war am besten?</p> <p>- Charakter erstellen?</p> <p>- Gegner töten?</p> <p>- mit anderen Deutschsprechern spielen?</p> <p>Wie oft hast du die Texte im Spiel gelesen?</p> <p>Quests? Kommunikation zwischen Spielern? Information über Fähigkeiten?</p>

Kannst du irgendwelche Quests oder Ereignisse beschreiben?
Was hast du schon im Spiel gemacht? Erledigt?
Welche Erfahrung im Spiel war am besten?
Gibt es neue Wörter im Spiel, denen du begegnet bist? Was sind sie?
Was willst du nächstes Mal tun?
- neuen Charakter erstellen?
- höhere Stufe erreichen?
- mit anderen Teilnehmern/Spielern spielen?

Kannst du irgendwelche Quests oder Ereignisse beschreiben?
Welche Erfahrung im Spiel war am besten?
Gibt es neue Wörter im Spiel, denen du begegnet bist? Was sind sie?

Jetzt siehst du eine Liste von verschiedenen Wörtern, die du im Spiel finden könntest.
Welche kennst du? Wie sicher bist du, dass du diese Wörter im Spiel gelernt hast?
Würdest du das Spiel nochmal spielen? Warum?
Wenn du Spiele nächstes Mal spielst, würdest du sie vielleicht auf Deutsch spielen? Warum?
Wenn jemand anders Deutsch lernen will, würdest du ihr / ihm ein solches Spiel empfehlen?

The first conversation, held after approximately one month of playing the game, focused on participants' experiences as they are related to the paradigm of learning to play (Arnseth, 2006; Sykes & Reinhardt, 2013). The concept of learning to play was not explicitly explained to the participants, but the questions themselves reflect the core principle of situating gameplay at the forefront of the experience, with learning being a desired, yet implicit, result. Basic questions concerning the initial month of gameplay were intended to ease participants into the conversation, utilizing game-related vocabulary that would have been essential to the character creation process, such as the race and class of the chosen character.

This was followed with questions relating to general comprehensibility of the game within the first month of play, in an effort to determine if players felt capable of understanding the game at its most basic level. Further questions were posed concerning other elementary functions of the game, including any opportunities to speak with other players. Given added importance in this initial conversation were questions pertaining to techniques used when a player did not understand something in the game. These questions were intended to tease out how players approached the gameplay experience – did they perceive these instances of confusion and difficulty to be primarily learning experiences, thus keeping a dictionary at-hand to reference any words that they did not understand, or did they attempt to use game-contextualized cues as a means to orientate themselves to the game world and its narrative.

Players were then asked to speak about their in-game experiences throughout the first month of gameplay, specifically highlighting at least one event that they took part in, as well as any new lexical items which they picked up through their play. Finally, each participant was asked to think about potential goals for subsequent months of play. For those who had not yet played much of the game, this was intended to spur them to play more and want to explore the world based upon what their fellow participants had experienced.

The second conversation was held two months into the study, at which point players would have had substantial time to play the game, as opposed to the first conversation where some players had only scratched the surface of what could be experienced. Furthermore, rather than being centered around learning to play the game, the discussions in the second

conversation shifted to meta-elements of the game that are often given ample attention in the media, namely stereotypes concerning violence and a perceived gender-bias that permeates the game.

Firstly, however, the participants were asked to reflect on what they accomplished since the last in-person conversation, and whether or not they had any opportunities to communicate with other players in the game. Discussion then migrated towards the aforementioned controversial topics, first beginning with the issue of violence in video games in general, and then in *World of Warcraft*, in an effort to determine whether any perceived violence existing within the game world can pose an impediment to playing the game. Afterwards, the conversation shifted to issues of a perceived gender-bias in digital gaming, both in terms of females actually playing these games, but also in the representation of females within the game itself. The second conversation concluded similarly to the first, as the participants were asked to narrate an experience that they had in the game, and recall any linguistic constructions that they believe they had learnt from the game.

The final conversation was conceptualized so as to provide participants with the opportunity to reflect upon the entirety of the study and their impressions of the gameplay experience, thereby lending a player/language learner-centered perspective to DGBLL. Participants were asked to consider which aspects of the game were most enjoyable, which helps understand what type of player/language learner might benefit most from the digital gaming experience. Questions were also posed concerning some of the various prolific functions of the game, such as the quest system, which are heavily dependent upon comprehending the written text descriptions informing the player of his or her objective, and how much attention was paid to these interactions. Players with previous gameplay experience could theoretically rely upon past experience more so than communication comprehension and still largely succeed, whereas others with little or no MMORPG experience would have to assumedly rely upon the features provided by the game environment to advance.

An integral part of this final conversation entailed students indicating how many linguistic constructions they had most likely learnt, and whether or not they believe the

developed constructions were a result of the gameplay experience, or a previous learning experience (such as in a classroom). All linguistic constructions presented to the participants were frequently found in the first ten hours of gameplay for any player who would play through the game in a somewhat normal fashion and participants were encouraged to contribute any additional linguistic constructions that were not indicated in the provided list (see Appendix B). Finally, questions surrounding the probability of playing this game or other digital games in German arose, as well as whether or not they would recommend DGBLL for SLD purposes to other learners.

Phase three – Concluding interviews and reflection. To conclude the study, each participant engaged in a concluding interview to reflect on the gameplay experience over the course of the study and any perceived SLD after having taken part. As part of the initial interview, learners were provided with a vocabulary test (see Appendix B), listing numerous linguistic constructions which they would have been exposed to during the 10 hours of playtime. Each participant was asked to indicate the English translation of the linguistic construction, and indicate whether or not they developed it previously, while playing the game, or whether it was reinforced by playing the game. Although the vocabulary test itself does not account for the richness of use as one would expect from a form-meaning-use mapping of a linguistic construction, it nevertheless serves as a data point which can be employed when determining the extent to which SLD occurs and the learner's own perception of his or her development.

The participants were also given a questionnaire consisting of 16 Likert scale items, with five-point Likert items (ranging from strongly agree to strongly disagree), adapted from Peterson (2012) and focusing on broad gameplay experiences when playing an MMORPG (see

Table 3).

Table 3

Concluding interview questionnaire (adapted from Peterson, 2012)

Concluding interview questionnaire (5 point Likert-item scale)
1. The game was easy to play.
2. The chat system was easy to use.
3. It was difficult to follow the quests/communication from other players
4. The quests were too difficult
5. I actively tried to comprehend the text of the quests
6. I experienced technical communication problems in the game
7. There was not much feedback from other players
8. Other players were helpful
9. I could express my opinion more freely than in a regular class
10. Having my own avatar made me feel more involved in the game
11. Most of the discussion was not useful
12. I could learn new vocabulary
13. The game made me use my German more than in a regular class
14. I enjoyed interacting in the game
15. Chatting in the game was a good way to improve my German

Peterson's study examined a group of participants playing a modified MMORPG exclusively with one another, thereby limiting the participants to interacting only with other participants, rather than the entire player-base. For the purposes of the present study, some of questions in this questionnaire required modification to better reflect the game-enhanced and vernacular nature of *World of Warcraft* and the types of experiences that players would regularly participate in (such as completing normal quests and interacting with other players outside of the study). Furthermore, if compared to the results of Peterson's administration of the Likert

scale item questionnaire, the questions which are directly related to communication with others will necessarily produce somewhat conflicting results as the participants did not have a readily-available group of individuals to play and communicate with synchronously. This was necessary to do, however, to replicate the authentic gameplay experience that players would otherwise participate in.

The questionnaire asked the participants to consider three aspects of the gameplay experience: technical, social/interactional, and pedagogical circumstances pertaining to the game. From the technical perspective, participants were asked to indicate to what extent problems existed while communicating in the game and whether or not the game was easy to understand and play. In terms of the interaction and societal aspects of the game, participants were instructed to reflect on the quality and helpfulness of interaction with other players. Pedagogically, the questionnaire examines whether the students perceived the gameplay experience as beneficial for SLD and if they had the opportunity to use their German language skills more than in a regular classroom.

To supplement the questionnaire, additional interview questions were posed to each participant to allow more detailed responses and further insight into how language learners engaged with the game environment and the German language. Each participant was asked a further set of eleven questions (see Table 4), focusing primarily on changes in perception after the three months of gameplay and participating in the conversations. These changes are reflected in previous and current perceptions of online gaming, playing games in a foreign language, and whether or not DGBLL is an effective means to develop second language proficiency. The participants also reflected on the efficacy of playing games outside of a controlled classroom environment.

Table 4

Concluding interview discussion questions

Concluding interview discussion questions
1. What resources did you use when stuck in the game?
2. Did you find it easier to discuss game-related topics rather than typical topics in a language class? Was the vocabulary easier to grasp and utilize in conversational settings?
3. Would you have played these games in German before? Would you now?
4. Do you perceive a change in your knowledge/proficiency of German over the course of the three months?
5. Do you think games designed for language learning purposes would be more effective to learn languages outside of the classroom?
6. Any final general thoughts concerning playing games for language learning?
7. Did you enjoy talking about your experiences in-game in group conversations? Was it easy to do so?
8. Would you have played these kinds of games before? Would you now?
9. What did you find most useful in terms of developing German proficiency? Reading quest text? On-screen commands? Communicating with other people?
10. Is playing games in your spare-time an effective means of learning language? Is it beneficial to continue learning a language outside of the language class?
11. Has this study changed your opinion about playing computer games like this?

The responses to these questions provide further clarification as to whether or not the participants noticed or believed proficiency development and other general changes to have occurred while playing an online MMORPG such as *World of Warcraft*. The questions help to

illustrate the complex trajectory which each participant experiences and how his or her approach to the game and DGBLL is modified over time.

Game-Related Factors Contributing to Second Language Development in Digital Gaming

To understand how the gameplay experience contributed to SLD for each learner, game-related factors were conceptualized which explain which elements of gameplay influenced change in the CAS. These are identified as game-related factors as they are rooted primarily in gameplay experiences, or in settings that position the game as the primary point of discussion (i.e. in various affinity spaces, such as wikis, discussion forums, or focus groups). These factors are classified into three categories: *gameplay*, *communication*, and *iteration*.

Gameplay factors harness the potential of the game and the frequency/repetition of various linguistic constructions. By needing to know these constructions in order to advance and progress in the game, players cannot simply ignore them and must otherwise have previous knowledge of the linguistic construction, or utilize a number of resources available to determine its meaning (including using visual and written context, dictionaries, discussion boards, and any other myriad possible choices). Specific words which are the focus of a quest, or which make up core characteristics of the player's chosen avatar mean that success and progress in the game cannot be attained unless the language is adequately understood. Individuals who play longer are more likely to be exposed to these gameplay factors.

Communication factors are those that influence the learner's production of language, either while playing the game or when speaking about game-related experiences. The language that is developed is less predictable than that which is strictly gameplay influenced. The linguistic constructions developed may not be immediately related to the game the same way that gameplay factors contribute to SLD, but the language encountered and produced is still central to understanding the dynamics of the game and engaging in authentic discussion with other players of the game. Because this use of language is rooted in communication, conversations are more dynamic in nature and the player does not have the benefit of looking

up words using resources like gameplay factors allow. Players must more often than not seek out this communication, however, as playing the game without this drive may not naturally lead to interaction between players. Classifying the game as an affinity space extends this realm of interaction beyond the game confines to other sites of game-related communication such as discussion boards, wikis, chatrooms, and out-of-game environments such as focus groups.

The last factor, *iteration*, is more ambiguous and difficult to define in comparison to the role gameplay and communication play due to its ubiquitous nature in the CAS. Iteration, within a CAS lens, implies that there are numerous events which are experienced time and time again, with slight variation as to induce change in the system; each time the event is experienced it differs to some degree, thus resulting in a new experience. Within the game environment, iteration factors target the linguistic constructions that are frequently encountered through iterative tasks that require that a player do or observe something so often as to necessitate focus. These linguistic constructions are produced by the learner in ways which suggest that he or she adapted its usage from the game environment, but are potentially general enough that the individual may have learnt the construction elsewhere. Due to the frequency with which the linguistic construction is uttered and employed throughout the gameplay experience however, and the context with which it is used, it is nonetheless likely that even if the learner already knew the construction, the gameplay would at the very least reinforce the learner's knowledge and understanding of the construction. These linguistic constructions act as attractor states within the CAS. Although not unique instances of language use, such iteration through gameplay still reflects the very nature of SLD, as the very term *development* suggests that iteration is vital to the process, as a (second) language is never completely acquired (Verspoor et al., 2011). The linguistic items that are emergent through these iterations are perhaps most comparable between different players, as they are integral to one's understanding of the game and are repeated so frequently that it is difficult to ignore them. Although progress is not tied to these as it is with gameplay factors, the sheer wealth of opportunities that players have to encounter them ensure that they are observed often and therefore act as a form of iteration.

Within the context of the gameplay processes as a CAS, these three factors are emergent in nature; they are completely dependent on how a learner decides to progress and play through the game, and as a result, certain factors will emerge more than others. Players who focus more on progression may have more opportunities to encounter linguistic constructions influenced by gameplay factors, whereas individuals who seek to communicate with other players are likely to see the influence of communication factors. All three factors are influenced by the internal and external resources of the system, but factors related to communication are more dependent on the system's internal resources (such as a willingness to communicate with other players), whereas those related to gameplay are more heavily influenced by the external resources (where the learner plays, how many quests he or she undertakes, their knowledge of the game's structure, etc.).

Computer-Aided Textual Analysis

In order to account for the wealth of language reception and production that each learner experienced, a computer-aided textual analysis is employed to analyze the many linguistic constructions found in both the gameplay transcript, as well as the in-person focus group transcripts. All linguistic constructions that are identified within the three aforementioned categories share a number of common attributes. Each linguistic construction is found outside of the list of the 1000 most frequent words in the German language (*Das Wortschatz-Lexikon*; Quasthoff & Wolff, 1999). I utilize a frequency list to filter out the wealth of linguistic constructions that are very likely to have not been developed through gameplay, and which more often than not are required in order to have the L2 proficiency necessary to play a game such as this. Each item has not only been encountered in the game, but the participant would have spoken the word in non-gaming contexts or indicated that they know the word and its English translation as part of the adapted YES/NO vocabulary test (see Meara & Buxton, 1987; Meara, 2009) that each participant completed in the third focus group (see Appendix B). Only linguistic constructions that were uttered by the participant before being exposed to in game were considered, providing further evidence that the gameplay experience contributed to their development.

In order to demonstrate this, an initial list of all linguistic constructions that each individual has arguably developed by playing *World of Warcraft* is composed. This list is compiled using Heatley and Nation's *RANGE* program (Heatley, Nation & Coxhead, 2002; Cobb, 2002). Text files of all language produced out-of-game and observed in game are compared to extract the linguistic constructions which are shared between the two contexts. The resulting list is then compared to the 1k frequency list to obtain a final list of linguistic constructions that could be argued to have been developed in the CAS. The linguistic construction, its use in the game (functioning as the participant's exposure to the construction), and the participant's use of the construction outside of the game (identified as the production) are all detailed as part of the computer-aided textual analysis.

When the linguistic construction is not found directly in the chat log transcript produced by the game, but is still a highly relevant element of the game, its function and level of exposure is nonetheless explained. Some elements, such as the labels on buttons that are repeatedly pressed, are not collected in the transcript each player produced, but are so frequently displayed that the participant is unquestionably exposed to it. Furthermore, if the linguistic construction produced is part of the list of constructions that each participant identified in the adapted YES/NO vocabulary test (Meara & Buxton, 1987; Meara, 2009) and wasn't directly spoken by the participant, it is listed as *vocabulary test*. Some of these are not part of the initial list of linguistic constructions provided to the participants, and are instead additional items that the participant highlighted as having developed through playtime. Due to their retrieved nature without immediate context, these are primarily simple examples of fixed constructions (Tomasello, 2003, 2007). Linguistic constructions that are actually produced by the participants can consequently fall within categories of either fixed, item-based, or abstract depending on how the player was able to use them in the out-of-game context, thus lending evidence for near transfer.

Efficacy Scores

Identifying the numerous linguistic constructions that each participant had identified as having learnt or had produced is meaningful, yet this result alone lacks an important

component of the analysis: how effective their near transfer is in relation to the amount of language observed and produced overall. To accomplish this, each participant was given an *efficacy score* which fundamentally represents how much linguistic growth occurred relative to the amount of language production that each individual contributed in the in-person conversations. Due to a number of factors that may have contributed to more of the target language being spoken in these out-of-game contexts (such as general German proficiency, the number of participants in each focus group, and the medium of the conversation – via Skype or in-person) it is helpful to contextualize the exposure and production of these various linguistic constructions. A simple calculation was applied to determine each participant’s efficacy score:

$$ES = GBC/WP * LC$$

The efficacy score (ES) is calculated by considering the following variables. Firstly, we take into account the number of game-based constructions (GBC) produced by the player when discussing the game in non-gaming contexts that fall outside of the 1k frequency list range and which are argued to be developed through the gameplay experience. Then, the number of words produced in out-of-game situations (WP) is calculated to understand how often and freely the individual spoke in general in the focus groups. Finally, we take into account the total number of linguistic constructions produced outside of the 1k frequency list (LC), a number which then includes the linguistic constructions which are understood as game-based constructions, but also those which were not developed by gameplay, ultimately providing a measure of the language learner’s L2 proficiency.

The efficacy score is then calculated by dividing the number of game-based constructions by the number of words produced in out-of-game situations, which is then multiplied by the total number of linguistic constructions produced outside of the 1k frequency list. This order of operations ensures that the SLD of each learner is appropriately contextualized as a factor of all communication in the out-of-game context, while simultaneously taking into account how much German language was known beforehand based upon their ability to use items which are more uncommon. The results derived from the eight

participants which are the focus of the upcoming analysis range from 1.12 to 2.36, the higher value representing a more successful SLD experience.

Computing this score in this manner accomplishes two goals. Firstly, it acknowledges the number of game-based constructions produced by each participant while taking into consideration the amount of language that he or she contributed to the out-of-game conversations. Secondly, it takes into consideration those participants who produced additional words outside of the 1k frequency list. This helps to ensure that individuals who produced linguistic constructions in German that are infrequent are rewarded as opposed to those who may have spoken often, but used only common words, or those who indicated knowledge of many of the item-based constructions listed as part of the final focus group, but did not contribute many additional constructions; the number of words produced in out-of-game conversations and the number of linguistic constructions produced outside of the 1k frequency range are not correlated, so this additional argument in the formula proves necessary and useful. The efficacy score exists fundamentally for comparison purposes, however. Its actual value is itself arbitrary. The efficacy score itself is not the sole indicator of success, however, as it is a numerical value lacking the qualitative analysis, but it does help contextualize the SLD occurring through gameplay and provides an additional level of analysis.

At this time, an initial understanding of these participants, and the means by which they were recruited, will provide the necessary underpinning for the analysis and discussion in the following chapter.

The Participants

Recruitment and retention. Recruitment began initially within undergraduate German-language courses offered at the University of Waterloo in January, 2013. The content and year of study of these courses ranged from second year intermediate German language instruction, to third year courses on German literature, and a fourth year course offering in second language pedagogy. These German students were targeted due to their expected rationale for having an interest in the German language: studying for a major or minor, possible career opportunities,

or a desire to study abroad in the future. Their intrinsic and extrinsic motivation for being interested in the German language would in turn perhaps provide the impetus for seeking additional opportunities to develop their L2 proficiency. A basic level of German language proficiency was required to participate in the study, and for this reason, first year students were not targeted. This initial phase resulted in 15 students opting to participate in the study.

The preliminary rate of uptake from this group of students was not as high as expected, necessitating an email to be sent out to all graduate students at the University of Waterloo. The requirements to be eligible to take part in the study remained identical, but this group of students may have additional rationale for being interested in the German language, such as having German heritage, working in Germany, or attending school in Germany as a child. Common among both groups was an inherent and intrinsic appreciation of the German language due to simple interest. This second phase of recruitment proved to be much more successful – an additional 30 students indicated that they would like to participate.

As a result of these two recruitment phases, 45 students in total demonstrated an interest in the study. These participation numbers were higher than expected, and proved to be unsustainable due to myriad reasons, such as the realization that a certain level of proficiency in German would be a prerequisite to participate. As participants began to be asked to complete the initial steps of the study in order to prepare adequately for the gameplay phase of study, only those who were truly interested maintained their participation in the study and completed these introductory requirements (which will be described in detail later). Of the 45 initial respondents, 24 completed a background information questionnaire and attended an orientation session. Participants who declined to continue the study claimed that they did not understand how much German proficiency was required of them, or decided that their academic demands would need to take priority over an intensive study of this nature.

As the gameplay phase of the study began to take place, requiring an investment of ten hours of time over the course of four months, along with three in-person conversations, there was another bout of attrition as participants found the demands of the study too time-consuming. Some, once seeing the level of German used in the game, decided that their

proficiency was not developed sufficiently to thrive in the game world. Others experienced unfortunate technical problems and their computers were unable to run the game appropriately.

As the study period wound down and concluding interviews were conducted, a total of 14 participants successfully completed all stages of the study. Although the final participant numbers are certainly lower than what they started at, the quantity and quality of data that was collected for each of the 14 participants is very detailed and can be used to establish individual, complex gaming and learning trajectories for each participant. All language produced by the individual and his or her reactions to the gameplay experience and study in general will all assist in answering the research questions which were outlined initially. This study will focus on the 14 participants with complete data sets, yet when useful, comparisons will be made with the participants of whom only partial data sets have been collected.

The Players

The 14 players who completed the entire study comprise a distinct and multivariate demographic. Of the 14 participants, 12 were male, and 2 were female. Their ages ranged from 15 (one high school student wanted to participate) to 37 (a mature student completing his undergraduate degree). The median age was 24. 7 participants were completing their undergraduate degrees, whereas 6 were currently enrolled in a Master's program, and one, as mentioned above, was a high school student. All participants indicated a level of proficiency in English and German, but many others languages were referred to as well, such as French, Spanish, Italian, Mandarin, Arabic, Slovak, and Czech.

The gameplay trajectories which emerged after participating in the study and exploring the game world contribute to our understanding of this group. The 14 individuals who concluded the study played a total of 202 hours of *World of Warcraft*, with an average playtime of 14.4 hours over the course of the study (substantially more than the required 10 hours of gameplay). One participant spent a total of 34 hours playing the game, whereas 2 participants only logged 4 hours (due to computer failures, the remaining 6 hours of recorded logs were

unfortunately lost). Furthermore, although the amount of gameplay may have indeed been longer than what is calculated, I have elected to only consider time spent actively playing the game as counting towards the hours played (whereas in actuality, a participant could be logged into the game and the game would record the player as 'playing', yet if there is no sign of actual gameplay, I elected not to count that). While there were many participants who played the game in shorter chunks, individual concurrent play sessions ranged from a couple of minutes to a high of four hours and 36 minutes in a single sitting, lending at least some credence to the potential immersiveness of DGBLL in a game-enhanced setting.

Exploring the gameplay trajectories of participants further define this group of players (Figure 3), with three distinct patterns being observed. The first type of participant (*the Gamer*) is one who has invested his or her time heavily at the beginning of the study, most likely due to previous gaming experience and thus actively looking forward to taking part in the study and playing *World of Warcraft*. *The Gamer* would then traditionally *burn out* (play so much that he or she finds no enjoyment), or hits a wall where there is no possible progression beyond creating a new character in the game.

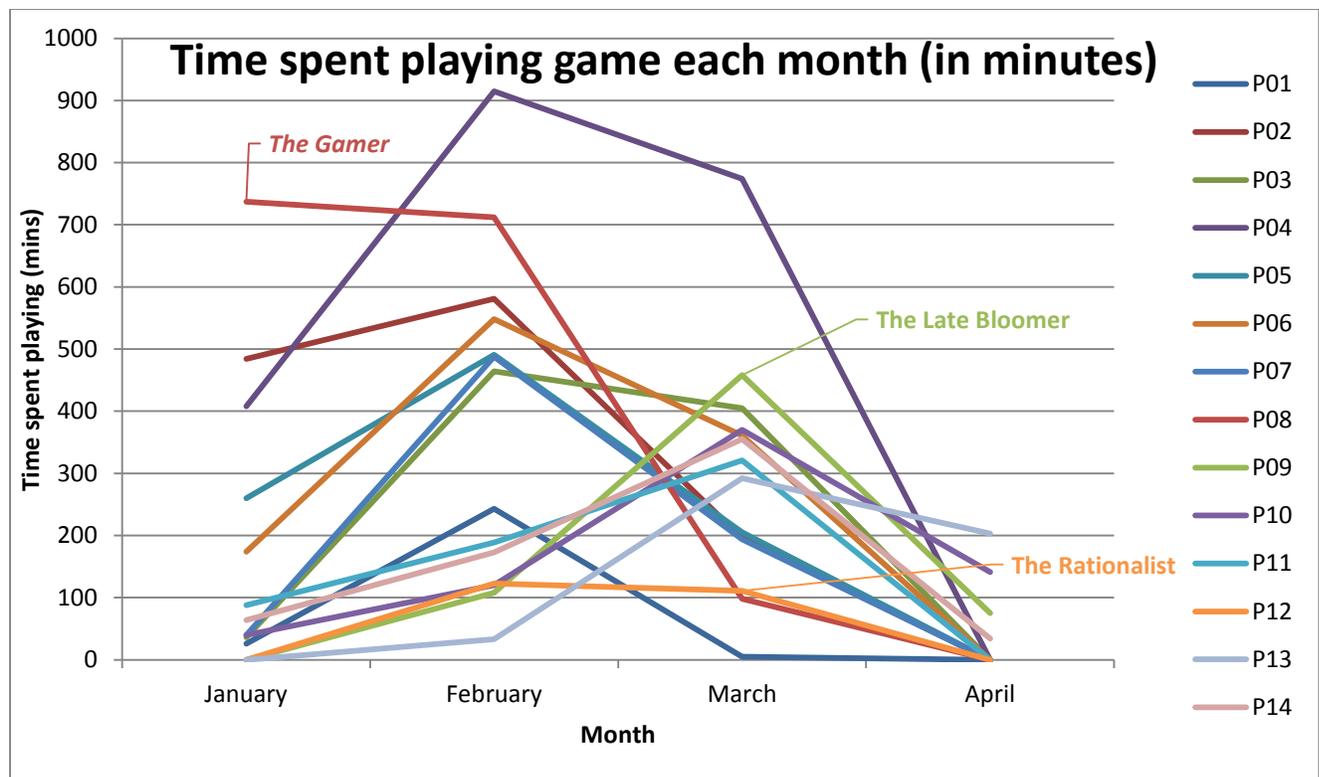


Figure 3. Time spent playing game each month (in minutes)

The second type of participant (*the Late Bloomer*) interacts in an opposite fashion, but may have various reasons for doing so. *The Late Bloomer* has chosen to take part in the study for reasons aside from wanting to play the game due to prior extensive gaming experience. He or she is well aware that he or she has to play a minimum of 10 hours, but due to a lack of interest waits until the end of the study to participate and complete the ten hours, thus resulting in a spike of activity in March. On the other hand, *the Late Bloomer* may have little sustained interest in the game, but once he or she finds a source of entertainment in the game that is unexpectedly entertaining, time spent playing spikes – not because the 10 hours have to be completed, but because a source of fun within the complex system that is gaming has been finally discovered.

The third participant type (*the Rationalist*) is rather uninspired in comparison. *The Rationalist* realizes that there are 10 hours of gameplay to complete, and spreads out these hours throughout the course of the semester, playing for short spurts and ensuring that 10 hours have been completed by the end of the study. Rarely does *the Rationalist* spend more than the 10

hours required to play as there is no necessity to do so; *the Rationalist* is, as the name suggests, rational and adequately completes the study.

Understanding the Group's Orientation to DGBLL

The initial four categories derived from the background information questionnaire – rationale for studying German, language learning experience, gaming proficiency, and computer proficiency – were comprised of thirteen unique questions, with a variety of responses possible for each. The responses provided for each question were not prescribed; participants were given complete freedom to answer as they wished, but by collecting the varied responses, each question could be conflated to a set of responses which would apply to all participants.

At this point, each category and its pertinent questions will be discussed. The values represented below are taken from the initial group of 24 participants who completed the background information questionnaire to demonstrate the variability of this group. In some cases, multiple responses could have been provided, so the total number of responses may be greater than 24. Although this may at first glance be an attempt to trivialize the multitude of responses which participants provided, it remains an accurate characterization of what information was relayed through the questionnaire. Furthermore, these amalgamated responses can simply be traced back to their original responses for a more lengthy depiction of each participant's persona.

It should be noted as well that these categories are themselves not comprehensive in their means of understanding the learners in this study. Factors such as language learning through use, proficiency level in the four primary receptive and productive skills, motivation and attitudes, and the participant's own rationale for participating in the study, are not specifically targeted in this questionnaire. As the goal of the study is to determine what change occurs for each participant through this gameplay and SLD process, however, the background information questionnaire is primarily intended to assist in comparing and contrasting participants, not to deduce the effectiveness of DGBLL.

Rationale for studying German. Only one question was asked which could be attributed to a participant's rationale for wanting to learn German (

Table 5). Participants' responses can be understood as such:

Table 5

What is your rationale for studying German?

What is your rationale for studying German?	Number of respondents (n=24)
Interest	16
Minor	6
Heritage	5
Major	4
Career	4
Study abroad	3
Attended school in Germany	1
Maintenance	1

Overwhelmingly, the majority of participants emphasized that their inherent interest in the German language was a contributing factor to subsequent effort in studying the language. An interest in the language tends to in turn contribute to learners finding additional extramural means to explore the language and use it in fun contexts (as will be seen in future questions). Other rationale is varied, but 10 indicated an explicit academic rationale in the form of a major or minor degree program, whereas the rest were interested in utilizing their language skills for experiences outside of the traditional classroom.

Language learning experience. Responses which speak to the participants' previous experience learning foreign languages are categorized into three distinct areas (Table 6):

Table 6

What is your experience learning German?

What is your experience learning German?	Number of respondents (n=24)
University	20
More than a semester spent in Germany	7
High school	5
Less than a semester spent in Germany	4

Childhood in Germany	3
Language Institute	3
Intensive summer program	1
German Saturday school	1
Tutoring	1

The demographic of participants clearly favours those who have developed at least a portion of their German language proficiency in the university setting. This assumes a certain rigor in terms of the quality of academic education, and based upon which year of study the student is in can further inform us of the type of linguistic knowledge they may have developed by this point in their language learning endeavors. Very few participants had taken part in some of the more common extracurricular language learning experiences such as summer institutes or tutoring, signifying that the majority of participants have developed their language proficiency in classroom settings within higher education, either at university, or while taking part in university-sanctioned study abroad programs.

The results of this category (Table 7) paint a diverse picture of the participants, with two extremes having been identified. Some participants claimed they speak colloquially with either friends or family, whereas others produced the language only in classroom interaction. Other potential responses depict the varying ways in which learners can interact with the language, and often they are signifiers that certain individuals are better prepared for the type of content that the game entails (as the game employs both the productive and receptive language skills in a non-academic context). The two individuals who stated that they currently use the language infrequently learnt German previously, but are now in graduate studies in fields other than German studies and find few opportunities to use the language. This, however, can be a motivator for wanting to play a digital game to maintain language skill levels.

Table 7

How often and in what context is German used?

How often and in what context is German used?	Number of respondents (n=24)
Speaking colloquially	11
Classroom interaction	11

Reading for pleasure	9
Writing for pleasure	5
Listening for pleasure	3
Used infrequently	2

When asked to consider any connections to the German language that are external to the classroom (**Error! Not a valid bookmark self-reference.**), a variety of answers were recorded, with no specific response being more frequently provided than others. Interestingly, many participants did indeed have some additional connection to the German language, which demonstrates that the majority of these language learners were motivated to engage in supplementary opportunities to develop their L2 proficiency. Personal connections however were most dominant, which again emphasizes the majority of participants' rationale for taking part in a study like this; the remuneration may have been an initial incentive to participate, but their desire to develop and improve their second language proficiency was a more persistent factor.

Table 8

What are your connections to the German language, external to the classroom?

What are your connections to the German language, external to the classroom?	Number of respondents (n=24)
Family	8
Friends in Germany	8
Local friends	8
None	6
Travel	4
Work	3
Study abroad	2

Gaming proficiency. Responses oriented towards gaming were a natural focus of the background information questionnaires. The responses provided are detailed as follows.

Overwhelmingly, participants had played some form of video game before playing *World of Warcraft* for the purposes of this study, and a large contingent also indicated that they played board games and card games with some degree of regularity (Table 9). Yet even though many participants cited some form of game play experience, not all participants actually played video games before this study.

Table 9

What kinds of games have you played before?

What kinds of games have you played?	Number of respondents (n=24)
Video games	20
Card games	16
Board games	14
Table-top games	6
None	1

Following up on the prior responses, the frequency at which games were played amongst participants demonstrates an almost equal distribution between the three rates, again signifying that frequent computer game players did not necessarily flock to participate, or were simply not a part of the population of students who could participate (those being students with the necessary German proficiency level) (Table 10).

Table 10

How often do you play these games?

How often do you play these games?	Number of respondents (n=24)
Infrequently	8
Moderately	9
Frequently	7

With nine participants claiming to have a high proficiency in playing online games, the largest contingent have indeed spent considerable time playing online computer games, giving them additional benefit and perspective when deciding to start playing a game like *World of Warcraft* (Table 11).

Table 11

What is your proficiency with online games?

What is your proficiency with online games?	Number of respondents (n=24)
High	9
Moderate	7
None	5
Low	3

Yet similar to the previous question concerning gaming proficiency, five participants indicated no prior playing experience playing online games, signifying that participants did not elect to take part in the study due to the ludic aspect of the game, but may have wanted to explore the language learning potential of an extracurricular activity.

In conjunction with the previous question, although a total of nineteen participants had some sort of experience with online gaming, only three had active experience playing *World of Warcraft*, thus providing a considerable advantage in at least the early stages of the DGBLL experience (Table 12). Whereas many participants did indicate at least some experience playing online games, the variety of responses that comprise the 'Other games' category do not necessarily have commonalities with *World of Warcraft*, and were therefore only a marginal influence in terms of gameplay capability, however these may in fact impact the perception of these sorts of games and a willingness to play them.

Table 12

What kinds of online games have you played?

What kinds of online games have you played?	Number of respondents (n=24)
Other games	15
Other MMOs	5
None	5
<i>World of Warcraft</i>	3

The frequency with which each participant plays online games was distributed similarly to the identical question posed concerning regular games, with the notable difference being that five participants could not claim any frequency of online gameplay due to their complete inexperience (Table 13).

Table 13

How often do you play online games?

How often do you play online games?	Number of respondents (n=24)
Infrequently	7
Frequently	6
Moderately	6
Never	5

This question (Table 14) presented the most variance as participants provided many unique responses when asked about the probable efficacy of DGBLL. Only two respondents indicated that they had tried using digital games with a language learning focus in the past, whereas the other responses were subjective with no objective or practical basis. For this reason, they varied greatly and there was no general trend that can explain the disposition of these language learners. Of note, however, is that the majority of participants believed that aspects of the game would be more beneficial than detrimental to learning.

Table 14

Do you think online games are useful for SLD?

Do you think online games are useful for SLD? Why/why not?	Number of respondents (n=24)
Helpful to develop proficiency	13
Potential for passive learning	6
Skepticism due to other players	6
Motivating/engaging	4
Online community useful	4
Gamification potential	3
Skepticism due to game environment	3
Previous success	2
Needs structured setting	2
Learning to play	1

Computer proficiency. As a means to determine what role computer proficiency may play, as distinct from gaming proficiency, the following questions were raised.

While the results portray the majority of participants as having indicated a high proficiency, not all participants could claim this level of proficiency (Table 15); the question then becomes do those individuals who claimed to be not highly proficient (thus naturally assuming they are not gaming proficient as well) react negatively or ambivalently toward a gaming experience? Is there something about the ludic aspect of this form of language learning that motivates and convinces those otherwise not inclined to engage in gameplay or use the computer to participate in this experience? These considerations will be explored in more detail when examining individual participants.

Table 15

How proficient are you with computers?

How proficient are you with computers?	Number of respondents (n=24)
High	18
Moderate	5
Low	1

An array of possible responses were conceivable when asked to reflect on daily computer usage, and many participants indicated three or four of these as part of their daily routine (Table 16). Both gaming and school generated many responses, with the other possibilities garnering varied rates of response. The utility behind these applications certainly varied in terms of its relevance to DGBLL; whereas gaming and programming require extensive computer skills to be successful, basic computer usage for work or school, or for communicating with friends or family via social media, require understandably less skill, and therefore may not contribute to additional success in the digital gaming environment.

Table 16

What do you typically use the computer for?

What do you typically use the computer for?	Number of respondents (n=24)
School	21
Gaming	14
Digital media	9
Social media	9
Programming	5
Work	4
Graphic design	1

Finally, when asked about previous experiences using digital forms of entertainment or media for SLD purposes, no clear artifact emerged amongst participants (Table 17). These results are largely reflective of the general state of CALL – unless it is incorporated into a traditional classroom environment, students either lack the incentive to engage in extramural activities, or are simply unaware of the potential that exists. Mobile technology and the proliferation of apps has somewhat mitigated this unawareness, as a simple search of the word ‘German’ will bring up a number of apps that one could try, but intentional and well-informed choice of language learning media is unlikely.

Table 17

What media have you previously used for language learning purposes?

What media have you previously used for language learning purposes?	Number of respondents (n=24)
None	8
Mobile applications	6
Digital media	5
Rosetta Stone	4
Online games	3
Language learning websites	3
Tutorial CALL	3

With the information gathered from the background information questionnaires, it proved necessary to operationalize and code their responses to construct better comparisons between participants, which in turn would ultimately lead to determining which participants

would be analyzed in greater detail. The process of coding will be described in detail, and initial results obtained through this process will be shared as a means of better understanding the process.

Coding of Responses

As can be seen above, the results of the initial background questionnaire proved to be incredibly varied. The open-ended nature of the questionnaire prompted and contributed to a vast array of possible answers; as a result, attempting to group and categorize each participant was a difficult task. Comparing results in a category such as rationale for studying German is simple enough – with only one pertinent question, a cursory comparison between participants is relatively easy. Even still, although we could summarize that two individuals who both cite family members speaking German as being a source of inspiration to study German as being similar, it is more challenging to sufficiently understand the change in gameplay trajectory which may result from someone who cites family as their motivator in comparison to an individual who is studying German to obtain a minor in his or her academic program. On a qualitative level, these two responses could be distinguished between, but once more participants are introduced into the conversation and a wider comparison is targeted, it becomes increasingly difficult to distinguish between participants. My goal in determining the characteristics of each participant was to understand and establish the initial conditions of the participants engaging in the digital game-based language learning process as a complex system.

Other categories, such as those concerning gameplay and previous language learning experience were comprised of multiple questions, which in turn make for a more challenging analysis. If we look at the responses to the category exploring gaming proficiency for two participants, we can begin to see the amount of potential variance in participant responses (Table 18).

Table 18

Gaming proficiency comparison between P01, Einpanda, and P09, Putags

Participant 1	Participant 9
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1. What kinds of games have you played?	Video games; cards	Video games; board games; cards
2. How often do you play these games?	Moderately	Infrequently
3. What is your proficiency with online games?	High	Moderate
4. What kinds of online games have you played?	Regularly plays other games	Other games
5. How often do you play online games?	Moderately	Infrequently
6. Do you think online games are useful for SLD? Why/why not?	Helpful to develop proficiency	Skeptical that other players can ruin the experience

Although commonalities exist between the two learners, there are some stark differences as well, namely in terms of each participant's preconceived impression of the efficaciousness of DGBLL. A basic contrast between the two in terms of their characteristics could be formulated, but other factors that contribute to their gaming proficiency and knowledge would need to be taken into account as well, making for a much more arduous task. It may be easy to argue that participants with less experience playing online digital games, or already harboring skepticism before the study has even begun, may be less inclined to immerse themselves fully in the study and the game itself, but as will be argued in *Chapter V: Analysis and Discussion*, such preconceived notions by themselves are misguided.

In order to make the remarks provided by participants more easily analyzable, a coding and operationalization procedure had to be established which could assist in delineating the various levels of granularity that each category could entail and output a resulting numeric value for statistical purposes. Furthermore, if each potential response is coded numerically, rather than verbally, there had to be a rational method behind the number each is assigned. The goal of this coding process was to be able to look at the numerical values that each item in each category was assigned and compare them against one another, while also being able to sum the

numbers within a category and perform simplistic comparative analyses across categories (Table 19).

Table 19

Background information questionnaire category rankings

Rationale for studying German	
<i>What is your rationale for learning German? (R1)</i>	Major (1); Minor (2); Career (3); Study abroad (4); Heritage (5); Attended school in Germany (6); Interest (7); Maintenance (8)
Language learning experience	
<i>What is your experience learning German? (L1)</i>	Childhood in Germany (1); More than a semester spent in Germany (2); Intensive summer program (3); A semester spent in Germany (4); University (5); German Saturday school (6); Language institute (7); High school (8); Tutoring (9)
<i>How often and in what context is German used? (L2)</i>	Speaking colloquially (1); Writing for pleasure (2); Listening for pleasure (3); Reading for pleasure (4); Classroom interaction (5); Infrequently (6)
<i>What are your connections to the German language, external to the classroom? (L3)</i>	Family (1); Friends in Germany (2); Study abroad (3); Work abroad (4); Local friends (5); Travel (6); None (7)
Gaming proficiency	
<i>What kinds of games have you played? (G1)</i>	Video games (1); Board games (2); Cards (3); Table-top (4); None (5)
<i>How often do you play these games? (G2)</i>	Frequent (1); Moderate (2); Infrequent (3)
<i>What is your proficiency with online games? (G3)</i>	High (1); Moderate (2); Low (3); None (4)
<i>What kinds of online games have you played? (G4)</i>	Wow (1); Other MMOs (2); Other games (3); None (4)
<i>How often do you play online games? (G5)</i>	Frequent (1); Moderate (2); Infrequent (3); Never (4)

<i>Do you think online games are useful for SLD? Why/why not? (G6)</i>	Yes - previous success (1); Helpful to develop proficiency (2); Motivating/engaging (3); Potential for passive learning (4); Online community useful (5); Learning to play (6); Gamification potential (7); Skepticism due to game environment (8); Skepticism due to other players (9); Needs structured setting (10); No grammar focus (11)
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Computer proficiency

<i>How proficient are you with computers? (C1)</i>	High (1); Moderate (2); Low (3)
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<i>What do you typically use the computer for? (C2)</i>	Gaming (1); Programming (2); Digital media (3); Graphic design (4); Social media (5); Work (6); School (7)
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<i>What media have you previously used for language learning purposes? (C3)</i>	Online games (1); Mobile apps (2); Digital media (3); Language learning websites (4); Rosetta Stone (5); Tutorial CALL (6); None (7)
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The numerical value beside each response indicates the ranking of the concept within the individual category. This ranking system is intended to establish a hierarchy with regards to how close each potential answer is to the response which is most-suited to DGBLL endeavours; the lower the value, the closer the response is to what would be expected for the type of participant who would find most utility in a DGBLL situation. These rankings are subjective, yet rational in their coding. There are of course many other characteristics and variables that could have contributed to not only these four categories, but any other potential influence not specifically examined as part of the background information questionnaire. No known studies analyze and compare their participants in this amount of detail due to the complexity theory framework utilized, and for this reason, there is no existing research that provides guidance as to what initial conditions contribute to change within the system. While this is a potential limitation of the study, it must be emphasized that these results serve the primary purpose of comparing participants for analytical purposes.

Computing challenges. Establishing a ranking for each response in a given category was the first step toward being able to more effectively compare and contrast participants. While the individual rankings in some of these categories can be debated, the rankings

themselves by no means attempt to signify that certain responses are inherently better; rather, they were done so that a visual representation of how similar participants are in these various categories could be obtained. At the same time, however, simply assigning each potential response a number would not accurately depict how similar certain participants are to one another. An individual who has previously played online games in an attempt to learn an L2 is naturally quite different from someone who has never used any form of media for SLD purposes. And someone who has used various language learning websites has more in common with the individual who has played online games for language learning purposes, and therefore, when attempting to determine similarities, deserves to be more closely aligned.

Problems arise, however, if the assigned ranking values are used when graphing each participant in contrast to one another. There are three reasons for this.

An initial challenge arises as individuals perceive a higher numerical value as *better* than a lower value. Consider the following:

When asked what experience each individual had studying the German language, Participant 05, Naturin, answered that he had spent a semester in German, had studied the language at the university, and also in the high school context. Participant 10, Trolinda, on the other hand had spent her childhood living in Germany and even after having moved, had spent more than four months in Germany.

With the ranking applied, Naturin provided responses which equate to a 4 (spending less than four months in Germany), a 5 (studying German at the university), and an 8 (having studied at high school), thereby resulting in 17. Trolinda's responses result in a 1 (having spent her childhood in Germany) and a 2 (spending an additional length of time in Germany at a later point in her life), giving a combined total of 3. Trolinda's experiences are more closely aligned with the conditions one would expect to lead to the ability to successfully interact with and in the digital game environment, but the summation of each participant's responses would make one believe that a total of 17 is certainly much better than a sum of 3. The large variance

between numbers compounds this issue in a way that participants scoring 3 and 5 would not, although in this instance the 5 is still perceived as the better result.

Furthermore, when comparing these numbers, due to the large variance, it implies that some responses are rather negative. This is not the case, and by no means does the ranking try to discount certain responses as being invalid. Yes, Naturin ranked lower than Trolinda, but his experiences while learning the German language are equally valid and will have been useful and influential in different ways. A base numerical value cannot explain this, and ultimately skews the reader's perception.

A second challenge arises due to some participants having provided more than one response for certain questions, making it challenging to compare these basic numerical values to one another. For example:

When asked what the rationale was for learning German, Participant 04, Eisenbarchen, indicated completing a minor (2) and a general interest in the language (7) to be the key motivating factors, whereas Participant 15, Eisschlange, stated a desire to study abroad (4) and a German heritage (5) as the prime inspiration for her learning the German language.

The issue in this instance arises when the aggregate is obtained for each participant's responses. Although Eisenbarchen and Eisschlange gave completely different responses, the sum of those two responses both equate to 9. When any purely numerical analysis is done then, these two learners are identical, which is entirely misleading. It is possible to just revert back to the learner-provided responses, but when more comprehensive visual representations of the data are produced (as will be explored in the next section), it is challenging to differentiate between the diverse variables.

A final challenge with adopting the numerical values comprising the initial ranking system presents itself when comparing the summed values for each participant. Compare Participant 01 and 11:

When asked if they thought playing digital games for second language development purposes would be useful, Participant 01, Einpanda, answered yes, they would be helpful to develop language proficiency (2). Participant 11, Obstfresser, had a more detailed response, and answered too that yes, they would help develop proficiency in the second language (2), but also that they would be motivating and engaging (3), that the online community to interact with would be helpful (5), but that there was some lingering skepticism about some of the individuals that could be encountered online and how they may inhibit the learning process (9).

This specific question has a wide variety of possible responses, with the highest being given a ranking of eleven. For this reason, when adding the responses of each participant, there are huge deviations between participants. Einpanda with his sole response would receive a 2, whereas Obstfresser would receive a 20. The range between these two responses is rather large, and when visually depicted would skew the results unnecessarily. Yes, Obstfresser answered very differently, but visually the responses would be difficult to extrapolate. This issue is compounded with questions which entail a multitude of responses, as compared to questions that only elicit three responses in total; they need to be represented on the same visual plane, but the numbers are heavily skewed towards responses with many potential responses.

Taking all of these issues into consideration, it was clear that a better means of employing these rankings was needed. For this reason, a binary numeral system was implemented in an effort to solve all three challenges (see Table 20).

Table 20

Binary numeral system

Ranking	Binary Association	Binary Value	Decimal Value
1	2^0	1	1
2	2^{-1}	0.1	0.5

3	2^{-2}	0.01	0.25
4	2^{-3}	0.001	0.125
5	2^{-4}	0.0001	0.0625
6	2^{-5}	0.00001	0.03125
7	2^{-6}	0.000001	0.015625
8	2^{-7}	0.0000001	0.007813
9	2^{-8}	0.00000001	0.003906
10	2^{-9}	0.000000001	0.001953
11	2^{-10}	0.0000000001	0.000977

Implementing a binary numeral system resolves the three challenges identified. Firstly, the binary numbers are able to be traced back to the original values as the sum of two or more (different) binary numbers can be deconstructed unambiguously to its summands. In other words, when added together, the sum of any combination of binary values will be unique, as each binary number is exactly half of the previous number (meaning even if all values are added together, they will never reach the sum of the previous number). Finally, rather than having potentially vast differences in the values that are produced through the ranking system, all values fall between 0 and 1, and even if all values are added together, the summation will never go beyond 2, ensuring that depicting these numbers visually is easier to do.

Beyond resolving the initial challenges faced with applying a ranking system for broader comparison and depiction purposes between participants, the adapted binary numeral system provides an additional benefit. The response most-suited for DGBLL for each category – the first ranking - receives a 1. Any response after that therefore receives a value less than 1. Individuals, however, who answer more than one response, while still selecting the response most suitable for DGBLL, result in a value higher than 1. When representing these responses visually, then, it is easy to identify that responses above 1 have demonstrated arguably better conditions for DGBLL and more, whereas those below 1 did not share these conditions. For comparison purposes, it is much easier to look at a wealth of participant profiles and quickly see how individuals chose to represent themselves.

With the processes used to collect results concerning each participant explained in detail, we can now turn our attention towards both the learner-related and game-related results

of the 14 participants who completed the study as a whole in order to establish a core set of variables which were utilized to determine which participants to analyze in full detail in the subsequent discussion. Learner-related results are defined as those which are self-reported by the participant and are therefore subjective in nature. This contrasts to game-related results, which are derived from the gameplay experience, either in the form of direct gameplay, or in discussions surrounding these gameplay experiences.

Group Results and Characteristics

Learner-related. Learner-related results and characteristics consist of the following components, as seen in Table 21, and the results vary dramatically between participants. As can be observed, each participant is given a pseudonym which is the name they chose for their avatar while playing the game. The results of each category derived from the background information questionnaire were divided by the number of questions pertaining to each category so that the numerical value is a factor of one, thus allowing for easier comparisons. For example, Obstfresser's answers relating to language learning experience resulted in values of 0.56 (experience studying German), 1.75 (how often is German used?), and 1.06 (external connection to German). When added together and divided by three, Obstfresser's language learning experience result is 1.13.

Table 21

Learner-related characteristics and results (R = rationale for studying German; L = language learning experience; G = gaming proficiency; C = computer proficiency)

	Sex	Age	Year of study	Languages	R	L	G	C
P01 - Einpanda	Male	22	3U	German; English; Mandarin	1.27	0.15	0.67	1.23
P02 - Srfroggy	Male	15	Grade 10	German; English	0.02	0.71	0.88	0.84
P03 - Föresty	Male	28	6M	German; English	0.75	0.20	0.70	0.92
P04 -Eisenbarchen	Male	37	4U	German; English; French; Spanish	0.52	0.61	0.57	0.93
P05 - Naturin	Male	21	4U	German; English; French; Mandarin	0.50	0.65	0.93	0.71
P06 - Kyrri	Female	19	2U	German; English; French	0.13	0.76	0.94	0.86
P07 - Baerenjaeger	Male	30	2M	German; English; French; Spanish; Italian	0.02	0.95	0.79	0.68
P08 - Gregmund	Male	23	4U	German; English; French	0.58	0.38	0.85	0.78
P09 - Putags	Male	24	2M	German; English; French	0.02	0.29	0.50	0.35
P10 - Trolinda	Female	26	1M	German; English; Slovak; Czech	0.02	0.70	0.56	0.34
P11 - Obstfresser	Male	28	2M	German; English; French; Spanish	1.20	1.13	0.80	0.82
P12 - Shadowsflame	Male	20	3U	German; English; French	0.52	0.40	0.45	0.70
P13 - Shaftgs	Male	25	2M	German; English; Arabic	0.25	0.25	0.27	0.54
P14 - Wolfköder	Male	18	2U	German; English; French; Spanish	0.52	0.45	0.79	0.69

From a cursory look, we can see that certain trends begin to emerge. In terms of one's rationale for studying German, the mean response provided was 0.42, implying that participants 01 (Einpanda), 03 (Föresty), 04 (Eisenbarchen), 05 (Naturin), 08 (Gregmund), 11 (Obstfresser), 12 (Shadowsflame) and 14 (Wolfköder) all provided responses that were well-suited to elements which may lead to a stronger rationale for studying German (such as majoring, minoring, or seeing its potential for a career). Interestingly, only Einpanda and Obstfresser had chosen to study German as a major, thereby receiving the highest value of one; many other participants indicated that they were studying German as a minor, or for career and study abroad purposes, thus resulting in high values regarding their rationale for studying German.

Responses pertaining to one's language learning experience, when summed together, result in a mean of 0.53. Participants 02 (Srfroggy), 04 (Eisenbarchen), 05 (Naturin), 06 (Kyrii), 07 (Baerenjaeger), 10 (Trolinda), and 11 (Obstfresser) all provided responses to the three questions in this category which resulted in values higher than the mean. Here too, only one participant's responses – Obstfresser's – produced a value higher than one. Analyzed further, we can see that Srfroggy, Eisenbarchen, Kyrii, Baerenjaeger, and Obstfresser all report their highest values when asked about how often and in what contexts German is used, indicating responses such as speaking colloquially or writing and listening to German for pleasure. Srfroggy, Naturin, Baerenjaeger, and Trolinda also have strong responses when asked about their external connection to the German language, noting that they had either family or friends in Germany who spoke the language with them. Trolinda is unique in that she spent her childhood in Germany, therefore resulting in a value above one for that question.

In the category relating to one's gaming proficiency, we begin to see higher numbers of participants whose reported responses are above the mean of 0.63; Einpanda, Srfroggy, Föresty, Naturin, Kyrii, Baerenjaeger, Gregmund, Obstfresser and Wolfköder all provided responses above this mean. In this instance, however, no individual reported a value over one, but with six individual questions comprising the category, this is not surprising, especially as the response most likely to contribute to DGBLL would imply someone having already frequently

played *World of Warcraft* and considered its benefits for DGBLL. Srfroggy, Naturin, Kyrii, Gregmund and Obstfresser all answered the background information questionnaire questions in such a way to receive values above 0.8, which are still very strong. These individuals have in common their experiences playing actual video games, not just board or card games, and a certain regularity with which they play, either expressing their frequent play styles, or more moderate gameplay regularity but with prior experience playing actual MMORPGs such as *World of Warcraft*.

Finally, analyzing the group of participants in terms of their computer proficiency again broadens the field of individuals who score above the mean of 0.68; this is unsurprising, as one would expect a certain level of proficiency with computers to show interest in DGBLL, and in this case, Einpanda, Srfroggy, Föresty, Eisenbarchen, Naturin, Kyrii, Baerenjaeger, Gregmund, Obstfresser, Shadowsflame and Wolfköder all indicate a relatively high level of computer proficiency. Common amongst these participants is that they indicated using their computers for gaming and had acknowledged a high proficiency with computers in general. Einpanda, Föresty, Eisenbarchen and Shadowsflame had the added benefit of already utilizing some form of online gaming or mobile app to learn a foreign language, whereas the majority of others had not tried one. Amongst all participants, only Einpanda had a final value above one.

Participants whose answers fall below the mean in multiple categories include participants 09 (Putags), 13 (Shaftgs), Trolinda, and Shadowsflame. These participants are especially interesting to analyze, as one may wonder what their initial interests were in taking part in the study. Out of the four participants, only one had a rationale for studying German above the mean, whereas the others indicated interest in the German language as a primary factor. Interest in German is a perfectly valid reason to want to study the language, yet without a more extrinsic motivating factor such as an academic-related milestone to complete, one has to wonder how sustainable the interest is for an extramural activity such as this.

In terms of language learning experience, only Trolinda is above the mean, having indicated that she had spent ample time in Germany as a child; the other three receive lower

values due to not utilizing their German outside of the classroom, or at least claiming to not have the opportunity to do so due to lack of external connections to the German language.

All four participants have values lower than the mean in the gaming proficiency category, which is primarily a result of having insufficient time to play games; interestingly three of the four are currently completing their Master's degrees, which could certainly contribute to a lack of time to invest in gaming in general. Some of them also express skepticism towards the DGBLL process, unsure of whether or not it will be possible to develop second language proficiency while learning to play the game. Such preconceived notions may contribute to a lack of future gameplay and engagement in the study.

Finally, Putags, Trolinda, and Shaftgs all have computer proficiency values below the mean, which stems from their rather mundane usage of the computer for primarily work and school-related purposes, as well as their lack of experience trying forms of digital media for SLD purposes. This lack of experience should not be an inhibiting factor, but it again may cause hesitation when exploring the affordances of this style of language learning.

It is at this stage too that we can refer back to the initial set of 24 participants who completed the background information questionnaire, and determine whether or not there is a consistent variable which sets these two groups apart, perhaps lending evidence as to why these additional 10 participants elected not to continue participating (Table 22).

Table 22

Learner-related characteristics and results (incomplete data sets) (R = rationale for studying German; L = language learning experience; G = gaming proficiency; C = computer proficiency)

	Sex	Age	Year of Study	Languages	R	L	G	C
P15	Female	23	4U	German; English	0.19	0.40	0.98	1.10
P16	Female	19	2U	German; English; French	1.00	0.58	0.42	0.32
P17	Female	20	3U	German; English; French; Spanish	0.08	1.10	0.54	0.57
P18	Female	26	PhD	German; English	0.02	0.15	0.38	0.67
P19	Female	37	PhD	German; English; French; Farsi	0.25	0.38	0.19	0.59
P20	Male	20	2U	German; English; French	1.02	0.24	0.48	0.44
P21	Female	18	1U	German; English; French; Mandarin	0.112	1.45	1.00	0.84
P22	Male	23	3M	German; English; Korean; Japanese	0.02	0.44	0.79	0.43
P23	Female	23	1M	German; English; Mandarin	0.02	0.37	0.16	0.20
P24	Female	21	2U	German; English; French; Spanish	1.00	0.05	0.40	0.45

A major, immediate difference in the demographic between the two groups is the number of females who had elected initially to participate in the study but then withdrew. While this was an unfortunate result, their withdrawal cannot necessarily be attributed to their sex; rather, an analysis of the background information questionnaire results, especially when compared to those of the 14 participants who elected to continue the study, portrays a very different demographic of learners.

Whereas with the group of 14, four participants had more than one category below the mean value, in this group of incomplete data sets, nine of the 10 have more than one category below the mean, with the majority having at least three. It may be difficult to purport that any single factor contributed to these players' decision to withdrawal from the study, but evidently they had less incentive before even beginning playing to contribute. This does however also suggest that the 14 participants who did elect to complete the study were motivated language learners and gamers, but the extent to which this affects the learner's trajectories of SLD and gameplay will be explored.

With this data collected and categorized appropriately, we can finally begin to determine how similar participants in the group of 14 are to one another by considering the myriad values that contribute to their learner-related results. Figure 4 depicts a correlogram portraying the correlation between each participant in reference to one another. It attempts to best situate each participant in terms of his or her relation to every other participant.

The correlogram is made up of two components. The bottom-left half depicts the correlation between participants as represented by a pie chart. The fuller the pie chart is, the higher the correlation is between participants. If the circle is blue, this represents positive correlation, and if it is red, negative. The top-right hand portion of the correlogram depicts the line of best fit between all data points that comprise the learner-related results. The circle surrounding this line portrays the range of possible data points for each participant. Although it is not a perfect representation due to the number of variables being considered, one can quickly see when comparing the pie graphs how similar a participant is to another.

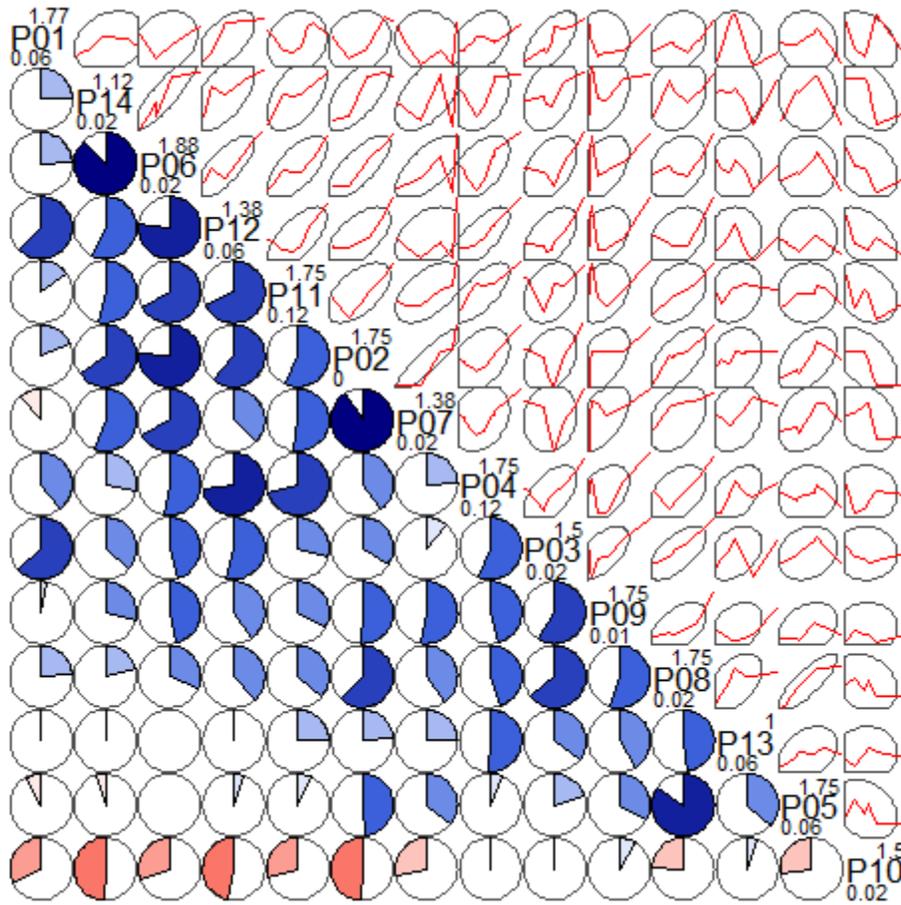


Figure 4. Learner-related results correlogram

As can be observed, participants 02 and 07 are most closely aligned. As participants become increasingly distanced from one another in the correlogram, the similarities between their learner-related results become further minute. Further to this, and to better make sense of how similar certain participants are, a cluster analysis can be conducted to better visualize which participants should be considered for pairwise comparison and a closer analysis (Figure 5). The dendrogram, like the correlogram, depicts the correlation of learner-related results between participants.

a different height. Participant 10, Trolinda, is the clear outlier, which is not surprising based upon her self-reported disinterest in gaming and her lack of computer proficiency, which ultimately makes it very difficult to categorize her with others.

These learner-related results aid in conceptualizing the initial conditions of the CAS. As we understand from retrodictive qualitative modeling, it is our goal to examine the change that occurred in the system by tracing back its development from the outcomes to the individual components which may have influenced that change.

Game-related. With the learner-related results identified for the participants in this study, we turn our attention to the game-related results which provide an initial indication of the outcomes of this CAS (Table 23).

Table 23

Game-related results (all times in hours and minutes)

	Overall time played	Number of days played	Number of sessions played	Average session length	Average text per 10 minutes	Average text per session	Average text per day	Total text exposure
P01 - Einpanda	4:34	4	5	0:55	2858	15433	30866	77166
P02 - Srfroggy	21:06	13	17	1:14	5196	39089	51116	664519
P03 - Föresty	15:05	17	20	0:45	2888	13278	14754	265566
P04 - Eisenbarchen	34:57	33	49	0:43	2115	8959	13282	438321
P05 - Naturin	15:56	10	12	1:20	4593	36742	44090	440904
P06 - Kyrii	18:03	17	20	0:54	3262	17774	20910	355476
P07 - Baerenjaeger	12:02	16	17	0:42	2589	11105	10989	188783
P08 - Gregmund	25:47	13	14	1:50	4617	50306	54177	704296
P09 - Putags	10:41	10	10	1:04	2746	17571	17571	175712
P10 - Trolinda	11:11	14	10	1:07	2158	13793	9856	137930
P11 - Obstfresser	9:58	9	9	1:06	3630	24197	24197	217771
P12 - Shadowsflame	3:54	3	3	1:18	1553	11894	11894	35683
P13 - Shaftgs	8:48	6	5	1:46	2039	21208	17673	106040
P14 - Wolfköder	10:26	9	9	1:10	4142	28469	28469	256225

The length of time each participant spent playing has been touched upon earlier, but now we see more specifically how each player utilized his or her time while playing. A simple sign of interest and engagement in the game can be attributed to the number of days and sessions played by each participant. Certainly Einpanda and Shadowsflame played relatively little in comparison to the rest of the group, both in terms of days and sessions played. This can be attributed to computer issues to some degree and the loss of data, but for Shadowsflame, the amount of text exposure over the course of his playtime was rather low, signifying that additional time spent playing would not have necessarily resulted in improved SLD.

Eisenbarchen stands out as an anomaly of sorts in the data set, having played almost twice as many days and more than twice as many sessions as the next few participants, Srfroggy, Föresty or Kyrii. Yet although these totals are impressive and would lead one to believe that he had the best opportunity for SLD, the actual amount of text exposure in the game is even more interesting. The values depicted here vary wildly – Gregmund was exposed to over 700,000 characters in the span of his gameplay, yet Shadowsflame was exposed to just above 30,000 characters – and largely are reflective of how much time the player spent playing, as those who play more often will most likely be exposed to more language. This alone however is not necessarily an indicator of SLD in the CAS; what is more telling is how much text a player is exposed to every 10 minutes, therefore providing an indication of how well they are spending their time while playing the game, as two individuals can have very different play styles which may or may not be conducive to SLD.

The mean amount of text exposure every 10 minutes was 3170 characters. Srfroggy, Naturin, Kyrii, Gregmund, Obstfresser and Wolfköder all observed more than the mean amount of text, meaning that they were able to engage in the game in such a way that introduced them to more potential observable language. While other participants hovered around that mean, Eisenbarchen, Shadowsflame and Shaftgs were all dramatically below it.

It is evident by these cursory numbers alone that playing the game is not a common experience – simply because the game itself is identical does not mean that players will play the game the same way. This may be true for game-based, educational DGBLL experiences, or those

where the *playing to learn* paradigm is instituted and therefore learners need to be introduced to the same material in the same logical order. Vernacular games, contrastively, embrace the complexity that encourages players to explore the game at their own pace and invest time in the game in such a way that makes the experience enjoyable for the individual. Yet this complexity also clearly favors certain types of play styles, as is evident by the drastically different amounts of text exposure in these 10 minute segments. How then does the play style impact the amount of text exposure? Does the amount of language exposure contribute to the near transfer of linguistic constructions? These questions will be unpacked in the subsequent Analysis and Discussion.

As with the learner-related results, these game-related results too can be contrasted with one another on the participant level to determine how similar participants are (Figure 6).

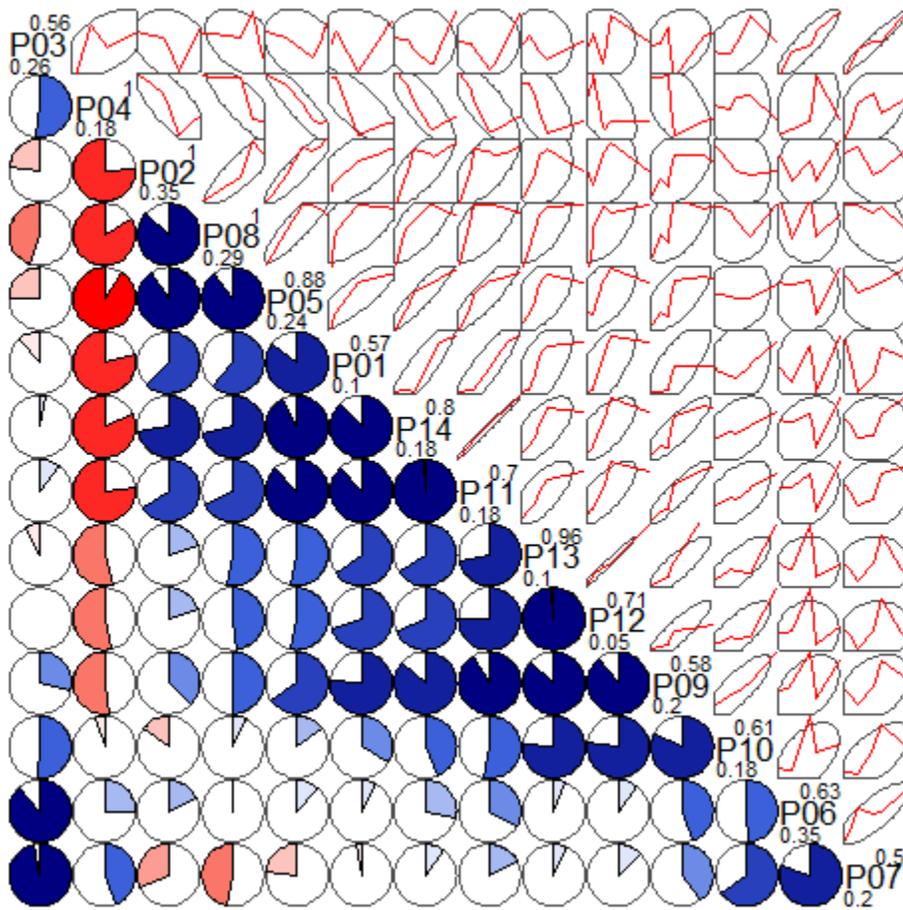


Figure 6. Gaming-related results correlogram

We can observe strong similarities between P11 and P14, as well as P13 and P12, and close alignment of gaming-related results between others around this core area. Participant 10, Trolinda, although initially being an outlier amongst participants, now finds commonalities with other participants, and yet participant 04, Eisenbarchen, now has a negative correlation with many participants due to the wealth of time spent playing *World of Warcraft*. An accompanying cluster analysis helps to further make sense of the correlogram and narrow one's focus to participants with similar experiences (Figure 7)

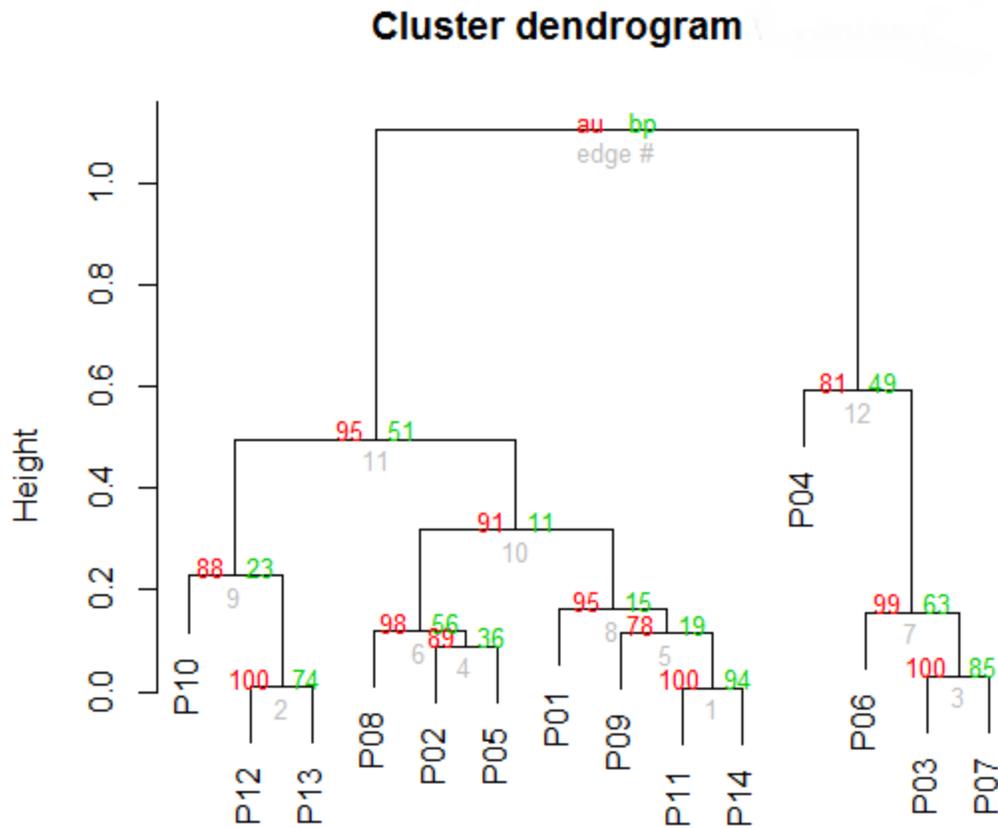


Figure 7. Gaming-related results cluster analysis

Unlike the dendrogram depicting the learner-related results, there are fewer outliers amongst participants when observing the gaming-related results, which signifies that the majority of learners had a relative level of success playing *World of Warcraft*. Whereas the correlogram depicts to what degree each participant is related to one another, we can observe now which participants' experiences are most well aligned. The wealth of results gathered on the group level ultimately serve to better understand how learners/players interact with DGBLL, and serve as the underpinning for the subsequent work of developing participant profiles and better understanding what gameplay and learning trajectories emerge while playing a game like *World of Warcraft*.

Participant Profiles and Selection

With the group-level results obtained and computed, participant profiles can begin to be constructed. Taking into account the learner and gamer-related group results obtained, I have elected to focus on four pairs of participants. As will be seen when examining the correlations between participants' results, many are not significant, suggesting that we cannot be sure if a correlation does exist, or if this is mere chance. The in-depth, qualitative data which accompanies these statistics, as will be explored in *Chapter V: Analysis and Discussion*, does however assist in lending further credence to these initial results. When the correlation is significant, this further serves as a point of discussion as to why the results would in fact be significant. These results fundamentally serve to establish initial pairwise comparisons for deeper analysis.

Srfroggy and Baerenjaeger are chosen due to their strong correlation in their learner-related results ($r = 0.908$, $n = 13$, $p < .001$), and as can be seen below, their responses in the four main categories as emphasized in the background information questionnaire are remarkably similar (Figure 8). The dotted line at the edge of the diagram indicates the response most appropriate for DGBLL success for each category. Each point in the four quadrants of the diagram represents the aggregated result of all items comprised in the category (see *Table 19*).

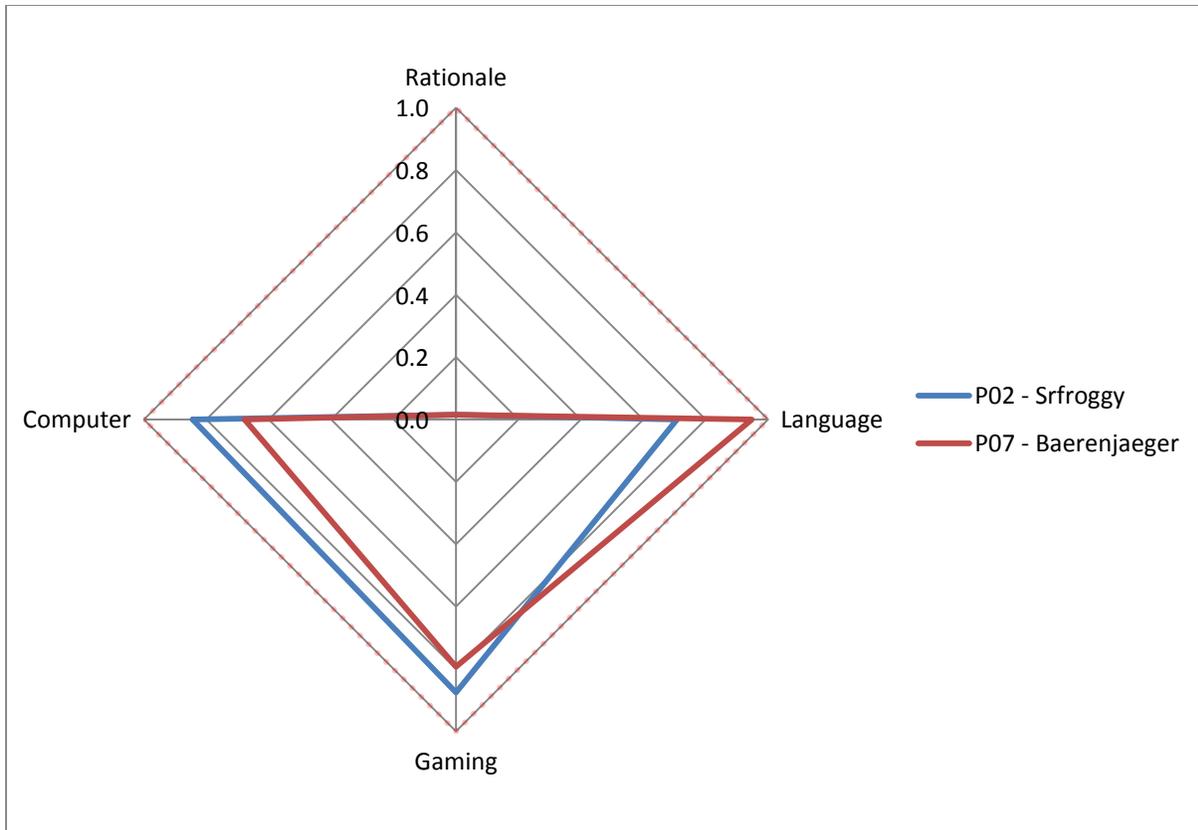


Figure 8. Learner-related results of Srfroggy and Baerenjaeger

Immediately we can observe the similarities between these two participants in all four categories. Both participants indicated that their rationale for studying German was purely out of interest, with no formal or informal education substantiating their rationale. In terms of language learning experience, Srfroggy had participated in a Saturday school program for German language development, but otherwise used his German colloquially with family and friends, as well as when travelling. Baerenjaeger had used German at the university level and had spent more than a semester abroad, and also uses his German language skills colloquially with family and for travelling, therefore resulting in a very high result for this category. Both participants claim to play video games and other types of games frequently, yet are skeptical about the game's potential to assist in SLD; Srfroggy thinks other players may ruin the experience, whereas Baerenjaeger is skeptical of the game environment itself as being beneficial to assist in some form of SLD. Finally, their computer proficiency scores are quite similar, citing

frequent use of computers for gaming and school work, while also having no prior experience using games for SLD purposes.

Yet although they approach the four primary categories similarly, their gaming-related results are drastically different, signifying that one cannot assume similar initial conditions will lead to equally similar gaming experiences on an objective level. The correlation of gaming-related results is markedly lower and not significant ($r = -0.314, n = 8, p = 0.447$), signifying that in comparison to the correlation of the initial conditions, these two participants' gameplay trajectories have clearly bifurcated (Figure 9).

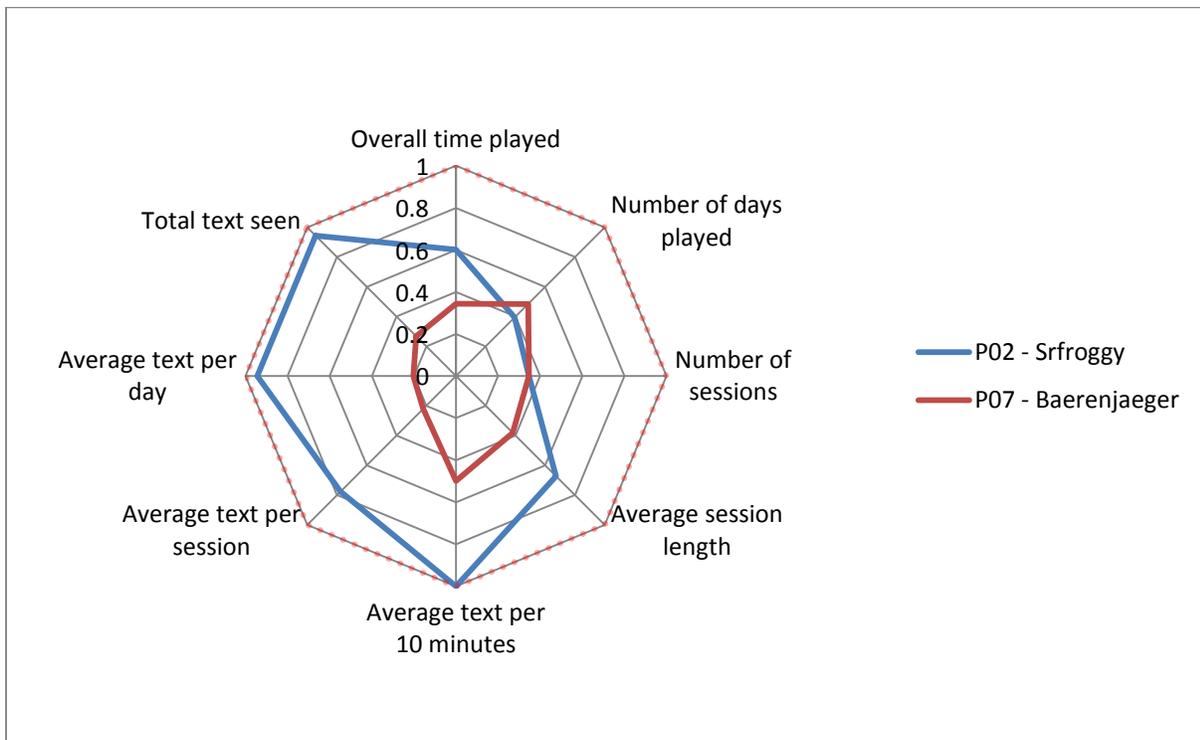


Figure 9. Gaming-related results of Srfroggy and Baerenjaeger

Depicted similarly to the diagram portraying differences in learner-related results, the gaming-related results can be represented visually as well. These results are however objective, in comparison to the entirely subjective responses garnered from the background information questionnaire. The upper limit of each category is defined by player experience, not the judgment of the researcher; whichever participant has played the most total hours of the game receives a one, and each other participant receives a value that is a factor of one; similarly, the

player who plays the most days would receive a one, and all other participants would be ranked accordingly. Just as with the learner-related results, however, scoring a one does not imply that this result is necessarily better than others, but it does ensure that participants can be contrasted fairly to one another in order to determine which participants to analyze in greater detail.

Srfroggy excels in many of these categories, having encountered the second most text of all participants, and more impressively, observing the most text per 10 minutes; this is noteworthy as his overall time spent playing and the number of sessions and days he played are decidedly average amongst the group, implying that his playtime was exceptionally efficient. Contrastively, Baerenjaeger has a relatively poor gameplay experience, and in comparison to Srfroggy, only excels on the number of days on which he played the game, yet the amount of text he observed was much lower than his counterpart's. Their concluding interview results also vary quite differently, confirming at least from a participant standpoint that they had very different experiences playing the game for DGBLL purposes, and which will be explored in greater detail in the Analysis and Discussion.

The next pair of participants, Obstfresser and Naturin, is chosen to demonstrate varying trajectories in comparison to the previous pair. Whereas Srfroggy and Baerenjaeger had a strong correlation with respect to their initial conditions, Obstfresser and Naturin's initial conditions had no correlation ($r = 0.067$, $n = 13$, $p = 0.828$) (Figure 10).

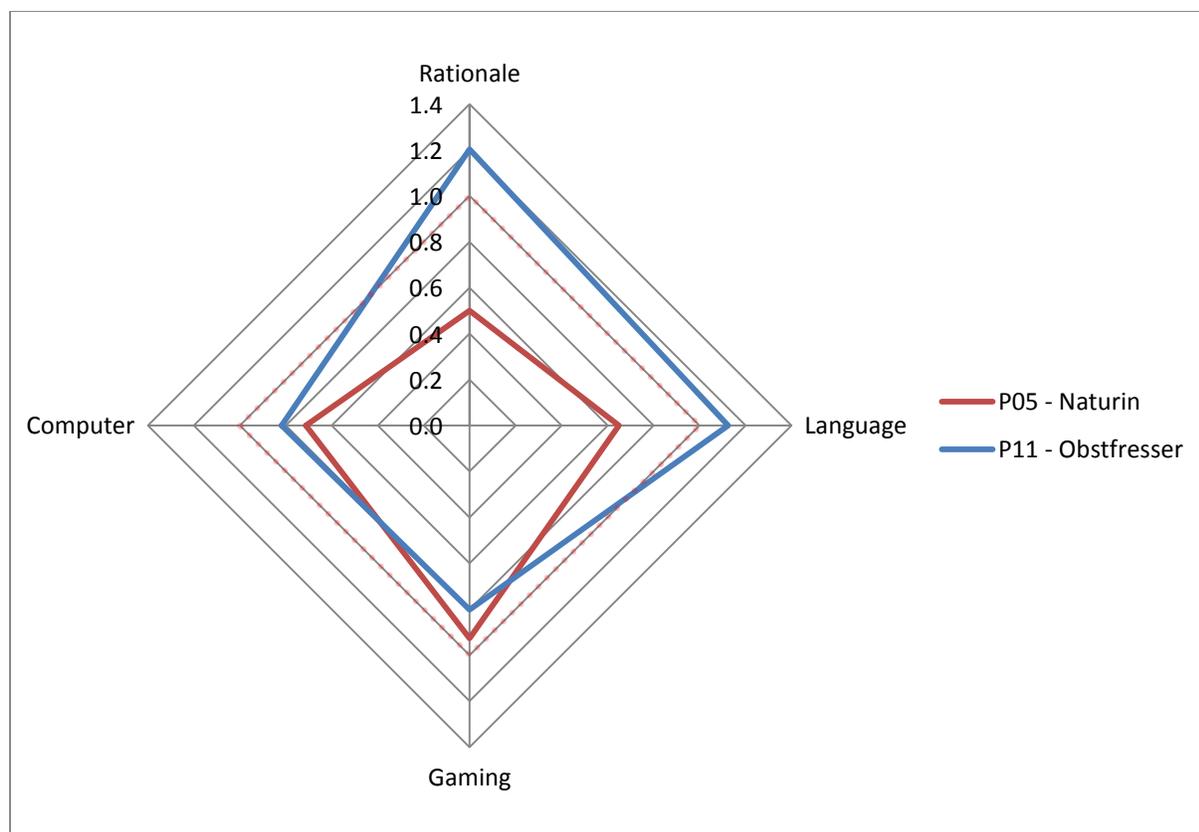


Figure 10. Learner-related results of Naturin and Obstfresser

Obstfresser states that his decision to obtain a major in German, as well as his previous goals of studying abroad and a general interest in the language, were major factors contributing to his rationale for studying German, whereas Naturin emphasizes his desire to obtain a minor as the sole factor influencing his rationale. Language learning experience varies as well, with Obstfresser having studied abroad for more than a semester and speaking colloquially with family and friends in German, whereas Naturin had spent less than a semester abroad and only read German and encountered it in the classroom, even though he had family and friends in Germany. Their gaming and computer proficiency are more aligned, with both claiming to play various games moderately. They believe too that DGBLL may be useful for SLD, as well as frequently use computers for gaming and having some experience using language learning media such as *Rosetta Stone*.

Again, demonstrating that the trajectories of these participants are indeed complex, the correlation of game-related results between these two participants is much stronger ($r = 0.877$, n

= 8, $p = 0.004$) (Figure 11). Although these two participants may not be clustered immediately together on the dendrogram (see Figure 7), the height of the two clades on which they belong is still very similar, emphasizing the similarity between their experiences.

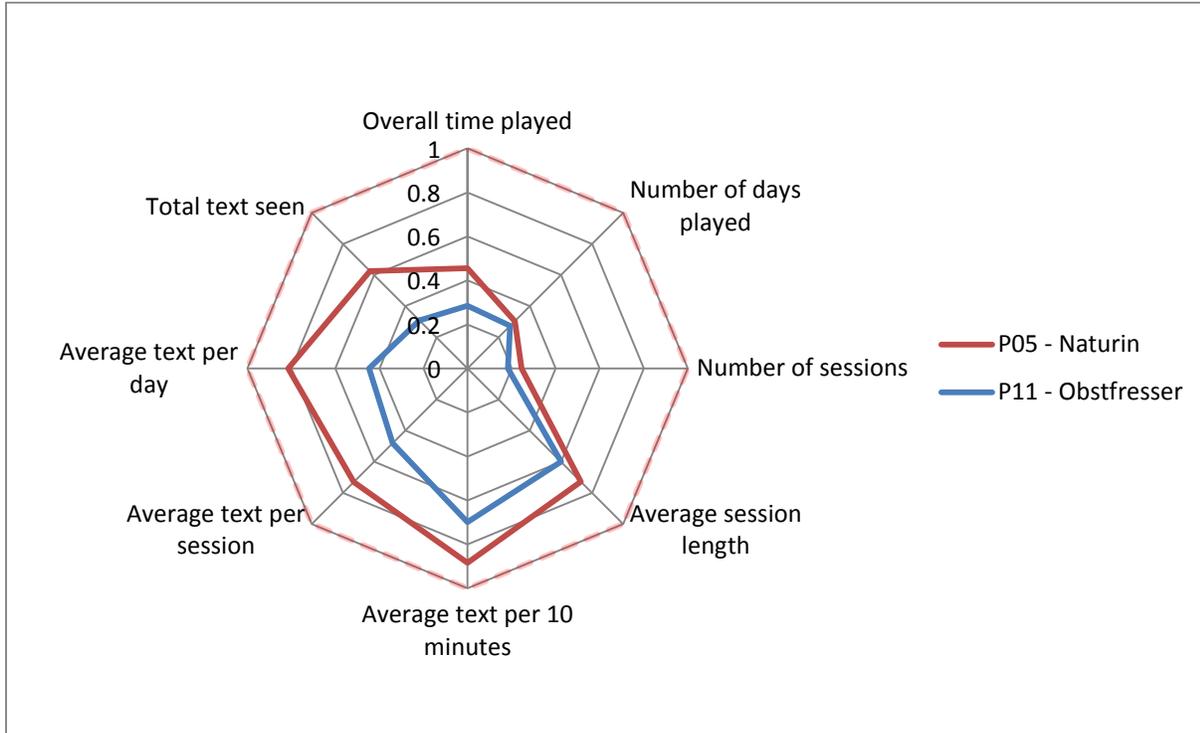


Figure 11. Gaming-related results of Naturin and Obstfresser

With the variance in terms of the initial conditions of these two participants, a strong correlation such as this may not have been expected, but evidently these two had very similar gameplay experiences, albeit with a varied scale. As can be observed, the two participants' gameplay trajectories are closely aligned; they both used a low number of days and sessions played, as well as an overall amount of time played, in order to observe a comparatively larger amount of text in each session, day, and every 10 minute interval. This speaks to the efficacy of their gameplay approaches, which therefore deserves to be further analyzed to determine what effect this has on SLD. And yet even though their gameplay experiences were clearly very similar, their concluding interview results are varied, implying that other factors again play a role in determining the effect of DGBLL.

The third pair consists of Föresty and Eisenbarchen, two participants whose learning and gameplay trajectories remain relatively consistent and aligned with one another throughout the study, resulting in comparable development. As opposed to the previous two pairs, there is only a medium correlation between these participants, sharing neither ample characteristics pertaining to the background information questionnaires ($r = 0.561, n = 13, p = 0.05$) (Figure 12), nor having very similar gameplay experiences ($r = 0.522, n = 8, p = 0.184$) (Figure 13), yet both invested ample time in the game, with Eisenbarchen playing the game for almost 20 hours, and Föresty investing over 15 hours of gameplay time. As older learners, they may also approach the gameplay experience differently than their fellow participants, which is worth analyzing in greater detail. The question then ultimately becomes: does investing so much time into the gameplay process predict better improvement in SLD, or do other factors play a more prominent role?

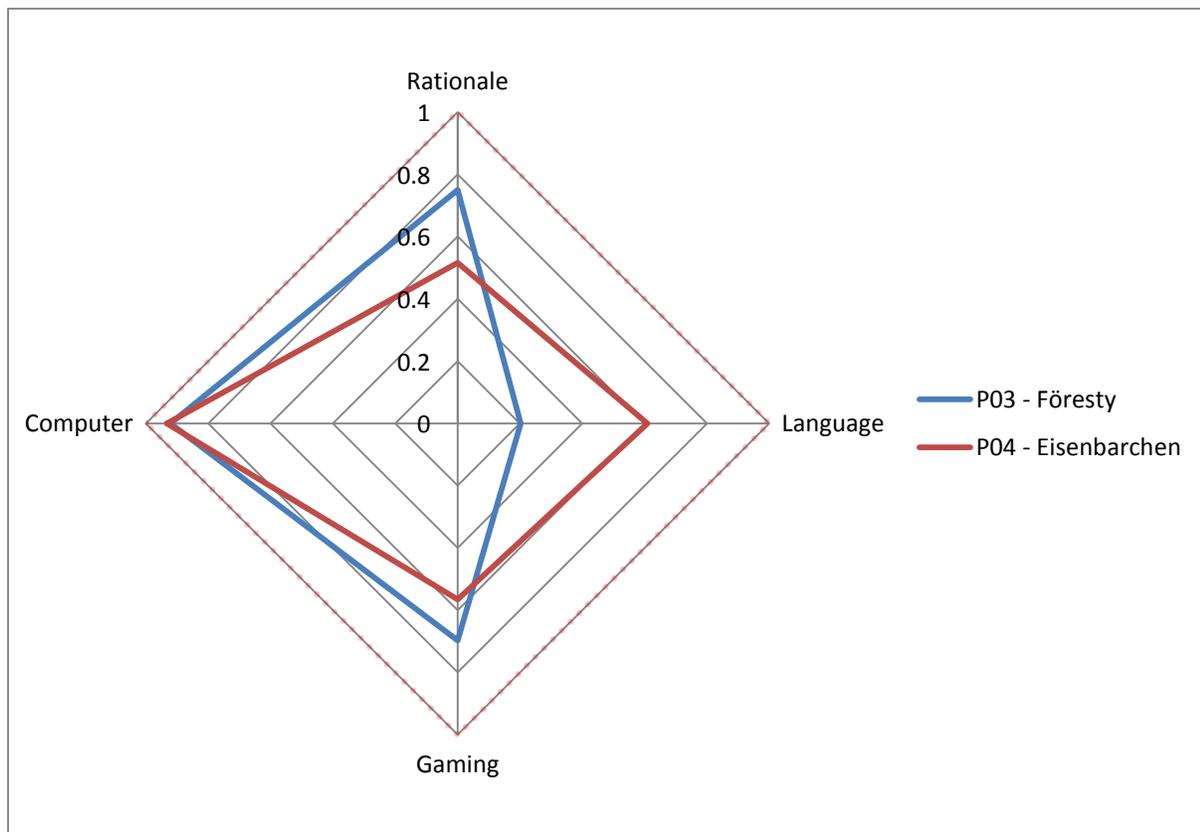


Figure 12. Learner-related results of Föresty and Eisenbarchen

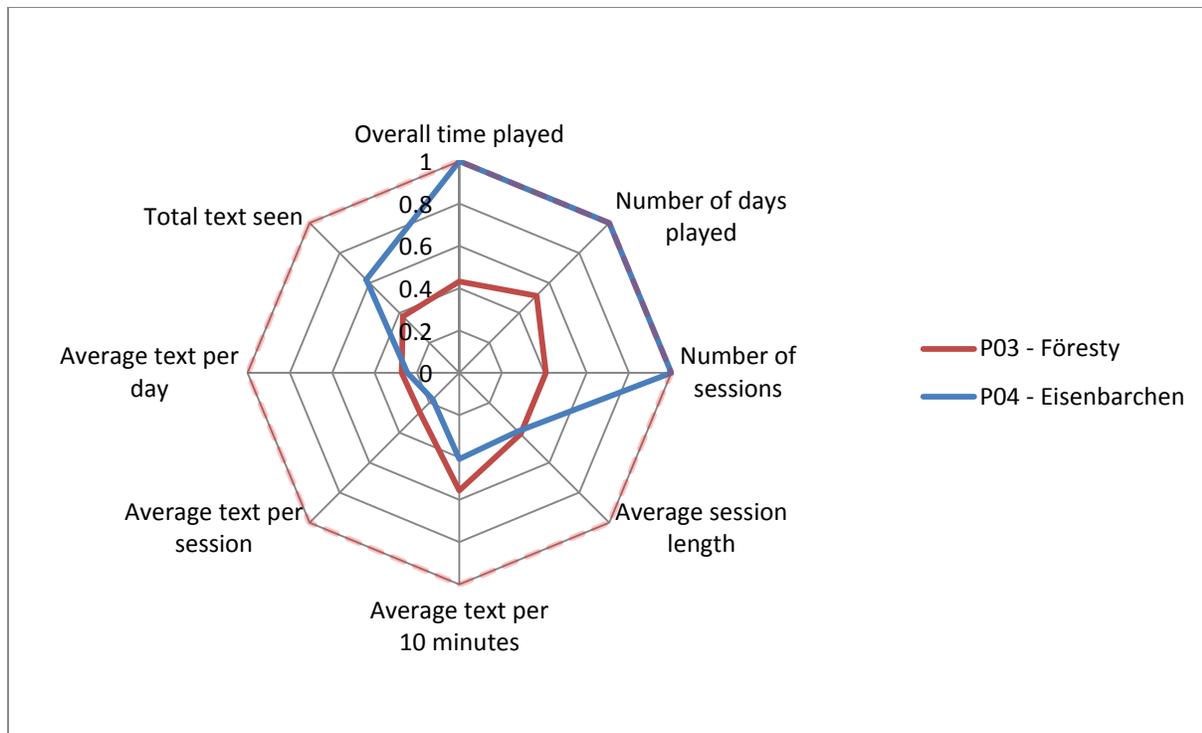


Figure 13. Gaming-related results of Föresty and Eisenbarchen

Finally, Kyrii and Trolinda are the focus of this analysis due to a number of factors, one of which is sex: of the 14 participants who completed the entirety of the research study, only two females completed the study, which then provides the opportunity to examine their gameplay trajectories to determine how these two engage in DGBLL. Their learner and gaming-related results are also interesting to compare. Like the other participants, they are of different ages and educational backgrounds, and vary quite widely in terms of basic German proficiency, with Kyrii having the weakest starting proficiency of all participants. Their initial conditions, derived from the background information questionnaire, have a weak negative correlation as well ($r = -0.304$, $n = 13$, $p = 0.313$) (Figure 14), and their relation to one another on the learner-related results cluster dendrogram (Figure 5) is distant, as Trolinda in general is an outlier.

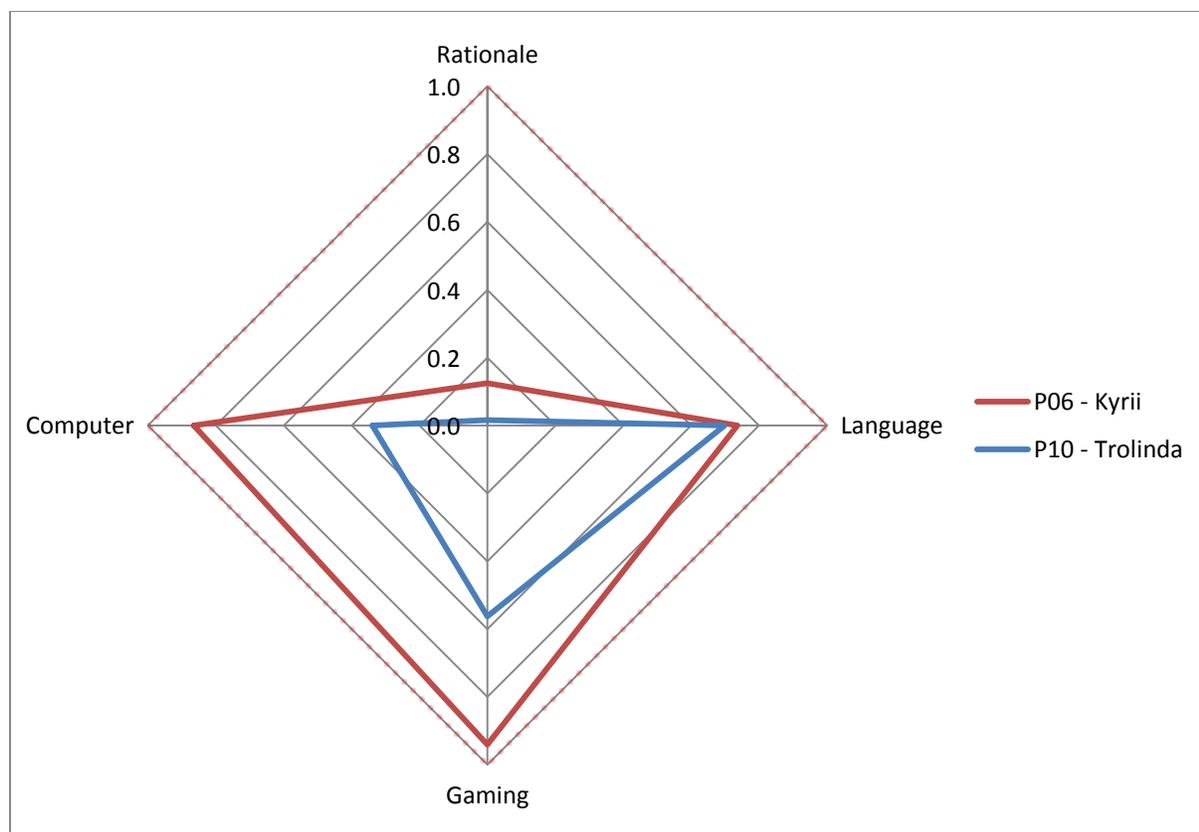


Figure 14. Learner-related results of Kyrii and Trolinda

Both Trolinda and Kyrii have a modest rationale for studying German – Trolinda cites an inherent interest in the language, whereas Kyrii wants to eventually participate in a study abroad. Although visually their responses for language learning experience look very similar, they are anything but: Trolinda grew up in Germany and has friends both locally and in Germany who speak German, although she has little opportunity to actually use her German language skills. Kyrii has spent less than a semester in Germany and receives language instruction via tutoring, but otherwise has no external connection to the German language. She, however, tries to actively use the language, speaking colloquially with her tutor and reads, writes, and listens to German for pleasure. Their gaming experiences are quite different as well, with Kyrii frequently playing many different types of games, including those online, and believing that games can be helpful for proficiency development. Trolinda, however, has very little experience playing games, video or otherwise, and has never played online games, yet remains very optimistic about the potential of games for SLD. Finally, their computer

experiences are different as well, with Kyrii frequently using the computer for gaming, programming and social media, yet not having explored digital media for SLD purposes, whereas Trolinda only uses computers for school-related work, yet has tried various mobile apps and digital media for language learning in the past.

Despite these stark differences, their gameplay experiences result in a moderate positive correlation ($r = 0.493, n = 8, p = 0.215$), signifying that although they had quite drastic differences before participating in the study, they had some similarities in their play styles (Figure 15), and their cluster analysis relation has improved, as now the two individuals' height difference has reduced drastically (see Figure 7).

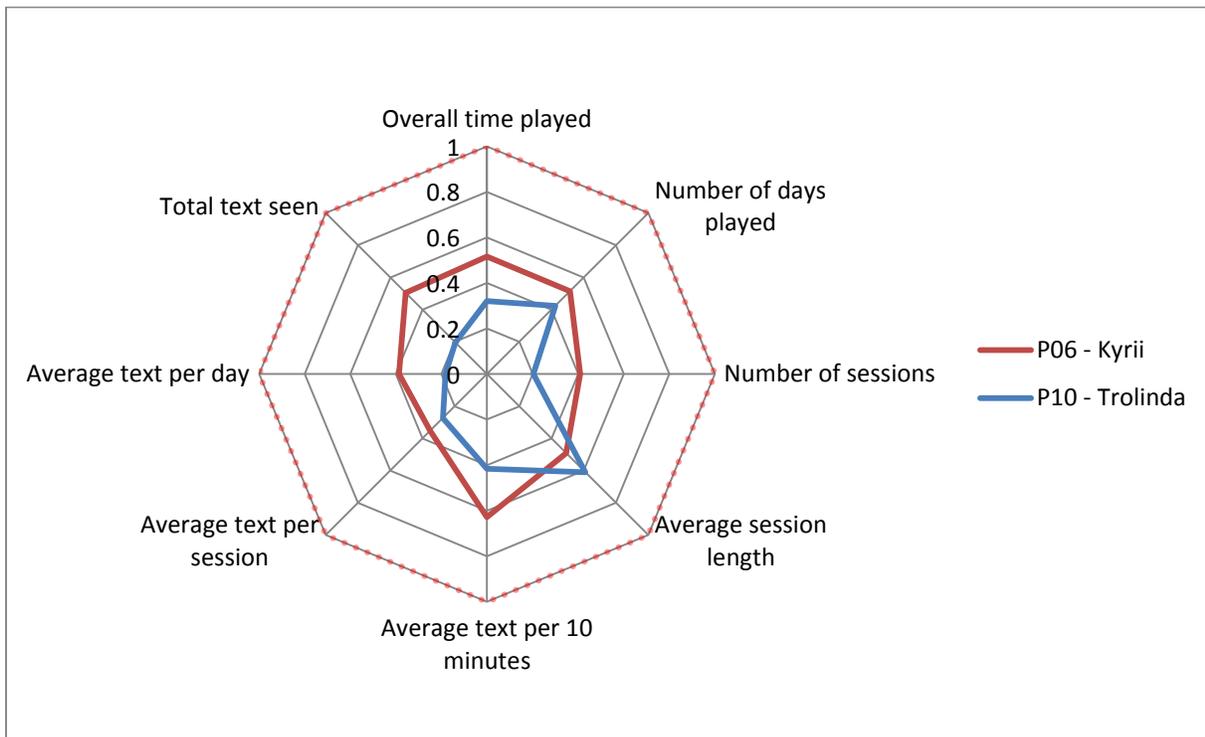


Figure 15. Gaming-related results of Kyrii and Trolinda

Their experiences align more closely in terms of their gameplay. Kyrii still certainly plays more and is generally more effective at playing the game than Trolinda, which indicates that her prior gaming experience seems to mediate her lack of German proficiency to some extent, whereas Trolinda, although never playing these games before, does admirably and even plays longer than Kyrii on a session-by-session basis. Most interestingly, their concluding

interview results are very similar, producing identical amalgamated scores. Again, to find similarities after having such distant initial conditions speaks to both the complexity of DGBLL, as well as the potential efficacy of the process for language learners from very different backgrounds.

With the pairs chosen for inclusion in the pairwise comparisons, the process of retrodictive qualitative modeling (Dörnyei, 2014) was instigated to determine, based upon the L2 proficiency each learner developed and his or her gaming-related results, what initial conditions, internal/external resources, or other properties of the CAS influenced change.

Chapter Summary

This study attempts to thoroughly depict and understand the various approaches to language learning and gameplay by engaging participants in a longitudinal study that examines every element of the experience as it pertains to DGBLL.

The diversity of these learners and their learning and gaming results serve to emphasize the need to examine trajectories of SLD and gameplay as a CAS. One cannot expect to see similar growth and development between learners based upon pre-existing language learning, gaming, or computer experience, and likewise, a learner's actual experience playing the game does not predict the type of learner behind the computer screen. Ultimately, by categorizing learners in this way, we can begin to determine if there are elements of the gameplay experience that influence change in the CAS, and if so, what approach to DGBLL may be best suited to various learners.

With the four participant pairings decided upon, we will turn to an in-depth analysis of each gameplay/learning trajectory through these pairwise comparisons to observe what changes in SLD occur over the course of this gameplay experience, and what arguments can be made that help to substantiate the potential of DGBLL.

Chapter V: Analysis and Discussion

Analyzing Language Learning and Gameplay Trajectories

Throughout this analysis, my focus will be on the learning cycle and social experience (Squire, 2011) of each language learner playing *World of Warcraft*. Squire, when discussing the meaning-making mechanisms of what he terms *ideological worlds* (these being environments which “instantiate ideas through implicit rule sets and systems” [2011, p. 28]), notes that two qualities deserve attention. These are: 1) the *learning cycle* of each player – how he or she learns to interact with the game world in order to establish goals and orientate him or herself to the rules (both explicit and implicit) within the digital environment, and 2) the *social experience* of belonging to and communicating within the affinity space of an MMORPG like *World of Warcraft* (Squire, 2011), both of which are core components of the gameplay process as a complex adaptive system. Thus, I focus not only on how the game world transforms or alters the learner’s experience, but how the individual and his or her unique gameplay trajectory, shaped by the learning cycle and social experience, constructs meaning and meaningful experiences for the participant. To substantiate this, it may be beneficial to return to the core research questions as I have presented them, each of which will be answered in detail in the discussion to come and related to the participants’ individual gameplay trajectories.

Firstly, I consider how complexity theory can further our understanding of the nature of online games for second language development. To do so, I adopt the CAS framework outlined in the third chapter and analyze the very nature of the gameplay experience and its role in the development of L2 proficiency, specifically detailing the linguistic constructions that each participant develops through gameplay and communication. This is implicitly underlined with a broader question concerning the general efficacy of DGBLL in extramural settings, which will be argued on the basis of the group of participants who completed the study in comparison to those who did not finish.

Secondly, I seek to determine how near transfer may function in this environment, and specifically, whether near transfer of linguistic constructions from gaming contexts to non-

gaming contexts can be observed. Substantiating the evidence from the first research question which details the linguistic constructions that each player has developed, I discern how each construction is used in contexts removed from the gaming environment, and argue the role and influence that each construction has for SLD purposes.

Finally, I expand upon these two research questions by analyzing participants on an individual level in an effort to determine to what degree language learners' trajectories of gameplay interact with their trajectories of SLD, thereby bridging the learning cycle and social experience (Squire, 2011) of the entire language learning experience. To do so, the pairs outlined in *Participant Profiles and Selection* will be intently analyzed through pairwise comparisons to portray trajectories of both gameplay and SLD, which will then be analyzed in conjunction with one another to determine not only how the distinct pairs' trajectories develop, but also how these developments compare to other pairs in an effort to better understand how this CAS ultimately functions.

As I present the analysis and discuss my findings, I will return to these core questions in order to substantiate my research and provide a framework with which to analyze my results. The following discussion will position the gameplay experience for each participant as meaningful and lend evidence to its possible inclusion as a means to assist in the further development of German as an L2. While it remains difficult (if not impossible) to definitely state that any linguistic construction produced by a learner is the unconditional result of sustained gameplay experiences, I will nevertheless argue that based upon a number of factors, it is highly likely the game itself and the player's interaction in the game contribute to SLD. Furthermore, while some of the linguistic constructions that originate in the DGBLL experience occur less frequently in daily conversations, there is still utility in knowing them and being able to utilize them in discussion, either for future gameplay experience, or as Chik (2014) argues, as a means of inspiring confidence in a learner's L2 ability and proficiency.

To assist in analyzing these participants and unraveling their complex trajectories of gameplay and SLD, I refer to the eight primary CAS characteristics as they can be understood for CALL research (Schulze & Scholz, 2016):

- i. What are the initial conditions for this learner-computer interaction? What aspects of *change* in the interaction showed sensitivity to or depended on these conditions?
- ii. What collective variables, actors, artefacts, and other components induced, influenced, and sustained *change* and development of which aspects of the learner-computer interaction? In which way are the variables, actors, artefacts, and components connected with each other?
- iii. What are the trajectories of the process of learner-computer interaction as a whole of (research-relevant) collective variables specifically? Which (fractal) patterns of *change* can be identified in the trajectory of an individual and across individuals?
- iv. What *change* occurred during the learner-computer interaction? What were the processes and outcomes of the corresponding self-organization of the CAS and of its interaction with the environment?
- v. Which internal and external resources led to *change* in the learner-computer interaction and how?
- vi. What is the general nature of the *change* in the CAS? Which attractor and repeller states can be identified? What can these phase spaces tell us about the nature of the CAS?
- vii. What are important iterative sub-processes of this learner-computer interaction? How does a particular iteration introduce *change* into the learner-computer interaction?
- viii. What properties of the learner-computer interaction emerge in its course and how do they *change*?

These questions will be explored throughout each of the following analyses in order to comprehend the process of SLD while playing *World of Warcraft*. The first pair of participants will be analyzed comprehensively as to demonstrate how these CAS characteristics apply to

each gameplay experience, but subsequent analyses will focus on the most interesting and salient features of each pair's gameplay and SLD experiences.

Srfroggy and Baerenjaeger - A comprehensive overview

When establishing the initial conditions of the system, Srfroggy and Baerenjaeger appear to be closely aligned based upon the results of their background information questionnaires (see *Participant Profiles and Selection*); they both are currently learning German purely out of interest, with no extrinsic rationale (such as attaining a degree or seeking to use their German language skills for a career or studying abroad). Their language learning experience is relatively similar as well. Both claim to speak German colloquially with family, which is one of their major external connections to the language. Srfroggy, the sole high school student, has spent ample time learning German in an extracurricular German school on the weekend, whereas Baerenjaeger can reflect back on his time studying German at the university and his short time abroad as the factors contributing to their current proficiency levels.

Their gaming and computer proficiency levels are strikingly similar as well. Both participants claim to frequently play games and have good knowledge of online games, yet Srfroggy has had a bit more experience than Baerenjaeger in actually playing these types of games; however, neither had played *World of Warcraft* previously. Interestingly, both are somewhat skeptical of DGBLL – Srfroggy expresses his skepticism of other players impeding SLD opportunities, and Baerenjaeger, although seeing the potential benefit of games for SLD, still thinks the game environment itself is not necessarily conducive to SLD. Their computer proficiency levels are even more similar, with both participants being very proficient with computers, and using them primarily for gaming and school. Both have had no prior experience using computers for any sort of language learning. One difference which must be noted is a 10-year age difference, but otherwise their initial conditions remain very similar.

These various characteristics of the two participants establish the initial conditions of the system, along with the characters they choose to play in the game (Srfroggy elects to play as a Draenei Paladin – a blue alien species that acts as a holy warrior – and Baerenjaeger, as the

name suggests, a Dwarf Hunter with a pet bear who he trained). These choices result in varying in-game experiences that can and will impact their gaming and SLD trajectories. I make no assumptions, however, regarding how these initial conditions will impact their gameplay and SLD trajectories – simply, after analyzing the CAS using retrodictive qualitative modeling, the factors which may have played a substantial role in the development can be observed.

In order to determine which aspects of change were influenced by these initial conditions, we return to the second core research question, which is whether near transfer of linguistic constructions from gaming to non-gaming contexts does indeed occur. The following tables (Table 24; Table 25) demonstrate evidence of this, and each participant’s number of game-based constructions (GBC), linguistic constructions outside of the 1k frequency range (LC), and words produced in out-of-game contexts (WP) will be displayed, accompanied by the calculated efficacy score (ES) (see *Efficacy Scores*):

Table 24

Srfroggy’s linguistic constructions (GBC = 48; LC = 178; WP = 3628; ES = 2.35)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>Ausdauer</i>	Senku bekommt Beute: Stürmischer Umhang der Ausdauer .	<i>Vocabulary test</i>
<i>Belohnung</i>	<i>The reward for each quest is expressed as the Belohnung.</i>	<i>Vocabulary test</i>
<i>Beute</i>	Ihr erhaltet Beute : Erfrischendes Quellwasser.	<i>Vocabulary test</i>
<i>Beweglichkeit</i>	Beute: Waldmannsaxt der Beweglichkeit	<i>Vocabulary test</i>
<i>Dungeonquests</i>	Srfroggy hat den Erfolg "5 Dungeonquests abgeschlossen" errungen!	instances machen and und dann kannst du dungeonquests machen
<i>Gegenstände</i>	Eure angelegten Gegenstände verlieren 10% Haltbarkeit.	gegenstände ja uh die sind halt stärkere sachen
<i>Greif</i>	<i>Encountered frequently when riding griffons throughout the game world.</i>	<i>Vocabulary test</i>
<i>heilen</i>	Entsetzliche Monstrositäts Wunden beginnen zu heilen .	und uh ich kann mich dann selber heilen wenn ich zum not mich selber heilen muss

<i>Hexenmeister</i>	Name of class played by player and constantly referred to on abilities that the player uses.	Vocabulary test
<i>ihr fühlt Euch normal</i>	Often repeated when having rested in an inn while taking a break.	Vocabulary test
<i>ihr habt eine neue Fähigkeit gelernt</i>	Ihr habt eine neue Fähigkeit erlernt: Kochfeuerstelle.	Vocabulary test
<i>ihr müsst euch näher an diesem Ziel befinden</i>	Pop-up message signifying the player is too far away from his or her goal.	Vocabulary test
<i>Leerwandler</i>	Ihr habt einen neuen Zauber erlernt: Leerwandler beschwören.	haben sie mich mir immer gesagt meine leerwandler also der tank
<i>Platte</i>	Harukâ-Garrosh flüstert: Verstärkte Palisadenschulterstücke Polierter Helm der Ehre Brünierte Brust platte der Macht	ahh platte
<i>plündern</i>	Plündern in "Plündern als Gruppe" geändert.	Vocabulary test
<i>Priesterin</i>	König Varian Wrynn ergeht hiermit an alle tauglichen Mitglieder der Allianz der Befehl, sich umgehend bei Priesterin Dentaria	uh dann würde ich schon als frau priesterin spielen
<i>Reittier</i>	Ihr habt das Reittier Teufelsross zu Eurer Sammlung hinzugefügt.	Vocabulary test
<i>Rüstung</i>	Beute: Rüstung des Giftzahns	Vocabulary test
<i>Schutz</i>	Wir sollten dorthin gehen und in der Masse Schutz suchen.	wenn ich jetzt ein schutz werden
<i>schützen</i>	Die Armee meines Vaters im Gefängnisviertel wird sie besser schützen können.	Hat dieser server mehr dps schützen oder heiler
<i>Wut</i>	Die besänftigende Energie des Totems wird die Elementare langsam umspülen, bis ihre Wut abgeklungen ist.	wut ja
<i>Zwerg</i>	Südwestlich von hier, hinter der Meistergleve, sind ein paar Ausgrabungsleiter der Zwerge	Vocabulary test

Communication factors

<i>Händler</i>	Harukâ-Garrosh flüstert: beim händler	wo kann ich ein Händler finden
<i>Heiler</i>	[2. Handel] Ferin: Suchen noch 2 Heiler für RBG. Bitte nur mit Erfahrung und Gear. Für weitere Infos /w me!	und uh dann brauch ich normalerweise ein heiler aber ich bin ein paladin
<i>heilt</i>	Paladinosius-Terrordar: steht da ein !@#\$\$%^& heal und heilt mich greif ich an is er weg	Warum heilt mir keiner :O

<i>Instanz</i>	[2. Handel] Leecu: Für Instanzen laufen,Questen und Leveln.Raids sind später nicht ausgeschlossen.	also instanz war neu für mich
<i>leveln</i>	[2. Handel] Leecu: Für Instanzenlaufen,Questen und Leveln .Raids sind später nicht ausgeschlossen.	und wenn du ganz schnell leveln will
<i>Levels</i>	Nixnux flüstert: Hallo..die gilde "Sonnenanbeter"sucht nette member allen levels ..die helfen wollen die gilde auf zu bauen	die levels würden immer langsamer und
<i>moin</i>	Pointer-Azshara: moin	solche neue sagen einfach mir gesagt haben also moin zum beispiel
<i>seid begrüßt</i>	<i>Said in passing by NPCs</i>	<i>Vocabulary test</i>

Iteration factors

<i>abbrechen</i>	Wenn Ihr eingeloggt bleiben möchtet, klickt auf den Abbrechen -Button.	<i>Vocabulary test</i>
<i>abgeschlossen</i>	Abgeriegelt! abgeschlossen .	<i>Vocabulary test</i>
<i>ablehnen</i>	<i>Found in all quest texts as a means to cancel the quest.</i>	<i>Vocabulary test</i>
<i>anlegen</i>	Wird beim anlegen gebunden.	Wie kann ich sachen anlegen ?
<i>Dungeons</i>	Schwierigkeitsgrad des Dungeons wurde auf 'Normal' gesetzt.	und uh was ich schon erlebt uh meine erfahrung uh die dungeons sind toll
<i>entdeckt</i>	Militärviertel entdeckt : 15 Erfahrung erhalten.	<i>Vocabulary test</i>
<i>Erfahrung</i>	Erhaltene Erfahrung : 80.	und uh was ich schon erlebt uh meine erfahrung uh die dungeons sind toll
<i>erhalten</i>	Erhalten : 15 Kupfer.	<i>Vocabulary test</i>
<i>Gegner</i>	Es gefällt mir zwar nicht, dass meine Gegner Artillerie in die Stadt geschmuggelt haben.	und das war ganz schön uh gegner töten
<i>Goblins</i>	Ein paar Goblins haben es irgendwie geschafft, sich als blinde Passagiere in den Frachträumen unserer beiden Schiffe zu verstecken.	und jetzt hab ich zuletzt eine neue dungeon gemacht das war mit solche goblins
<i>Klasse</i>	[2. Handel] Shadowthorn: Die 25er Raidgilde ASCENDING sucht für Mists of Pandaria(9/16) noch Member aller Klassen !	Klasse
<i>Quest</i>	Quest angenommen: Da stimmt was nicht.	weil er hat mich gesehen wie ich immer so von quest zum quest gegangen bin

<i>questen</i>	[2. Handel] Leecu: Für Instanzenlaufen, Questen und Leveln.Raids sind später nicht ausgeschlossen.	also ich würde sagen ja es ist okay weil es weil nicht alle questen für gewalt
<i>Quests</i>	Die täglichen Quests wurden zurückgesetzt!	ich habe schon lang nicht mehr solche quests durchgeschafft uh
<i>Schaden</i>	Die Überlebenden suchen in den Ruinen Unterschlupf und fügen der Ausgrabung mehr Schaden zu	und uh ja also der ist mein schaden pro sekunde
<i>Silber</i>	Erhalten: 1 Silber .	und na ja ich hab schon das meisten silber also brauch ich das
<i>Stärke</i>	Ihr erhaltet Beute: Räuberbeinschützer der Stärke .	<i>Vocabulary test</i>
<i>Stufe</i>	Srfrogz hat den Erfolg " Stufe 10 " errungen!	ja ich bin jetzt stufe zwanzig und ja

Table 25

Baerenjaeger's linguistic constructions (GBC = 32; LC = 90; WP = 1857; ES = 1.55)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>abbrechen</i>	Default command to cancel any action in game.	Vocabulary test
<i>abgeschlossen</i>	Die Stellung halten! abgeschlossen.	Vocabulary test
<i>Ausdauer</i>	Gnonate-Un'Goro erschafft Rolle der Ausdauer.	Vocabulary test
<i>ausstoßen</i>	Name of ability often used in game.	uh ja uh tapfer ausstoßen und gegenstand uh sie waren die letzte drei oder vier wörter das ich uh kennengelernt habe
<i>ausweichen</i>	Name of ability often used in game.	uh scha ja uh kräuter war neue uhm uh ausweichen
<i>Bedrohung</i>	Der Troggbefall stellt die größte Bedrohung für Eisenschmiede dar.	Vocabulary test
<i>Beseitigung</i>	Name of ability often used in game.	Vocabulary test
<i>Beweglichkeit</i>	Often seen on equipment the player uses.	Vocabulary test
<i>Dieb</i>	Strauch dieb der Felsenkiefertroggs stirbt, Ihr bekommt 33 Erfahrung.	Vocabulary test
<i>drängen</i>	Quest angenommen: Vorwärts drängen.	Vocabulary test
<i>Fähigkeiten</i>	Ihr habt eine neue Fähigkeit erlernt: Zuverlässiger Schuss.	ein tier kontrollieren oder neue ich weiß net fähigkeiten bekommen
<i>Gegenstand</i>	Erhaltener Gegenstand: Umkreiskniehosen.	uh ja uh tapfer ausstoßen und gegenstand uh sie waren die letzte drei oder vier wörter
<i>ihr fühlt Euch normal</i>	Ihr fühlt Euch normal.	Vocabulary test
<i>ihr habt eine neue Fähigkeit gelernt</i>	Ihr habt eine neue Fähigkeit erlernt: Kürschnerei.	Vocabulary test
<i>ihr müsst euch näher an diesem Ziel befinden</i>	Pop-up message signifying the player is too far away from his or her goal.	Vocabulary test
<i>Kette</i>	Ihr erhaltet Beute: Lockere Kettenarmschienen.	eine kette
<i>Kräuter</i>	Bringt Rejold Gerstenbräu in Kharanos 7 Schimmer kräuter.	uh scha ja uh kräuter war neue uhm uh ausweichen
<i>plündern</i>	Observed whenever the player picks up any new loot.	Vocabulary test

<i>Ruf</i>	Euer Ruf bei der Fraktion 'Eisenschmiede' hat sich um 250 verbessert.	<i>Vocabulary test</i>
<i>Rüstung</i>	Ihr erhaltet Beute: Flickwerk rüstung .	<i>Vocabulary test</i>
<i>seid begrüßt</i>	Lina Ofner sagt: Seid begrüßt .	<i>Vocabulary test</i>
<i>Tal</i>	Westlich von Ambossar, entlang der nördlichen Grenze des Tals , werdet Ihr Fässer mit Sturmhammer-Starkbier und Theramore Hell finden.	<i>Vocabulary test</i>
<i>tapfer</i>	Vielleicht seid Ihr tapfer genug, die Bestie aufzuspüren und zu erschlagen.	uh ja uh tapfer ausstoßen und gegenstand uh sie waren die letzte drei oder vier wörter das ich uh kennengelernt habe
<i>Wendigos</i>	Quest angenommen: Die Wendigos erlegen.	weisst du wo die Wendigo sind?
<i>Zuflucht</i>	Dank Eurer Hilfe sind wir näher an die Zuflucht der Frostmähen herangerückt.	<i>Vocabulary test</i>
<i>zurückkehren</i>	Macht sie ausfindig und sagt ihnen, sie sollen diese ferngesteuerten Beobachtungsbots aufstellen und dann nach Kharanos zurückkehren .	<i>Vocabulary test</i>
<i>zwerg</i>	Joren Eisenquell sagt: Fresst Zwergenblei !	ich hatte eine lieblingscharakter zwischen die paladin und die zwerg uh ich ja mag ich die zwerg viel besser
Communication factors		
<i>ablenken</i>	<i>Used in a group conversation about the distracting nature of the game.</i>	<i>Vocabulary test</i>
<i>umgebracht</i>	<i>Used by Föresty in group conversation.</i>	für neue wörter uh ein dankbar an Föresty umgebracht
Iteration factors		
<i>erhalten</i>	Erhalten: 35 Kupfer.	<i>Vocabulary test</i>
<i>pfeifen</i>	Benutzt pfeifen , um 6 gestohlene Widder aus den Tundridhügeln zurückzuholen.	uh ich habe ein problem es es gab ein quest und ich sollte auf irgendwelchen tiere pfeifen
<i>pfeift</i>	Ihr pfeift Gestohlener Widder zu.	und uh ich wusste nicht wie man uh auf deutsch pfeift im spiele

As described previously, these lists of linguistic constructions are the result of thorough analysis of all language that was observed and produced in-game and in group conversations

by each participant (see *Chapter IV: Methodology and Group-Level Results* for a more thorough description of this process). After distilling the wealth of language into the linguistic constructions that have likely developed as a result of the gameplay experience, a final list can be constructed that provides initial evidence of their SLD in this CAS.

The linguistic constructions developed by both Srfroggy and Baerenjaeger that can be associated with their experiences while playing *World of Warcraft* are largely influenced by gameplay factors. Due to the importance placed on progressing in the game and accomplishing as many game-related goals as possible, linguistic constructions directly related to advancement are given specific attention by Srfroggy. Many are utilized as fixed constructions, as the participant is able to recognize them when shown in the vocabulary test, but has not produced them in group conversations or while playing the game and conversing with other players; while the learner could potentially be able to use the linguistic construction in a fixed or abstract manner, the collected data would suggest this is not the case. This does not however mean that the linguistic construction was not developed by playing the game, as evident both by the Srfroggy's own indication of this phenomenon (those constructions identified during the concluding interview also are indicated by the participant as being developed in-game), and by the centrality of the construction as it is used in game. Linguistic constructions such as *Ausdauer*, *Belohnung*, *Beute*, and *Beweglichkeit* are core aspects of the game, either used for descriptive purposes of helping the player know how best to choose equipment (as is the case with *Ausdauer* and *Beweglichkeit*) and with finding the equipment necessary to succeed (as with *Belohnung* and *Beute*). *Belohnung* especially is prominently displayed during each acceptance of a quest or completion of a specific task (Figure 16).



Figure 16. "Belohnung" for completing a task

Although the first time encountering this linguistic construction may be confusing, through repeated quest and task completion, the player quickly associates *Belohnungen* with rewards and further establishes the association with subsequent iterations of the construction in varying contexts. Other linguistic constructions developed through similar means are explicitly used by the participant in conversation. A construction like *heilen* begins as a fixed construction, observed in a descriptive message that aids the player in understanding how combat is progressing in game. When having observed the linguistic construction enough, Srfroggy produces it in the first focus group conversation when speaking about his preference of character in game. As can then be seen in the communication factors (see Table 24), the verb is conjugated to *heilt* and converted to a noun in *Heiler*, both of which are first observed by Srfroggy in his in-game interaction, and then spoken in focus groups (as can be seen in his use of *Heiler*) and written in-game (as he questions his group members as to why no one is healing him). This progressive use of *heilen* demonstrates his likely development of the abstract construction and his ability to utilize it in various ways. In these instances, his use of these constructions is directly related to progress and success in the game as he rationalizes his choices based upon his play-style preference and a need to succeed while playing with others.

By contrast, the gameplay factors that influence Baerenjaeger's SLD are primarily based upon comprehension of the game's narrative, rather than progression as in Srfroggy's case. Fixed constructions such as *Bedrohung*, *drängen*, *Kräuter*, *Tal*, and *Zukunft* are all prominent fixtures of quests that necessitate understanding in order to discern the goal of the quest (Figure 17). In these instances, the linguistic constructions themselves are not frequently encountered in the game, but due to Baerenjaeger's approach of trying to understand the language for the sake of comprehending the game, such constructions are developed by the participant.

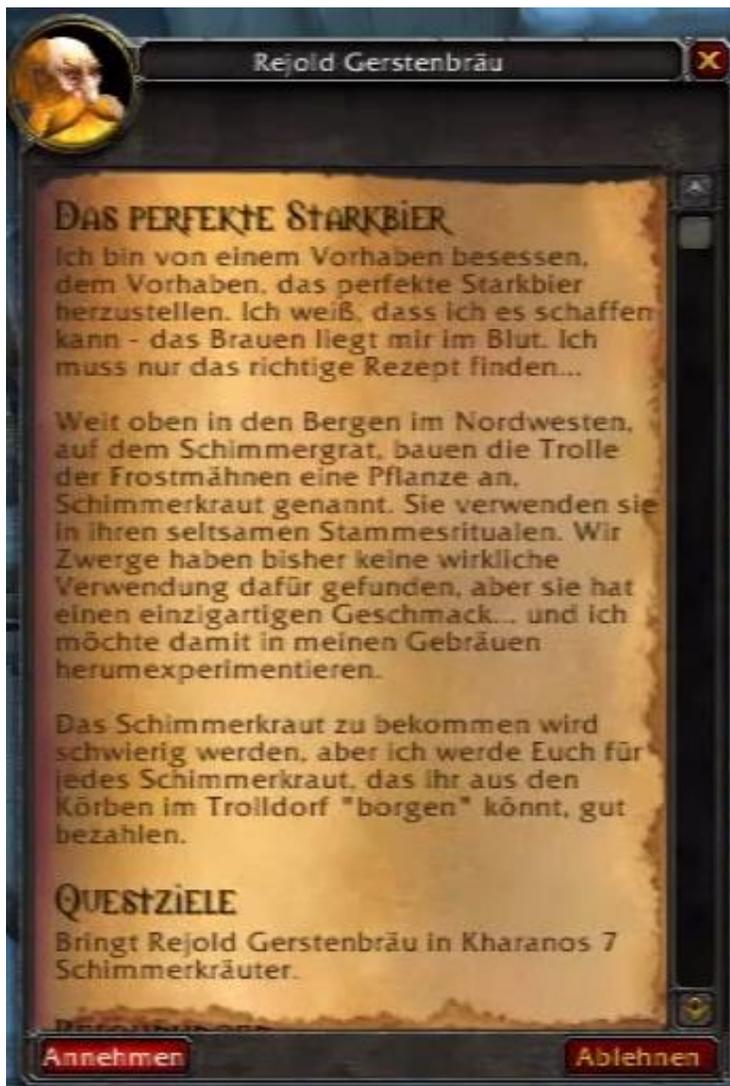


Figure 17. Quest text containing "Kraut" and "Kräuter"

Other linguistic constructions, such as the aforementioned *Ausdauer* and *Beweglichkeit*, as well as others (*Fähigkeit*, *-en*, *Gegenstand*, *-“e*), are shared between the two participants, and as will be seen, by many other participants as well. Indeed, this is partially because these specific linguistic constructions were the target of analysis in the concluding interview and as part of the vocabulary test, but their inclusion in these lists is due to the fact that the individual was able to correctly translate the word and indicated that he or she had developed it while playing the game.

Looking at their communicative behaviour, Srfroggy can attribute many more developed linguistic constructions due to discussion concerning the game, either while playing or speaking about his experiences in group conversations. When trying to figure out where to sell his loot, he asks a friendly player with whom had been chatting for a little while, and is told to do so at the *Händler*. Srfroggy is evidently able to understand the interaction, as he later uses it as an item-based construction, correctly utilizing it in a sentence yet ungrammatically so as he fails to mark its appropriate declension. The emergence of other item-based constructions that are co-adapted through interaction with other players is seen in Srfroggy’s use of the colloquial greeting *moin*, which translates to the effect of ‘hello’. Although a linguistic construction that is never utilized by the external resources of the CAS (i.e. spoken by NPCs or used in quest descriptions), after having interacted with a number of other players of the game in various group tasks, he has picked up the construction and uses it himself when greeting other players.

Baerenjaeger does not have as much success in his interactions as Srfroggy does. This is primarily due to his hesitation to communicate with other players, and also his chosen play style which revolves around learning and comprehending the language, rather than strictly progressing. It is therefore not surprising that the few linguistic constructions developed while playing the game are a result of discussion centred on gameplay, such as the construction *umgebracht* which was said initially by Föresty in the second focus group. Baerenjaeger inquired into its meaning at the time, and was able to recall it during the concluding interview. These two examples, *umgebracht* and *ablenken*, remain fixed constructions as they are simply recalled, rather than the employed in innovative ways that demonstrate Baerenjaeger’s understanding.

The third factor contributing to SLD, that of iteration, plays a prominent role for Srfroggy, and less so for Baerenjaeger. This can be expected – Srfroggy began the study with a higher proficiency in German than Baerenjaeger, and as a result, claimed to already know many linguistic constructions that were shared during the vocabulary test. In these situations, however, Srfroggy still observed and produced more in the target language than Baerenjaeger, resulting in a much higher probability to transfer linguistic constructions between these two contexts. Due to the very nature of iteration in the target language, and the nonlinear nature of SLD, such opportunities for iteration are valuable learning opportunities, and are bolstered by efficiently playing the game and being exposed to as much language as possible.

As a result, linguistic constructions that Srfroggy already claimed to know, such as *abbrechen*, *ablehnen*, *erhalten*, and *Stärke*, are consistently reinforced due to the frequency with which they are encountered; *ablehnen*, for example, is an option given to the player with every quest that they undertake. For Srfroggy, this implies that he would have consciously observed this linguistic construction at least 247 times, if not more. *Erhalten* is a more prolific example, as it is announced to the player whenever loot is obtained, which for Srfroggy was a total of 547 times – again, the frequent nature of these constructions through multiple iterations, each using the construction in a different context, facilitates the emergence of the learners L2 proficiency . The fact that they exist outside of the 1k word frequency list implies that for the learner’s stage of language development these linguistic constructions are very likely being reinforced through gameplay.

Baerenjaeger’s relative lack of German proficiency suggest that similar constructions are being developed, yet they are in fact newly learnt linguistic constructions and are influenced and developed by gameplay factors, such as the aforementioned *abbrechen* that Srfroggy claimed to have reinforced; for Baerenjaeger, however, it is a newly developed fixed construction. Baerenjaeger too finds that *erhalten*, although already developed, was reinforced through the 197 occurrences of the word while playing the game; this is notably less than Srfroggy’s, yet is still a frequently observed construction and thus benefits from iteration. The other notable construction, *pfeifen*, is perhaps abstract in its usage, as Baerenjaeger not only uses it in its

infinitive form, but also conjugates it properly to describe his confusion in German as to how to whistle in the game. Although it is difficult to state with authority whether or not this linguistic construction was developed by Baerenjaeger's gameplay, his choice of avatar, the *Jäger* (hunter), and the frequency with which the role of whistling is explained, necessitate the understanding of the word and ensure that it is at the very least being consistently reinforced.

When analyzing these distinct lists of linguistic constructions, it becomes evident that Srfroggy and Baerenjaeger's SLD trajectories depict a bifurcation between players who initially were very similar to one another based upon their learner-related results (see *Group Results and Characteristics*). This is further accentuated when examining the efficacy scores of each participant. Srfroggy receives a 2.35 compared to Baerenjaeger's 1.55, which is reflective of the vast number of additional linguistic constructions outside the 1k frequency range that Srfroggy utilized in his conversations. Although Baerenjaeger understands the majority of constructions he was presented with as part of the final focus group, he does not produce as many additional ones as Srfroggy does. This is somewhat reflective of his general approach to gameplay, focusing primarily on trying to learn the language and take notes rather than just play the game. Approaching these results using the aforementioned retrodictive qualitative modeling framework (Dörnyei, 2014), we can begin to determine how the complexity of their development is represented through their play-styles and how it affects SLD.

Srfroggy invested ample time in the game as soon as he was given access, playing upwards of seven hours in the first week of the study alone and ultimately playing upwards of 20 hours. Baerenjaeger, too, initially spent ample time playing the game, recording four and a half hours in the game over the first week of potential playtime. Although Baerenjaeger invests consistent time in the game after this point, he quickly settles into shorter sessions averaging just over 30 minutes of gameplay, resulting in a total of just over 12 hours played. While still more than the 10 hour minimum, it is notably shorter than Srfroggy's time spent playing. The internal resources of the CAS, such as Srfroggy's evidently stronger rationale to play the game resulted in the change of the external resources, such as the opportunities for conversation which would be more plentiful, or the ability to complete more quests, all of which are evident

(as will be seen below). Likewise, Baerenjaeger's hesitation to interact with other individuals (functioning as an internal resource of the CAS) induces change in aspects of gameplay such as how long he plays at a time, as lacking individuals to play with (the external resources of the CAS) will inevitably impede another internal resource of the system, Baerenjaeger's own incentivization to play.

Srfroggy's playtime was used incredibly efficiently when compared to the other participants in the study. He reached the 28th level while playing the game, and created multiple other avatars in order to try and find the play-style that best suited his interests. Throughout his time playing, he managed to complete 248 quests, requiring the player to read through lengthy quest texts and understand the goal of the quest in order to complete it. Some of the richest language in the game is supplied by these quest descriptions (see Figure 17 for example), and as such, the more quests a player completes, the more opportunities he or she has to understand the language and potentially transfer it to non-gaming contexts.

Baerenjaeger, in comparison to Srfroggy, was not as efficient when playing *World of Warcraft*. He only managed to reach the 15th level while playing a single avatar, and as a result limited the number of quests he could attempt. Consequently, as he completed only 81 quests, the amount of language that Baerenjaeger was exposed to was notably different to Srfroggy's, and in terms of potential gameplay factors influencing SLD, there are fewer opportunities to encounter linguistic constructions that require the player to deduce the meaning of the construction if unknown.

These differences are more pronounced as we examine how their gameplay preferences reflect and impact the amount of exposure to language each player has. I analyze these two factors as a conglomerate variable, as the two are certainly interrelated, yet do not share an identical trajectory of change implying that the way in which these variables interact with one another is worth analyzing further. There are three distinct lenses through which this can be analyzed, each of which helps to better understand the role gameplay has on potential second language development.

An initial perspective which provides insight into how each learner spends his or her time informs us as to when players invest time in the game, and how often they are actually playing the game (Figure 18).

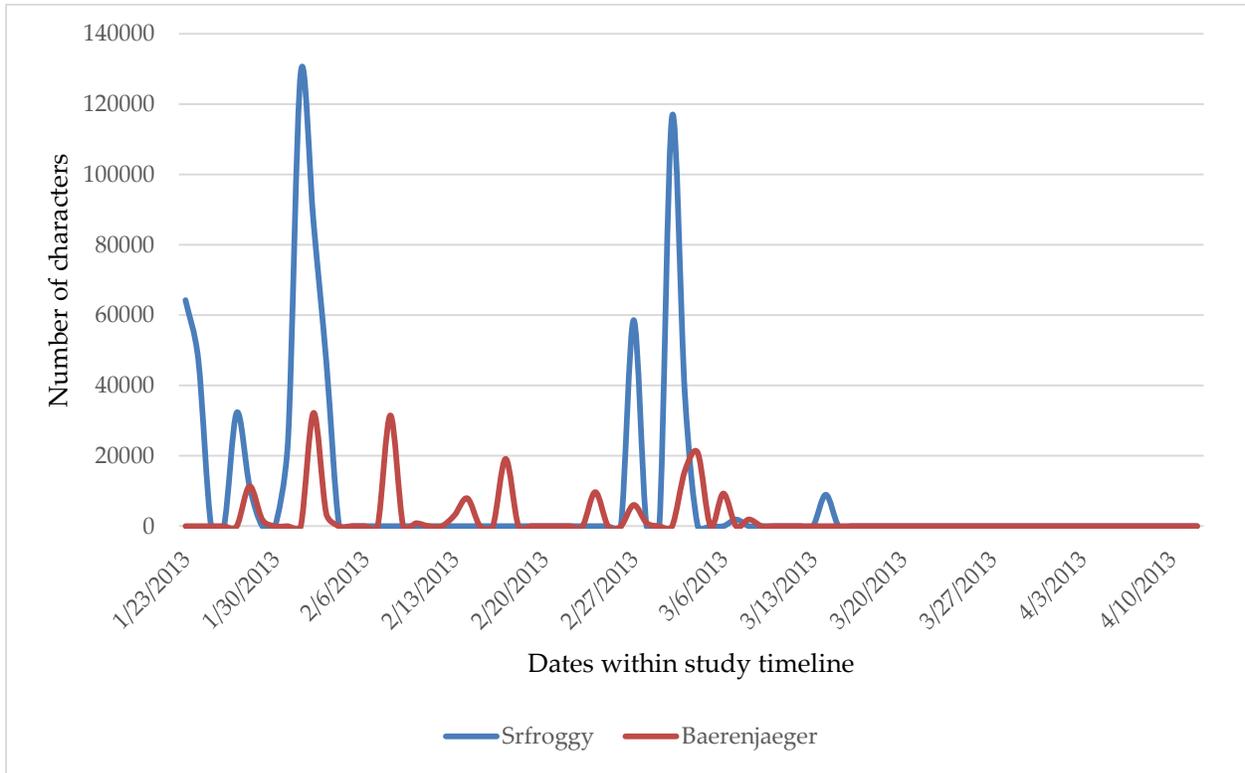


Figure 18. Chronological language exposure (Srfroggy and Baerenjaeger)

As can be observed, both Srfroggy and Baerenjaeger play the game predominantly in the first two months of the study. Both immediately begin playing when the study had commenced, and had fulfilled their minimum of 10 hours by the beginning of March. While Baerenjaeger’s play sessions are more evenly spaced throughout these two months, none begin to compare with the quantity of Srfroggy’s in terms of the language exposure possibilities that exist. At these points in time, Srfroggy is so engrossed by the game that he spends hours each day playing *World of Warcraft* and being immersed in the German language — an experience which arguably would be difficult to replicate in other mediums — while still maintaining the attention necessary to succeed in the game. This initial period of playtime acts as an attractor in the CAS for both participants, and rather interestingly, the last month of the study acts as a repeller state, likely due to the external resources of the system and having met the 10 hour minimum

requested, or due to internal resources and their desired approach to the game as outlined in the previous chapter – of the three types of play-styles, both participants exhibit traits of a *gamer*, or the kind of participant who has prior gaming knowledge and thus, after spending such an extensive amount of time in the game at the beginning, becomes somewhat burnt out and simply chooses to do something else with his or her time due to already having completed the requirements of the research study (see *Chapter IV: Methodology and Group-Level Results*).

Another perspective can be analyzed which brings further insight to the diversity between Srfroggy and Baerenjaeger's gameplay experiences. Examining gameplay trajectories in 10 minute intervals, we begin to notice the complexity of their gameplay and communication with the target language. Although both players start the game on equal footing and with similar initial goals – completing basic quests and attaining higher levels – their actual experiences vary wildly and subsequently impact the quantity of language which they are exposed to (Figure 19). The initial conditions of the system then, although seemingly similar, result in a bifurcation of experiences as each player explores the game slightly differently and encounters various quests and other individuals. It should be noted that characters is the unit of analysis selected due to it being a relatively simple way to operationalize the language observed in game quantitatively; the specific number of characters does not matter as much as the visual indication of where change occurs and how much each player differs from one another.

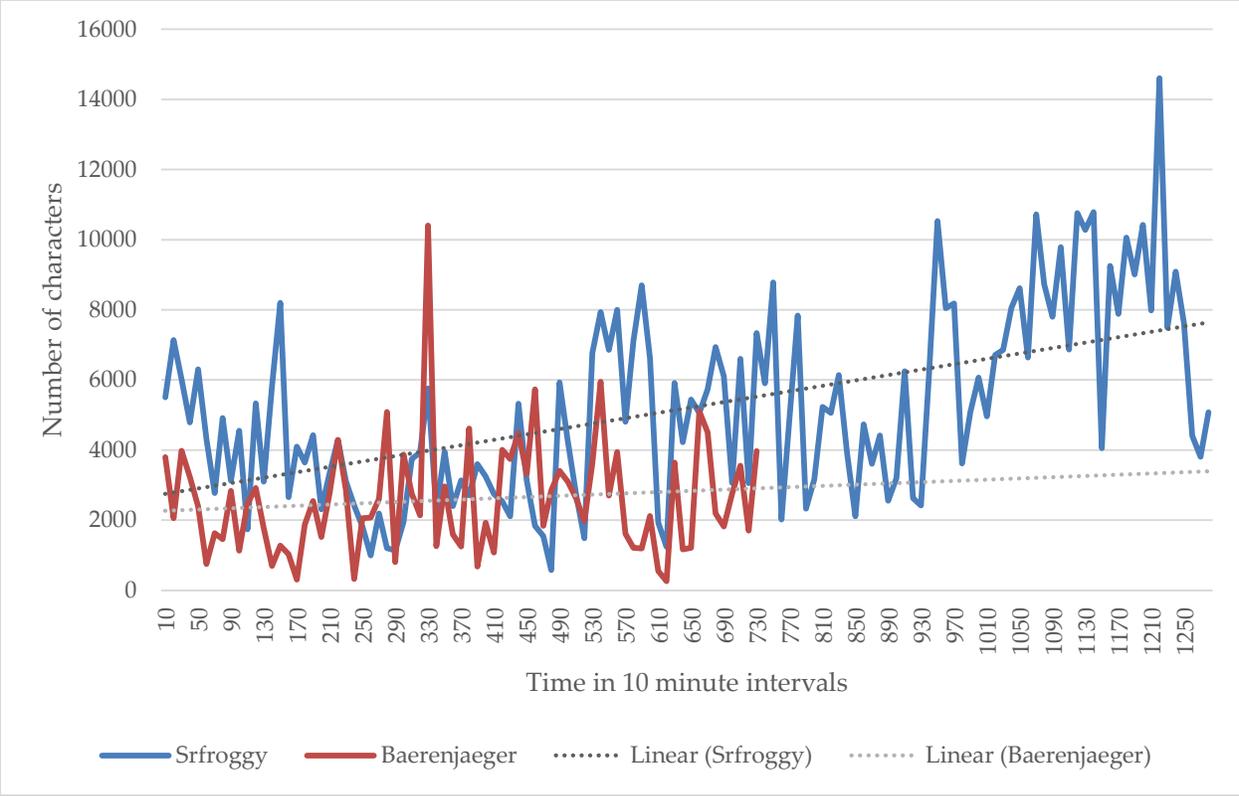


Figure 19. Exposure to language over 10 minute intervals (Srfroggy and Baerenjaeger)

We can immediately see that Srfroggy is exposed to decidedly more language than Baerenjaeger over these 10 minute intervals at almost all timescales, with the exception of some periods of gameplay around the five hour mark at which point Baerenjaeger had invested more time completing a number of unique quests at once, resulting in an influx of dense language that, if given sufficient attention, can result in SLD, as will be explored. This also signifies that although Srfroggy utilized his time more efficiently than Baerenjaeger on average, the complexity of the gameplay experience results in instances where one player may have more opportunities for language exposure than another, but the amount and validity of language encountered varies drastically even in 10 minute intervals.

Even with the obvious complexity of the gameplay trajectories, Srfroggy has a general trending upwards trajectory of SLD, being exposed to an increasing volume of language which as a result may lead to more opportunities for SLD. As he progresses in the game, he is able to experience more challenging quests and interact with players with more experience playing the

game. Baerenjaeger, while also trending gradually upwards, does not demonstrate the same level of growth as does Srfroggy. Even had Baerejaeger played as much as Srfroggy, his reluctance to communicate with other individuals in the game would limit his potential for SLD, which is likely a reflection of his relative lack of online gaming experience or his lower L2 proficiency as indicated in the initial conditions of the CAS.

This trend is further accentuated when analyzing the amount of text observed on a session by session basis (Figure 20).

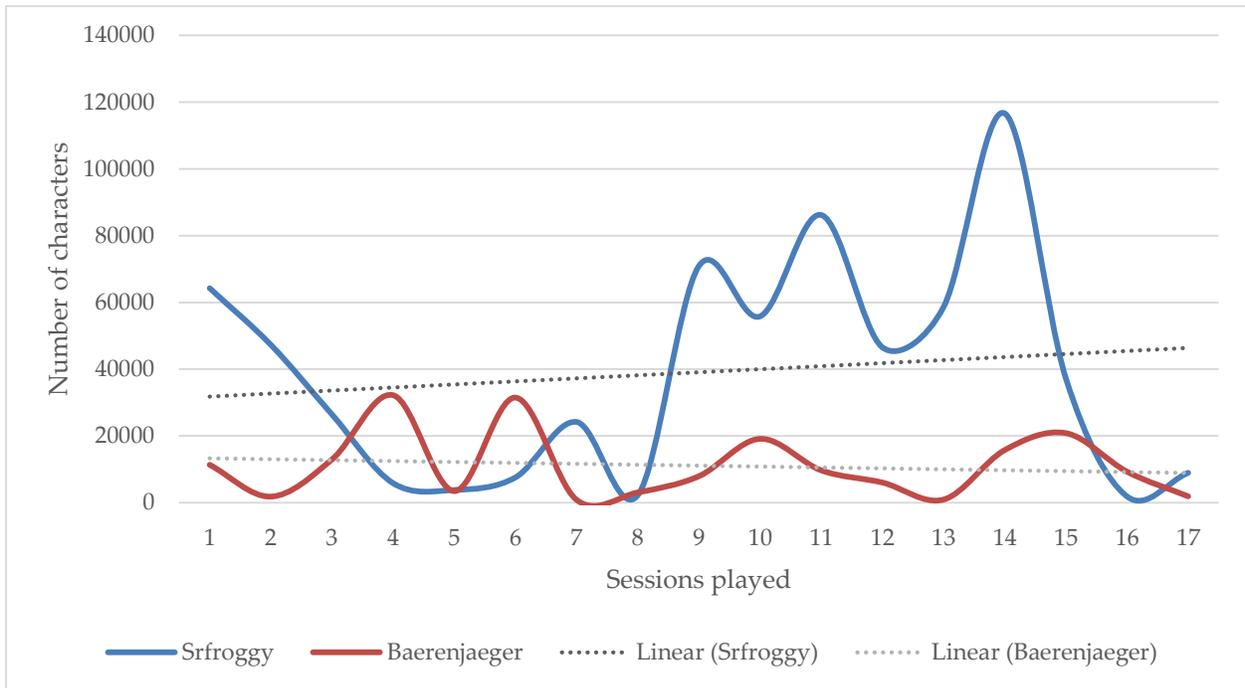


Figure 20. Exposure to language per session played (Srfroggy and Baerenjaeger)

Referring back to language exposure in 10 minute increments, the data may look somewhat skewed as we have substantially more data for Srfroggy in comparison to Baerenjaeger (see Figure 19). When analyzing the amount of text each player is exposed to per session played, however, the participants can be analyzed similarly as both played a total of 17 sessions over the course of study. Baerenjaeger’s text exposure is consistently low in comparison to Srfroggy’s, and an average trajectory shows a decline in the amount of language exposure which may be due to a variety of factors such as lack of interest or a pre-existing

feeling of accomplishment in the game after a certain point in time. Srfroggy has a similar decline in the final two play sessions, yet his trajectory is trending upwards and reinforces his play-style as one that provides ample opportunities for SLD.

In the final stages of the study, each participant was given the opportunity to self-reflect on their experiences by completing a questionnaire. The questionnaire, adapted from Peterson (2012), captures the participant's feelings concerning the entirety of the gameplay experience, focusing on elements such as communication in game and the general technical difficulties encountered while playing and interacting in the game. As can be seen, the responses provided by both participants largely reflect their individual gameplay trajectories (Table 26). Whereas Srfroggy is primarily positive in all accounts, Baerenjaeger is generally negative. Although both players agreed that the game was relatively easy to play and did talk about their ability to learn new vocabulary through gameplay experiences, they otherwise have differing opinions about the efficacy of DGBLL. Srfroggy values the feedback and communication with other players, and would genuinely like to play the game again in the future; Baerenjaeger does not, likely the result of his failed interactions in game and his relative isolation that he felt when playing.

Table 26

Concluding Interview Questionnaire (Srfroggy and Baerenjaeger)

Question (Strongly Agree = 5, Strongly Disagree = 1)	Srfroggy	Baerenjaeger
1. The game was easy to play.	4	4
2. The chat system was easy to use	4	2
3. It was difficult to follow the quests/communication from other players	3	3
4. The quests were too difficult.	3	1
5. I actively tried to comprehend the text of the quests.	4	5
6. I experienced technical communication problems in the game.	2	2
7. There was not much feedback from other players.	4	3
8. Other players were helpful.	4	3
9. I could express my opinion more freely than in a regular class.	3	1
10. Having my own avatar made me feel more involved in the game.	4	4
11. Most of the discussion was not useful.	2	4
12. I could learn new vocabulary.	4	5
13. The game made me use my German more than in a regular class.	3	3
14. I enjoyed interacting in the game.	4	2
15. Chatting in the game was a good way to improve my German.	4	2
16. I would like to play the game again in the future.	4	2

These results were further substantiated by the discussions occurring in the concluding interview. Srfroggy explained how easy it was to discuss his experiences in-game, stating that the inherent interest in the genre helped sustain his interest to speak about his experiences and interact with other players and participants, a possibility which Baerenjaeger saw the potential in, but did not ultimately share. Baerenjaeger also states that a fear of becoming addicted to the game may have ultimately hampered his potential while playing, perceiving gameplay as a time-waster, despite his initial proclivity for gaming as indicated in the established initial conditions. The importance of Srfroggy's external connection to the German language proves to be important here as well, as he indicated that his parents were encouraged by his use of

German after playing *World of Warcraft* as he had developed better grammatical structure in his oral communication.

Each perspective serves to further delineate the two players as distinct in their own right, even though the initial conditions of the CAS are incredibly similar. Srfroggy's sole focus while playing the game is on progression; communication with other players becomes a necessity, and although he may not focus on specific details in quest descriptions, his aspiration to be a great player means he is well engrained in the vernacular needed to succeed and combat the obstacles in his path.

Baerenjaeger's initial learner-related results may suggest a similar inclination to progress while playing these kinds of games, yet in reality, he is far more restrained and concentrates on experiences that explicitly relate to language learning. His gameplay session times are diminished, although the frequency with which he plays is much more regular than someone like Srfroggy. He is not blistering through the game for advancement purposes, but rather spends his time paying particular attention to quest text and keeping track of new lexical items that he encounters on a piece of paper.

These two participants and their gaming/SLD trajectories reveal two particular approaches to the process of playing *World of Warcraft* for SLD purposes. Each approach results in SLD, yet Srfroggy's is evidently more effective than Baerenjaeger's for the various reasons listed above. The inherent complexity of this experience means that other participants who share common traits or characteristics, as these two have, will result in unique trajectories too that deserve to be analyzed to provide further insight into the process of DGBLL.

Naturin and Obstfresser – Iteration Factors and Prior Gaming Experience

As with Srfroggy and Baerenjaeger, it is imperative to look at the initial conditions of Naturin and Obstfresser in order to determine how closely aligned they are as participants with respect to this study. Rather than thoroughly discussing the results of the comprehensive analysis as was done for Srfroggy and Baerenjaeger, the iteration-related factors and prior gaming experience will be focused upon and analyzed in detail.

In comparison to these first two participants, the various aspects which make up Naturin and Obstfresser's background information questionnaires are markedly different. Naturin states that he is learning German to obtain a minor, whereas for Obstfresser, his rationale includes obtaining a major, studying abroad, German heritage and a simple interest in the language. Their general language learning experience is quite varied as well, as Naturin generally has less experience learning languages as compared to Obstfresser, having spent a bit of time in Germany and studying at university in Canada and using the language only for reading and in-class. Obstfresser, on the other hand, has spent ample time in Germany and has studied it at university (both in Canada and in Germany). He claims to use the language when speaking with friends, as well as for writing and listening for pleasure. Both participants do, however, have family in Germany and local friends who speak the language.

Their computer and gaming proficiencies are more similar, with Naturin being slightly more proficient as a gamer due to his prior experience playing online games, including *World of Warcraft*, yet both share similar general gaming tendencies and optimism about DGBLL (Obstfresser does retain some scepticism however, imagining that some players may inhibit the learning potential of the game). In terms of computer proficiency, both participants use their computers frequently for gaming, school, and social media, and have used some web-based programs for SLD. Obstfresser also claims to use his computer for video and photo editing, thus separating their experiences slightly, but otherwise they exhibit similar characteristics when comparing these two aspects which construct the initial conditions for the ensuing gameplay experience.

Applying a retrodictive qualitative modeling perspective again, after understanding the initial conditions of the CAS, we look at the list of linguistic constructions developed over the length of the study in an effort to determine what characteristics of the system may have contributed to SLD (Table 27; Table 28).

Table 27

Naturin's linguistic constructions (GBC = 37; LC = 125; WP = 3010; ES = 1.53)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>abbrechen</i>	Default command to cancel any action in game.	Vocabulary test
<i>abgeschlossen</i>	Viel zu lernen abgeschlossen .	Vocabulary test
<i>annehmen</i>	Wir werden uns des Problems auf direkte Art annehmen - indem wir die Schriftrollen zusammen mit den Schmierereien der Ho-zen vernichten.	Vocabulary test
<i>der Zauber ist noch nicht bereit</i>	Immediate feedback provided when trying to cast a spell that can't yet be cast	Vocabulary test
<i>Fähigkeiten</i>	Quest angenommen: Die Lektion des Eisenasts. Zuallererst werdet Ihr Waffen benötigen, die Euren Fähigkeiten entsprechen.	uhm und also und die information über fähigkeiten war ein bisschen schwer zu verstehen
<i>Geist</i>	Bitte kehrt zu Huo zurück, dem Geist des Feuers im Tempel der Fünf Sonnenaufgänge.	und ich ich sah wie sie wie das das wort geist benutzen und ich könnte wie sie wie uh eigene wörter auf deutsch benutzen werden
<i>ihr fühlt Euch normal</i>	Ihr fühlt Euch normal.	Vocabulary test
<i>ihr müsst euch näher an diesem Ziel befinden</i>	Pop-up message signifying the player is too far away from his or her goal.	Vocabulary test
<i>Magier</i>	Bruder Sarno sagt: Grüße, Magier! Willkommen in der Kathedrale des Lichts!	schon gemacht also ich hab uhm einen magier
<i>plündern</i>	Das ist das zweite Mal, dass wir uns mit plündernden Ho-zen herumschlagen mussten.	Vocabulary test
<i>Rüstung</i>	Morris Lawry sagt: Ich polier Eure Rüstung für 'n Stück Kupfer.	Vocabulary test
<i>seid begrüßt</i>	Seid begrüßt , Pandaren.	Vocabulary test
<i>zur Kontaktliste hinzugefügt</i>	Eisenbarchen zur Kontaktliste hinzugefügt .	Vocabulary test
<i>zurückkehren</i>	Solltet Ihr herunterfallen, wird der Fluch des Teichs es Euch erschweren, den Pfahl erneut zu erklimmen, sodass Ihr zum Ufer zurückkehren müsst, um von vorn zu beginnen.	Vocabulary test

Communication factors

Iteration factors

<i>ablehnen</i>	<i>Found in all quest texts as a means to cancel the quest.</i>	<i>Vocabulary test</i>
<i>Allianz</i>	Korga Starkmähne sagt: Korga Starkmähne, einst Gefangener der Allianz , jetzt ein freier aber kläglich unterbewaffneter Tauren.	ich weiß uh also mit pandarin kann man sich entscheiden entweder für die allianz oder für die horde
<i>Ausdauer</i>	Ihr habt gelernt, einen neuen Gegenstand herzustellen: Rolle der Ausdauer .	<i>Vocabulary test</i>
<i>Beweglichkeit</i>	Ihr habt gelernt, einen neuen Gegenstand herzustellen: Rolle der Beweglichkeit .	<i>Vocabulary test</i>
<i>Charakter</i>	Euer Körper muss den Kampf bestehen, aber in Wahrheit ist es Euer Charakter , der geprüft werden soll.	uhm ich hab zwei charakter
<i>Dungeons</i>	Folgt dem Zug der Heimatlosen zum Eingang des Todesminend dungeons .	uhm und ich ich glaub auch uh dungeons
<i>Erfahrung</i>	Erhaltene Erfahrung : 10.	aber uhm und das ist wirklich die die uhm einige erfahrung erfahrungen mit deutschen spielern die ich gehabt die ich gehabt habe
<i>erstellen</i>	<i>Used when creating a new avatar and seen when starting the game.</i>	ich also uh wenn ich ich prob probiere also wenn ich ein neue character charakter machen oder erstellen werde
<i>ihr habt eine neue Fähigkeit gelernt</i>	Ihr habt eine neue Fähigkeit gelernt: Kräutersuche.	<i>Vocabulary test</i>
<i>Quest</i>	Quest angenommen: Die Lektion des Eisenasts.	das quest zu beenden ist war sehr also es war leichter mehr als ich gespielt habe
<i>Quests</i>	Die täglichen Quests wurden zurückgesetzt!	uhm aber jetzt ich hab noch nicht ich hab keine quests bekommen der
<i>Reittier</i>	Rettet Krennan Aranas, indem Ihr die Fähigkeiten Eures Reittiers ausnutzt.	<i>Vocabulary test</i>
<i>Ruf</i>	Euer Ruf bei der Fraktion 'Akademie des Shang Xi' hat sich um 10 verbessert.	<i>Vocabulary test</i>
<i>schlagen</i>	Es ist etwas ganz anderes, einem lebenden Gegner anstatt dieser Übungsziele im Hof	es gab ein konversation und dann haha am ende musst du ihm schlagen

	gegenüberzustehen. Lebende Gegner schlagen zurück.	
<i>Stärke</i>	Ich sehe große Stärke , gewaltigen Mut und eine unübertroffene Reinheit der Seele in Euch.	<i>Vocabulary test</i>
<i>sterben</i>	Wenn wir nicht handeln, wird unsere Welt sterben , und wir mit ihr.	<i>Vocabulary test</i>
<i>Stufe</i>	Fordert die anderen Schüler innerhalb des Tempels oder auf den Stufen davor heraus und bezwingt sie. Bezwingt 6 Huojin- oder Tushui-Schüler.	ja und uh mit ihm hab ich stufe zwanzig schon erreicht
<i>teilzunehmen</i>	Sprecht mit Krennan Aranas, um an der Schlacht um Gilneas teilzunehmen .	uhm zu zu spielen oder uhm teilzunehmen
<i>töten</i>	Quest angenommen: Töten oder getötet werden.	da gehe ich war will mit mir etwas andere sagen und ich hab ah ich muss sie töten und das ist was das ist
<i>Volk</i>	Meister Shang Xi sagt: Willkommen, Huo. Das Volk hat Eure Wärme vermisst.	volk also mit jeder volk sie haben uhm verschiedene anfangsquestlinie
<i>vorhaben</i>	Sie muss wissen, was wir vorhaben , damit sie alle in Sicherheit bringen kann.	oder eine mich vorhaben wenn ich diese also als magier diese uhm ist das diese zauber benutzen
<i>Waffe</i>	Quest angenommen: Die Lektion des Eisenasts. Zuallererst werdet Ihr Waffen benötigen, die Euren Fähigkeiten entsprechen.	<i>Vocabulary test</i>
<i>Zauber</i>	Ihr habt einen neuen Zauber erlernt: Frostnova.	oder eine mich vorhaben wenn ich diese also als magier diese uhm ist das diese zauber benutzen

Table 28

Obstfresser's linguistic constructions (GBC = 49; LC = 113; WP = 2702; ES = 2.05)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>Ausdauer</i>	Elenny bekommt Beute: Nummeriertes Wickeltuch der Ausdauer .	ausdauer ausweichung was was soll das heißen
<i>Dieb</i>	Korothe der Hügelbrecher schreit: Du mickriger Dieb! Korothe findet dich! Korothe drückt dir Gesicht ein!	so ein dieb oder
<i>Dunkelküste</i>	Fisch klingt für mich jetzt unfassbar gut. Dunkelküste ist für Barsch bekannt.	nein, dunkelkueste
<i>Feind</i>	Ich darf mein Heimatland nicht zweimal in meinem Leben verlieren. Aber diese Erdbeben sind kein Feind , den wir besiegen können.	war unser feind und ich habe hinter ihm und (makes stabbing sounds) ist nicht uh
<i>gebissen</i>	Ihr seid von einem Worgen gebissen worden. Wahrscheinlich ist es nicht weiter schlimm, aber es tut schon ein wenig weh.	und dann ich kam in einer keller und ich würde von einer gebissen
<i>Gefecht</i>	Quest angenommen: Das letzte Gefecht .	ich dachte immer was ist das uh or ausdauer ausweichung was was soll das heißen uhm auch gefecht
<i>ihr fühlt Euch normal</i>	<i>Often repeated when having rested in an inn while taking a break.</i>	<i>Vocabulary test</i>
<i>ihr habt eine neue Fähigkeit gelernt</i>	Ihr habt eine neue Fähigkeit erlernt: Ausweiden.	<i>Vocabulary test</i>
<i>jagen</i>	Noch so viele Jahre nach dem Krieg hat Crowley genügend Waffen in diesem Keller versteckt, um das halbe Viertel in die Luft zu jagen .	ich muss jetzt sie uh jagen glaub ich
<i>lebendig</i>	Ich bin mir nicht sicher, ob Ihr lebendig oder tot seid... Mensch oder Worgen...	mmhmm uh also die untöter untöter hmm sind nicht mehr lebendig aber sie leben noch
<i>meucheln</i>	<i>Name of ability often used in game.</i>	meine abilities sind so wie ein meuchler ich meuchle meine feinden
<i>plündern</i>	Plündern in "Plündern als Gruppe" geändert.	<i>Vocabulary test</i>
<i>Reittier</i>	Rettet Krennan Aranas, indem Ihr die Fähigkeiten Eures Reittiers ausnutzt.	<i>Vocabulary test</i>

<i>Rüstung</i>	Löffelstiel-Malygos erschafft Leichtes Rüstungsset .	<i>Vocabulary test</i>
<i>schützen</i>	Die Armee meines Vaters im Gefängnisviertel wird sie besser schützen können.	uh ich habe den hofmeister so unser dorf zu zu schützen von dieser erschrecken mit große zahnen
<i>Segen</i>	Quest angenommen: Der Segen des Patriarchen.	uh ah sichel und ich dachte dass ist vielleicht ein so ein segem oder weiß nicht
<i>seid begrüßt</i>	Quest angenommen: Dröhnkiste 413. Seid begrüßt!	<i>Vocabulary test</i>
<i>Sichel</i>	Talran aus der Wildnis sagt: Lasst die Sichel das lösen, was nicht verbunden sein sollte!	uh ah sichel und ich dachte dass ist vielleicht ein so ein segem oder weiß nicht
<i>Umhang</i>	Ihr erhaltet Beute: Flickwerk umhang .	umhang?
<i>Verlassenen</i>	Auftragsmörder der Verlassenen sagt: Gilneas wird schon bald den Verlassenen gehören!	Ich muss auf die Schiffe der Verlassenen zielen.
<i>zur Kontaktliste hinzugefügt</i>	Studygirl zur Kontaktliste hinzugefügt .	<i>Vocabulary test</i>

Communication factors

<i>Gilde</i>	Hircine flüstert: hey, hast du Interesse unserer Gilde beizutreten, wir sind zwar noch im Aufbau, weil wir wieder neu angefangen haben zu spielen	ja und ich bin auch mit ein ein gilde uh teilgenommen
<i>Moin Stufe</i>	Thetaden: moin Obstfresser sagt: Toll! zweiter Stufe	<i>Vocabulary test</i> uh huh ah stufe acht habe ich erreicht
<i>Tastatur</i>	Leandâ-Arthas: sry tastatur spinnt und pc hang	Mann, ich brauch ne deutsche tastatur -layout

Iteration factors

<i>abbrechen</i>	<i>Default command to cancel any action in game.</i>	<i>Vocabulary test</i>
<i>abgeschlossen</i>	Abgeriegelt! abgeschlossen .	<i>Vocabulary test</i>
<i>ablehnen</i>	<i>Found in all quest texts as a means to cancel the quest.</i>	<i>Vocabulary test</i>
<i>Barsch</i>	Fisch klingt für mich jetzt unfassbar gut. Dunkelküste ist für Barsch bekannt.	<i>Vocabulary test</i>
<i>Belohnung</i>	<i>The reward for each quest is expressed as the Belohnung.</i>	<i>Vocabulary test</i>
<i>Beute</i>	Ihr erhaltet Beute : Zähes Stockfleisch.	<i>Vocabulary test</i>
<i>Beweglichkeit</i>	<i>Common attribute found on many items.</i>	<i>Vocabulary test</i>

<i>Dorf</i>	Quest angenommen: Sturmsiel. Unsere Kutschenfahrer wurden angewiesen, sich im Fischer dorf Sturmsiel zu sammeln.	am anfang war mein dorf gilneas unter von erschrecken attacked
<i>Dungeon</i>	Schwierigkeitsgrad des Dungeons wurde auf 'Normal' gesetzt.	wie komme ich zuruck von dungeon?
<i>entdeckt</i>	Militärviertel entdeckt : 15 Erfahrung erhalten.	<i>Vocabulary test</i>
<i>Erfahrung</i>	Erhaltene Erfahrung : 80.	ich glaube den besten erfahrung war wenn die pirater uhm sind uh gegen uns zum kämpfen
<i>getötet</i>	Quest angenommen: Töten oder getötet werden.	uh alle diese große hässliche feinden sind hab ich getötet
<i>ihr müsst euch näher an diesem Ziel befinden kämpfen</i>	<i>Pop-up message signifying the player is too far away from his or her goal.</i>	<i>Vocabulary test</i>
	Ich verstehe nicht, warum der König meine Zeit damit verschwenden will, um diesen Unterschlupf zu kämpfen	ich glaube den besten erfahrung war wenn die pirater uhm sind uh gegen uns zum kämpfen
<i>Kapitän</i>	Quest angenommen: Nimm mich mit, Kapitän , auf die Reise.	und uh dann haben wir die die kapitän von zwei schiffe uh gekämpft und er erschlagen ja
<i>Keller</i>	Nicht weit von hier gibt es ein sicheres Versteck, in Josiahs Keller .	ich kam in einer keller und ich würde von einer gebissen
<i>Quest</i>	Quest angenommen: Abgeriegelt!	vielleicht ist das die nächste die nächste quest wo ist mein familiar
<i>Quests</i>	Die täglichen Quests wurden zurückgesetzt!	hmm okay uh uh irgendwelche quests ich hab uh einige ärmliche bock gejägt
<i>Ruf</i>	Euer Ruf bei der Fraktion 'Gilneas' hat sich um 250 verbessert.	<i>Vocabulary test</i>
<i>Stärke</i>	Lord Darius Crowley sagt: Gut, Genn. Nicht das Gesetz bindet uns, sondern etwas viel Stärkeres .	<i>Vocabulary test</i>
<i>sterben</i>	Nehmt mein Pferd und rettet ihn. Krennan darf nicht sterben . Rettet Krennan Aranas.	<i>Vocabulary test</i>
<i>Waffe</i>	Beute: Formel: Waffe - Schwacher Wildtiertöter	<i>Vocabulary test</i>

<i>Waffen</i>	Quest angenommen: Waffenbrüder .	der name des uhm des types hab ich nicht gesehen aber hält zwei waffen ah in jedem hand
<i>zurückkehren</i>	Wir werden dafür sorgen, dass die Toten zu ihrem ewigen Schlaf zurückkehren . Besorgt 5 freigelegte Andenken.	<i>Vocabulary test</i>

Unlike Srfroggy and Baerenjaeger, Naturin and Obstfresser's SLD is largely influenced by iteration-related factors. For Naturin this is perhaps predictable due to his prior experience playing *World of Warcraft* and other online games, and therefore some of the more frequent linguistic constructions encountered in the game may have been developed previously; indeed, constructions such as *Ruf* or *Reittier*, which Srfroggy and Baerenjaeger claimed were being developed by playing the game, are already known to Naturin and identified as fixed constructions. Due to their prominent nature in the game, although these linguistic constructions were further developed through their multiple iterations for Naturin, they lend additional evidence to the previous participants' claims that these constructions were indeed a product of gameplay. *Stärke* and *Ausdauer*, common attributive affixes on the numerous pieces of equipment found throughout the game (which specify what attribute they focus on for the player, such as strength or stamina), are examples of additional fixed constructions which Naturin indicates as being reinforced by playing the game, according to the participant (see Figure 21 and Figure 22 for examples of how item descriptions are displayed in-game to players). Items such as these are incredibly common, and often display the construction multiple times. Due to these items having direct consequences for advancement in the game (ensuring that the character is using equipment with the right attributes), it is no surprise that Naturin can recall these fixed constructions in the adapted vocabulary test (see Appendix B). The need to pay attention to these items for progression purposes acts as an attractor state in the CAS: players like Naturin spend ample time looking at their equipment choices and determining whether or not they are appropriate, so much so that the actual name of the item is less important than the attributive affix that it contains.

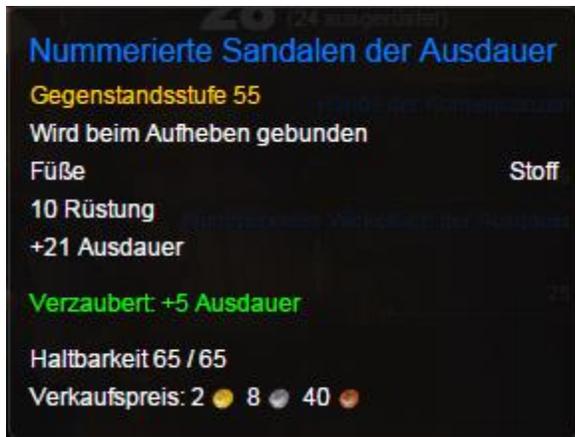


Figure 21. Example item with "Ausdauer" emphasized



Figure 22. Example item with "Stärke" emphasized

Other linguistic constructions that are frequently observed through multiple iterations, such as *Volk* or *schlagen*, are low-frequency constructions in general and yet so central to the game that it can be argued that iteration while playing leads to further SLD. These are used in varying ways by Naturin too, such as the item-based construction *Volk* – used in a sentence, but not grammatically correct – and the abstract construction *schlagen* – used to explain the goal of a specific quest encountered while playing and done so often enough to suggest his complete understanding.

Of course, Naturin's previous experience playing *World of Warcraft* does not eliminate the potential to learn game-based linguistic constructions and utilize them in abstract ways, as

can be seen when he reflects on the use of *Geist*. It has multiple applications in the game world, used in quest texts, interaction with NPCs, and through the provision of feedback:

*Quest angenommen: Aysa, Anhängerin der Tushui. In so kurzer Zeit habt Ihr mir gezeigt, dass in Euch das Potenzial steckt, <ein wahrer Meister/eine wahre Meisterin> Eurer Klasse zu werden, <Klasse>. Das Ausbildungsgelände liegt hinter Euch, und nun müsst Ihr Euch beweisen, indem Ihr eine ungleich größere Herausforderung annehmt, die bislang noch keiner meiner Schüler bewältigt hat. Bitte kehrt zu Huo zurück, dem **Geist** des Feuers im Tempel der Fünf Sonnenaufgänge. Meine zwei besten Schüler neben Euch werden Euch bei dieser Aufgabe unterstützen. Sucht zunächst bitte Aysa Wolkensänger auf. Ihr findet sie beim Teich im Westen. Sprecht mit Händler Lorvo bei Fus Teich.*

*Ihr hört das Echo von Meister Li Fei: "Huo, der **Geist** des Feuers, ist bekannt für seinen Hunger. Er braucht Zunder als Nahrung und die Liebkosung des Windes, um erweckt zu werden."*

*Mönch der Huojin sagt: Der **Feuergeist** ist aufgebracht. Es wäre gefährlich, den Tempel jetzt zu betreten...*

Although he states that he understood the use of *Geist* to denote the ephemeral figure, its use in *World of Warcraft* to signify something spiritual or intellectual was novel to him; his use of the linguistic construction and understanding of its broader use imply that Naturin can indeed use it abstractly, and this is directly the result of Naturin's initial conditions in the game placing him within a starting location that so heavily focuses on the spiritual. It helps as well that the construction *Geist* is produced 57 times throughout the course of his gameplay experience in various contexts, thus providing ample iteration and the necessary growth conditions in the CAS to assist in SLD. Others linguistic constructions, such as *Fähigkeiten*, are such fundamental aspects of the game and how a player progresses that one can argue for their contribution to SLD as well; learning that all abilities that a player uses in the game are called *Fähigkeiten* is integral to one's eventual progress in the game.

Obstfresser's SLD is also largely influenced by iteration while playing the game, and he too shares common fixed constructions with Naturin, such as *ablehnen* and *Waffe*, and other

constructions which are likely abstract such as *Erfahrung* and *Kapitän*. Although words like *Kapitän* may not commonly find use in out-of-game contexts, its use in-game in central story-related contexts and its subsequent use in the focus group conversations lends evidence that would support its further development in game. *Kapitän* is first encountered in an initial quest that Obstfresser completed in early February:

*Quest angenommen: Nimm mich mit, **Kapitän**, auf die Reise. Die Katapulte der Verlassenen machen uns ganz schön zu schaffen, <Name>. Und selbst wenn wir ihrer Herr würden, stehen da noch zwei Schiffe mit zwei Reihen Kanonen. Ich habe jedoch einen Plan, mit dem wir zwei Fliegen mit einer Klappe schlagen. Ihr seid bei diesem Plan die Klappe. Beseitigt die Maschinisten an den Katapulten. Nutzt danach die Katapulte, um Euch selbst an Bord der Schiffe der Verlassenen zu katapultieren. Wenn Ihr nicht gerade komplett daneben zielt, solltet Ihr sicher landen. Sobald Ihr an Bord seid, geht unter Deck und erledigt den **Kapitän** jedes Schiffes. Viel Erfolg, Schürke. Benutzt die Katapulte der Verlassenen, um auf die Schiffe zu gelangen und tötet **Kapitän** Morris und **Kapitän** Anson.*

In order to complete the quest, Obstfresser had to first understand that the quest text was asking him to climb onto a catapult and launch himself onto two nearby ships, at which point he had to attack the captains of both ships. In the second month of the study, when discussing his recent experiences in game in the first focus group, Obstfresser recounts:

*ich glaube den besten erfahrung war wenn die pirater uhm sind uh gegen uns zum kämpfen bin ich mit dem katapult auf der piratenschiff uh geworfen und uh dann haben wir die die **kapitän** von zwei schiffe uh gekämpft und er erschlagen ja*

One can see the similarity in the original quest text and Obstfresser's ability to retell this experience in his own words, even though these two events were more than a week apart. Due to Obstfresser's already strong German proficiency, as identified as part of the initial conditions of the CAS, the majority of linguistic constructions developed are related to iteration factors. This does however also signify that there is potentially more benefit to playing these games with an intermediate, rather than advanced, German language proficiency, as there could then

be more opportunities to be introduced to entirely new linguistic constructions due to novel game-related factors. And yet, even though Obstfresser possesses an already impressive proficiency in the German language, by playing the game and actively paying attention to it, he is able to at the very least consistently find opportunities to further develop his vocabulary.

Examples of this can be found in the development of the linguistic construction *Beute*. Obstfresser recalls *Beute* as part of the adapted vocabulary test, and the construction itself has a rich usage history throughout the entirety of Obstfresser's play experience, as evidenced below (Figure 23).

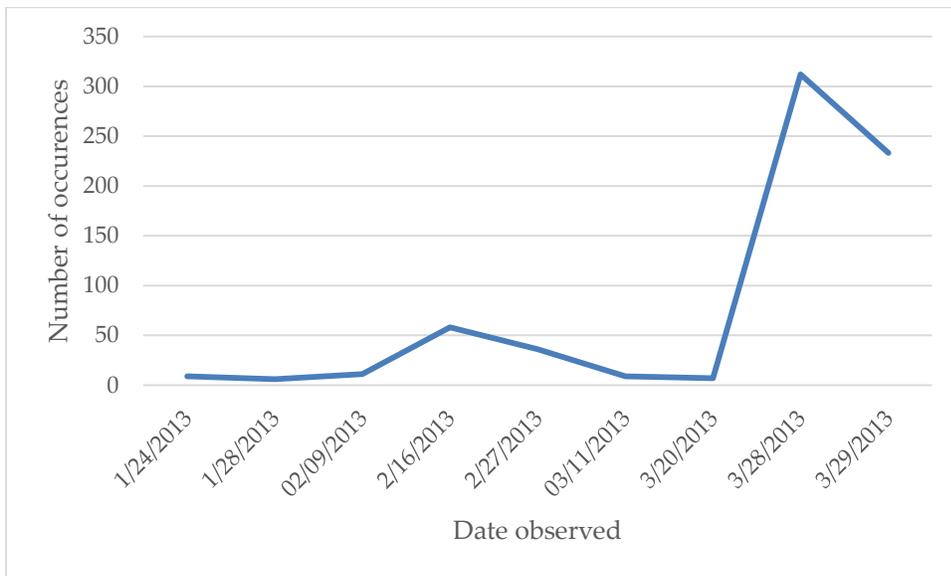


Figure 23. Development of construction "Beute"

In every single one of Obstfresser's play sessions, he encountered the linguistic construction *Beute*, and as can be seen, these occurrences increased dramatically in his final two play sessions as he began to play with other individuals, joining their groups and generally accomplishing more than he could have playing alone. This group play is itself an emergent aspect of the CAS, as it only becomes possible with sufficient advancement playing the game, and through this group gameplay, the construction itself emerges more frequently. With hundreds of instances of *Beute* being observed (in total, Obstfresser was exposed to the linguistic construction 681 times), it is unsurprising that he is able to recognize and translate the

item when presented with it in the adapted vocabulary test. Of the 8 participants focused on in this analysis, 5 of them correctly identified the linguistic construction in this test. Those who didn't (Naturin, Eisenbarchen, and Kyrii) have some of the lowest efficacy scores, which rather than being due to a lack of exposure (all three participants played well beyond the 10 hour minimum) is likely due to a lack of attention, either due to having already played the game (as in Naturin's case) or due to being overwhelmed with other, more rudimentary aspects of the game and having a relatively low German language proficiency (as will be seen in the analyses for Eisenbarchen and Kyrii below). For Obstfresser, however, each unique act of encountering the construction *Beute* within the game is an individual iteration, and as these continually emerge they further enact change on the system and become engrained into his vocabulary.

Still, gameplay-related factors influence the emergence of new linguistic constructions for Obstfresser too. His choice of avatar largely inspires the types of linguistic constructions that he developed due to influence on the initial conditions of the CAS. Playing as a Worgen (a werewolf-type creature), his early gameplay is situated around defending a medieval town from impending doom due to a horde of undead soldiers. The quests that he partakes in revolve around this scenario, and as a result of his opportunities to discuss his experiences in a non-gaming context, we can observe the emergence of many item-based, and potentially abstract, constructions. Words such as *Dieb*, *Erschrecken*, *gebissen*, *Feind*, *lebendig*, and *meucheln*, are all evidently developed as a result of these experiences and the quests that are undertaken. Obstfresser uses these expressively when describing his gameplay experiences, explaining that:

*also es gab so viel uhm also geworden ja ziemlich uh nicht in einer gute lage und dann ich kam in einer keller und ich würde von einer **gebissen** weil er dachte dass ich kein **erschrecken** war aber dann zeigt er dass er ein worgen war... er hat mir gebissen und dann ich würde zu worgen **erschrecken** selbst sie haben mir in ein so ein in einem stock (makes locking noise) gefangen*

Obstfresser is genuinely excited to discuss his experiences, which speaks to the level of engagement he has while playing the game, and in turn, leads to additional opportunities to, if not develop new linguistic constructions, at the very least further develop them through

exposure in multiple iterations. With further evidence of their correct usage in sentences, it can be argued that Obstfresser understands them thoroughly and can use them abstractly.

The efficacy scores of each participant further aid us in understanding to what extent their gameplay experiences were beneficial for SLD. Obstfresser's score of 2.05, although not as high as Srfroggy's, is still relatively strong, and is certainly higher than Naturin's score of 1.53. The result is intriguing when compared to the previous participants, as although Naturin developed more linguistic constructions than Baerenjaeger, his ES is slightly lower due to the amount he spoke in out-of-game contexts and the relative lack of constructions produced outside of the 1k frequency list, again suggesting a lack of attention paid to the in-game language that he was exposed to.

Judging by these lists of linguistic constructions and the respective efficacy scores, it is evident that Obstfresser had developed a larger variety of items through his playtime and the many iterations of the CAS than Naturin, leading us to engage in an analysis of the trajectories of gameplay that impacted each participant's SLD. As was observed in *Chapter IV: Methodology and Group-Level Results*, the correlation of their gaming results was strong ($r = 0.877$, $n = 8$, $p = 0.004$); indeed, returning to the radar graph presented earlier (see *Participant Profiles and Selection*), the two shapes delineating Naturin and Obstfresser's gameplay-related results were almost identical, with the differing factor being that Naturin's results were unequivocally stronger than Obstfresser's in all areas, the degree to which however was fairly consistent. This would seem to suggest that due to the magnitude of difference between gameplay-related results, Naturin would have developed exponentially more linguistic constructions, which is evidently not the case. What then can we learn from their trajectories of gameplay as they relate to SLD?

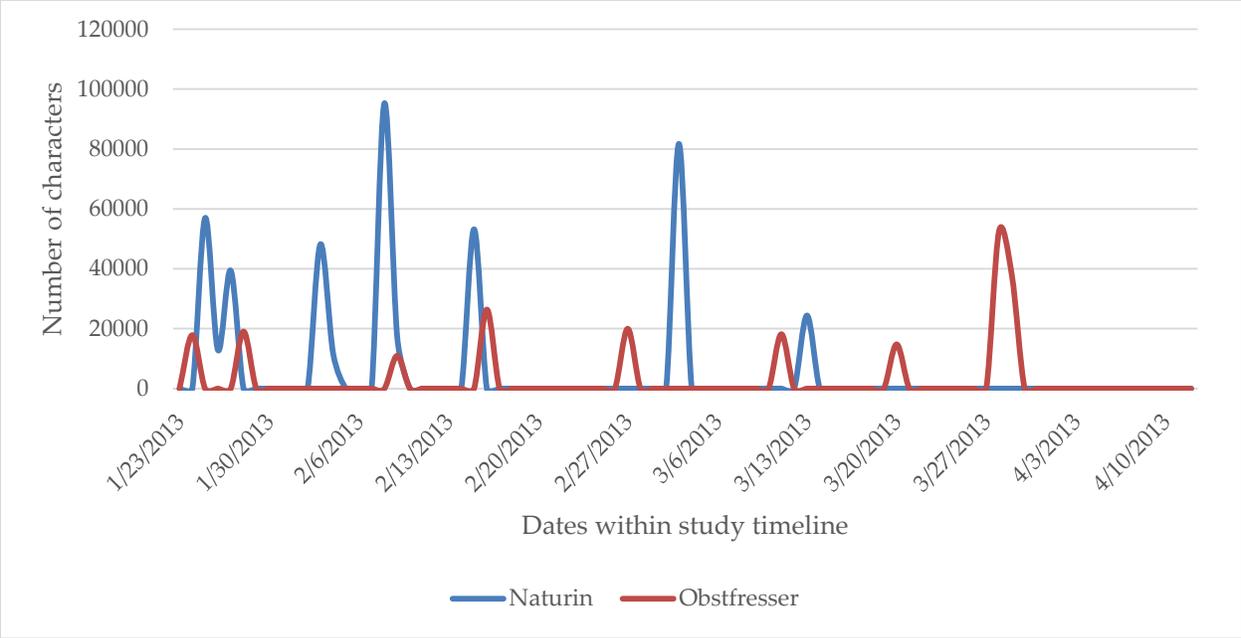


Figure 24. Chronological language exposure (Naturin and Obstfresser)

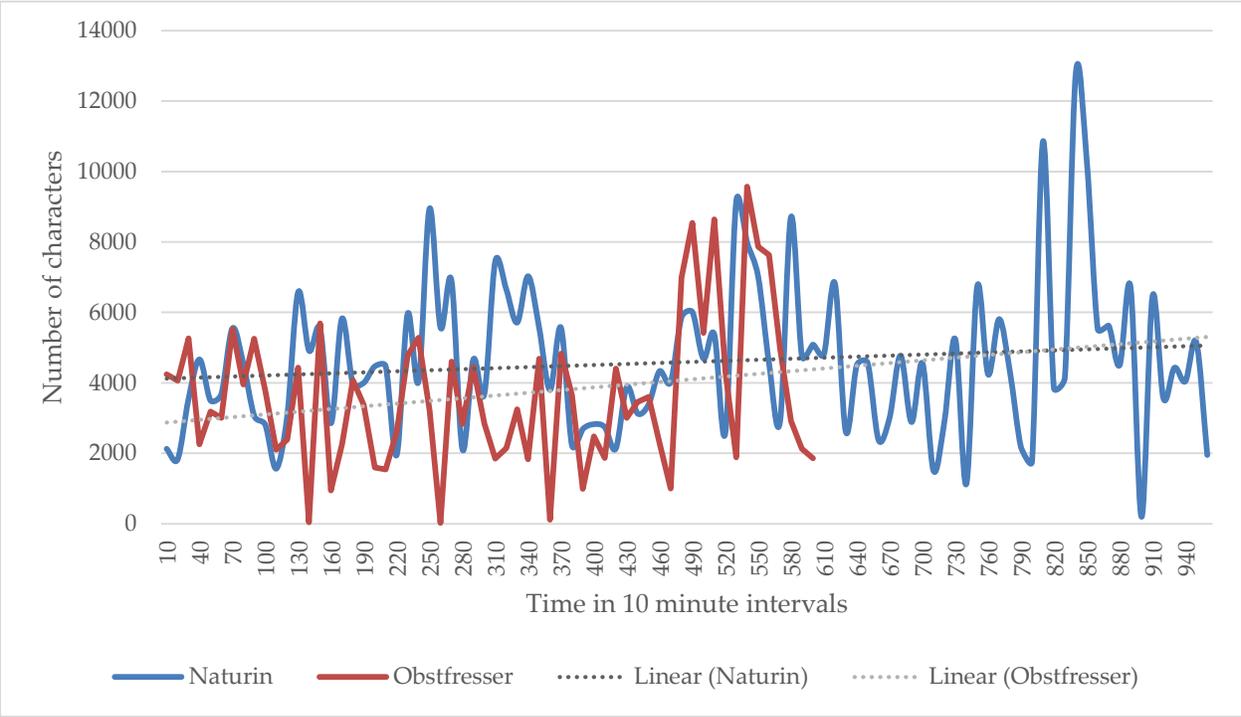


Figure 25. Exposure to language over 10 minute intervals (Naturin and Obstfresser)

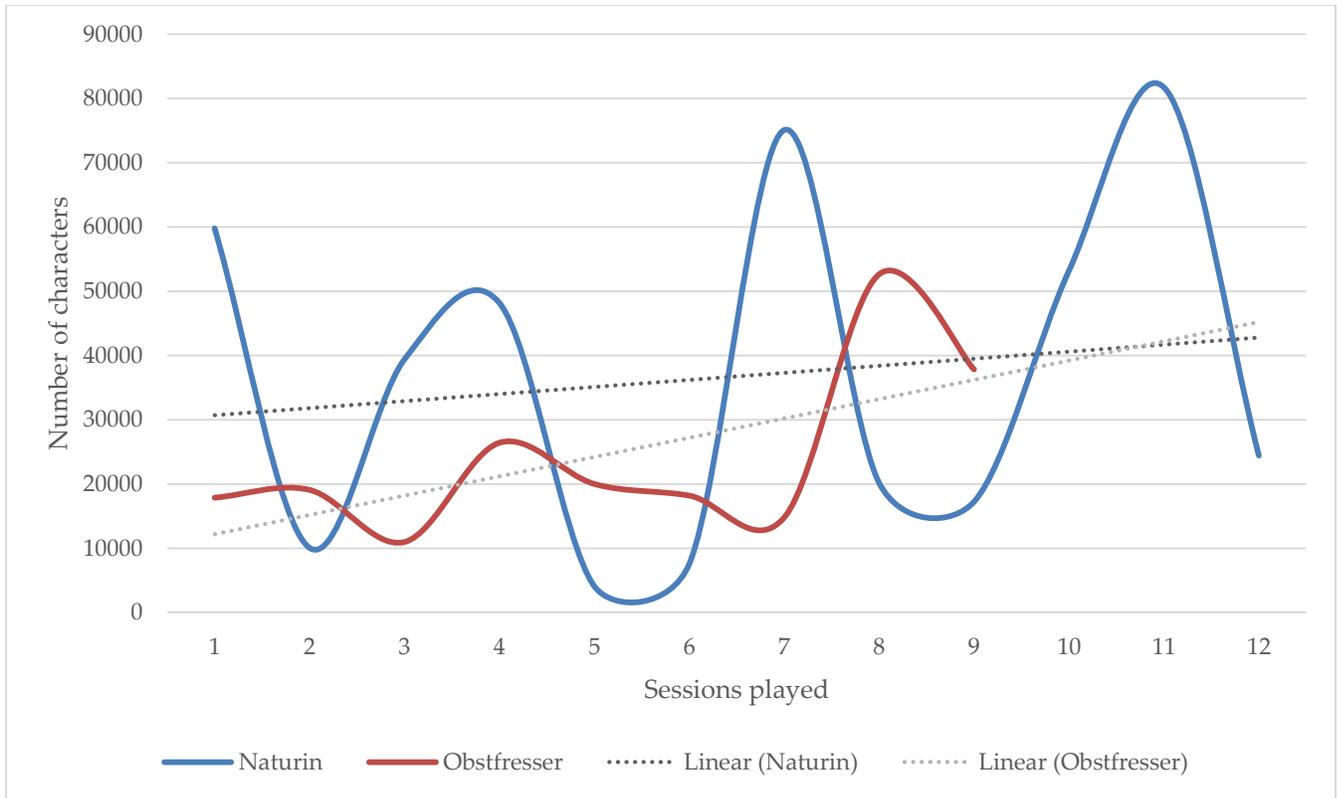


Figure 26. Exposure to language per session played (Naturin and Obstfresser)

Regardless of how similar Naturin and Obstfresser’s gameplay-related results were in relation to one another, the actual progression when tracked chronologically presents a differing perspective whereby Naturin invests ample time into the game early in the study, as did Srfroggy and Baerenjaeger, but with a similar intensity as Srfroggy (Figure 24). Having played a total of approximately 16 hours, the majority of which occurs in the first 30 days of gameplay, Naturin’s initial investment in the game likely harkens back to his prior experience playing *World of Warcraft* and a rekindling of the enjoyment he had exploring the game once before. He progresses quickly due to his knowledge of the mechanics of the game and does not have the same learning curve as Obstfresser does. As a result, Obstfresser initially shows difficulty playing the game, reflecting the expected learning to play paradigm as he slowly becomes accustomed to the conventions and mechanics of gameplay and thus becomes more proficient.

As can therefore be seen, when examining the complexity of the gameplay experience and the language that the player is exposed to – regardless of the actual amount of time spent playing the game – the resulting experiences cannot be linearly associated to one another (Figure 25). Naturin may play more often, but examining his average trajectory in contrast to Obstfresser’s indicates less of an upward trend; certainly both are trending upwards, signifying that both participants are indeed able to better learn to play the game over time and resulting in more opportunities to develop the second language.

Analyzing playtime on a session-by-session basis helps bring to light two additional aspects. Naturin’s play was rather irregular, with four individual sessions resulting in a wealth of language exposure, three of which resulted in more language exposure than Obstfresser’s most successful play session in terms of possible language exposure (Figure 26). It is also clear, however, that although Obstfresser plays fewer sessions and does not have the same quantity of language exposure as Naturin, his average trajectory of development increases steadily, just as was observed when analyzing the complexity of interaction in 10 minute intervals. Obstfresser himself explains in the concluding interview that although he was initially skeptical of the game’s potential for SLD, by the end of the study he had started to truly enjoy his time spent playing and therefore this trajectory of language exposure would likely continue to increase as he becomes increasingly proficient in playing the game.

Turning now to the results of the questionnaire conducted in the concluding interview (Table 29), we observe that their individual results largely mirror one another, in effect reinforcing the general alignment of the gameplay trajectories as the study concluded. Both participants are generally pleased with the gameplay experience and found it not daunting, which although expected for Naturin, is encouraging for Obstfresser as this implies that even learners with little experience playing online games of this nature can over time become familiar with the game’s various conventions.

Table 29

Concluding Interview Questionnaire (Naturin and Obstfresser)

Question (Strongly Agree = 5, Strongly Disagree = 1)	Naturin	Obstfresser
1. The game was easy to play.	4	5
2. The chat system was easy to use	4	4
3. It was difficult to follow the quests/communication from other players	2	2
4. The quests were too difficult.	1	1
5. I actively tried to comprehend the text of the quests.	3	5
6. I experienced technical communication problems in the game.	4	2
7. There was not much feedback from other players.	4	3
8. Other players were helpful.	3	4
9. I could express my opinion more freely than in a regular class.	2	3
10. Having my own avatar made me feel more involved in the game.	4	5
11. Most of the discussion was not useful.	2	2
12. I could learn new vocabulary.	5	5
13. The game made me use my German more than in a regular class.	4	2
14. I enjoyed interacting in the game.	4	5
15. Chatting in the game was a good way to improve my German.	4	4
16. I would like to play the game again in the future.	4	4

Of all questions, the fifth is perhaps most compelling as it relates to the efficacy scores of both participants. As was suggested above, Naturin's previous experience playing *World of Warcraft* may have resulted in reduced SLD, and to some extent, he rationalizes this as well by stating that he didn't necessarily try to comprehend all quest text, as it simply wasn't necessary to progress. Obstfresser, however, was encouraged to comprehend the quest text to understand how to proceed in the game, and his explanations of his in-game experiences provide further evidence to suggest that he actively paid attention to the game. Otherwise, even though both players generally enjoyed the gameplay experience and found communication in the game beneficial, neither sees this as a replacement for the traditional language class, and nor should it be treated as such – digital games of this nature are best utilized in conjunction with either a

formalized intervention to encourage discussion surrounding gameplay experiences, or an informal opportunity to speak with other players within an affinity space.

In their concluding interviews, when asked whether or not they enjoyed talking in German about their gameplay experiences, Obstfresser expressed how fun it was to do so, whereas Naturin stated that it was easy to do so, seemingly signifying again that Naturin's approach to gameplay was manipulated by his extensive prior experience, whereas Obstfresser had to genuinely learn to play the game and through this process affiliated his experiences with fun more so than a sense of ease like Naturin. This theme arose multiple times when discussing educational games and the extramural nature of language learning, to which Obstfresser consistently returned to the need to have an enjoyable experience to ensure sustained interest and a beneficial experience. Both however believed that because the language was contextualized and experienced through the act of gameplay that it was easier to discuss game-related topics than those found in a traditional language class. Obstfresser specifically indicated that the many iterations experienced in his gameplay helped to reinforce the language that he already knew, but did so in such a way that it made it more relevant and memorable.

The experiences and trajectories as depicted here provide further insight into this CAS and the SLD that emerges as a result of gameplay and communication. What is clear is that although Naturin's gameplay experiences are stronger and more substantial than Obstfresser's in every facet analyzed, Obstfresser still was more successful in his SLD as evidenced by the linguistic constructions he produced over the course of the study. This should inform us then that we cannot simply amplify the amount of time spent playing the game or being exposed to the target language and subsequently expect a certain level of linguistic development; rather, time spent effectively and finding opportunities to interact frequently both in the game and out of the game may not only make-up for a reduced playtime, but may encourage more SLD. This is certainly not to discount Naturin's experience, which evidently led to positive growth in his SLD too. Fundamentally, if a player does not want to interact with other players while playing, that is his or her prerogative. What is necessary, however, is some forum to discuss experiences, which in this case were the focus groups in the context of the study. Obstfresser's animated and

vivid retellings of his in-game experiences demonstrate his passion for the gameplay, as well as his proficiency with the associated vocabulary necessary to narrate what happened.

Föresty and Eisenbarchen – Communication Factors In- and Out-of-Game

Concentrating on the third pair of participants, Föresty and Eisenbarchen exhibit remarkably similar comparable development over the course of the study. The learner-related and gameplay-related results are themselves only moderately correlated ($r = 0.561, n = 13, p = 0.05$); ($r = 0.5221, n = 8, p = 0.184$), yet as can be seen, the correlated difference between the results of the two players remains relatively similar. This prompts discussion then concerning why their trajectories were so closely intertwined throughout this diverse, nonlinear experience. As will be seen, communication factors in- and out-of-game played a significant role in determining how effective the DGBLL experience was for each learner.

The learner-related results from the background information questionnaire begin to explain how these trajectories remained as similar to one another as they did, and what this implies then for their respective SLD. Their rationale for studying German is somewhat similar - both participants had studied German to complete a minor at university, but whereas Föresty sees its relevance also for his career path, Eisenbarchen studies it out of pure interest. The initial conditions of the CAS begin to diversify as we examine their experience learning language. Föresty has more experience actually learning the language, spending more than four months in Germany and having studied it for his minor, whereas Eisenbarchen had spent less than four months abroad in Germany, while too studying the language for his minor and also attending a language institute. What separates the two, however, are current opportunities for interaction in the foreign language. Eisenbarchen uses German more regularly than Föresty, speaking colloquially with both friends in Germany and locally, and having regular classroom interaction in the foreign language. Föresty, having already completed his minor, may be more proficient in the language and have more experience learning it, yet now uses it very infrequently and has no external connection to the foreign language, which speaks to his rationale to participate in the study.

Gaming proficiency also is a point of differentiation between these two. Although both participants play games (digital and physical), Föresty claims to play them more often than Eisenbarchen, citing moderate play to Eisenbarchen's admittedly infrequent play. More importantly, perhaps, is Föresty's experience playing online games (but not *World of Warcraft*), whereas Eisenbarchen claims to having no prior experience. Nonetheless, Eisenbarchen remains convinced of the potential games have for SLD, listing positive previous experience. Föresty is also optimistic, but does not have the same prior experience that Eisenbarchen boasts. He does, however, see potential in the online community and the implicit and passive language learning that could occur. Their computer proficiency results, while not identical, are very similar, with each being competent users of computers who have tried language learning applications before.

To this end, we turn to the linguistic constructions observed and produced by each participant throughout the gameplay experience to see evidence of SLD, as well as to determine the trajectories of linguistic growth while engaging in the CAS and which growth conditions exist (Table 30; Table 31).

Table 30

Föresty's linguistic constructions (GBC = 38; LC = 113; WP = 1822; ES = 2.36)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>abbrechen</i>	<i>Default command to cancel any action in game.</i>	abbrechen uh cancel auf englisch
<i>ablehnen</i>	<i>Found in all quest texts as a means to cancel the quest.</i>	ablehnen uh to cancel or oder stop etwas wieder glaub ich
<i>annehmen</i>	<i>Found in all quest texts as a means to accept the quest.</i>	annehmen uh ja das war auch etwas das ich im spiel gelernt habe uhm accept
<i>ausspähen</i>	Ausspähen der Tiefenschachtmine	uhm ausspähen uhm umbringen uh dorn rausschmeißen
<i>aufstehen</i>	<i>Name of ability in game.</i>	uh ja ich hab uh ein paar wörter gelernt uhm aufstehen
<i>Ausdauer</i>	Erhaltener Gegenstand: Rolle der Ausdauer .	<i>Vocabulary test</i>
<i>Axt</i>	Ihr erhaltet Beute: Abspalter axt des Wolfs.	in dem spiel uh gibt es uh starker männer aber es gibt auch uh starke frauen die männer mit ein uhm axt töten kann
<i>Bergbauer</i>	Ihr habt eine neue Fähigkeit erlernt: Bergbau .	uh und auch uh bergbauer
<i>Beute</i>	Ihr erhaltet Beute : Hasenpfote.	beute ja das unbedingt im spiel hab ich gelernt haha
<i>Beweglichkeit</i>	Ihr erhaltet Beute: Zigeunertunika der Beweglichkeit .	uh beweglichkeit uh movement or oder speed
<i>erhalten</i>	Erhaltene Erfahrung: 500.	erhalten uh get or receive
<i>erhalten</i>	Ihr erhaltet Beute: Hasenpfote.	glaub ich uhm wahrscheinlich im spiel weil ich hab schon viele sache erhalten haha
<i>erstellen</i>	<i>Used when creating a new avatar and seen when starting the game.</i>	ich könnte erstellen oder abbrechen das ich könnte das uhm uh figure out
<i>heilen</i>	Ihr Ziel ist es nicht, das Brachland zu heilen , sondern es zu beherrschen.	uh ja das macht mir ganz spaß uh ich könnte allein überall herumlaufen und uh meine charakter hmm heilen
<i>ihr habt eine neue Fähigkeit gelernt</i>	Ihr habt eine neue Fähigkeit gelernt : Erste Hilfe.	<i>Vocabulary test</i>
<i>ihr müsst euch näher an</i>	<i>Pop-up message signifying the player is too far away from his or her goal.</i>	<i>Vocabulary test</i>

<i>diesem Ziel befinden</i>		
<i>Kette</i>	Erhaltener Gegenstand: Sturmwind ketten panzerhandschuhe.	uh ja ich hab haha leider hab ich uh stoff uh genommen und mein charakter benutzt nur uh kette und leder
<i>Leder</i>	Quest angenommen: Rüstung aus Tuch und aus Leder .	uh ja ich hab haha leider hab ich uh stoff uh genommen und mein charakter benutzt nur uh kette und leder
<i>Paladin</i>	Es scheint sich um einen versiegelten Brief mit den Insignien von Bruder Sammuell, unserem örtlichen Paladin lehrer, zu handeln.	ja ich spiele nur mein uh paladin
<i>plündern</i>	Hab viel zu lang daran gearbeitet, um zuzusehen, wie das verdammte Ding von plündernden Orcungeheuern zerstört wird!	<i>Vocabulary test</i>
<i>rausschmeißen</i>	<i>Name of ability in game.</i>	so das war für mich interessant uhm rausschmeißen
<i>Reittier</i>	Ihr habt das Reittier Kriegssross zu Eurer Sammlung hinzugefügt.	<i>Vocabulary test</i>
<i>schlingen</i>	Meldet Euch bei Leutnant Doren im Rebellenlager im Nördlichen Schlingendorntal .	uhm schlingen
<i>seid begrüßt</i>	Quest angenommen: Grenzschutz. Seid begrüßt , Foresty.	<i>Vocabulary test</i>
<i>Stoff</i>	Ihr erhaltet Beute: Leinen stoff .	uh ja ich hab haha leider hab ich uh stoff uh genommen und mein charakter benutzt nur uh kette und leder
<i>umbringen</i>	Leutnant Horatio Laine sagt: Weshalb habt Ihr die Brauenwirbels umbringen lassen?	uhm ausspähen uhm umbringen uhm dorn rausschmeißen
<i>zur Kontaktliste hinzugefügt</i>	Eisenbarchen zur Kontaktliste hinzugefügt .	<i>Vocabulary test</i>
<i>Zwerge</i>	Quest angenommen: Sturmlanzes Lieferung. Die Sturmlanzen sind ein geachteter Zwergen klan und bekannt für ihren feinen und kritischen Geschmack.	uh was war das drache zwerge

Communication factors

Iteration factors		
<i>Belohnung</i>	Kopfgeldjäger, die sich die Belohnung verdienen möchten, sollten in die Wälder reisen und die Bestie beseitigen.	<i>Vocabulary test</i>
<i>Dungeon</i>	Betretet den Dungeon "Die Todesminen" und benutzt das Räuchergefäß, um in die Vergangenheit zu blicken	und ja ich hab uh ein einmal ein durch ein dungeon gekämpft
<i>getötet</i>	Ich habe nicht gesehen, wer sie getötet hat, Kumpel, doch ich habe eine Ahnung.	danach uh müsste ich gegen den uh schwarzfeldorcchef kämpfen und wir haben diesen chef getötet
<i>kämpfen</i>	Wenn Johnny für uns kämpfen soll, müssen wir seinen wertvollsten Besitz bergen.	ich müsste uh fünf verschiedene männer retten und danach uh müsste ich gegen den uh schwarzfeldorcchef kämpfen
<i>Ruf</i>	Euer Ruf bei der Fraktion 'Sturmwind' hat sich um 275 verbessert.	<i>Vocabulary test</i>
<i>Rüstung</i>	Ihr erhaltet Beute: Flickwerk rüstung .	rüstung uh armour auf englisch und ja das hab ich in ein texte gelesen vielmal
<i>Stufe</i>	Erreicht Stufe 3, um das Siegel des Befehls zu erlernen.	und meine stufe ist uh stufe neunzehn jetzt
<i>töten</i>	Spionin des Schwarzfels sagt: Orc TÖTEN Mensch!	es gibt auch uh starke frauen die männer mit ein uhm axt töten kann
<i>Waffe</i>	Die Waffe ist fertig, aber... Gebirgsjäger Sturmlanze ist weit weg, am fernen Loch Modan.	waffe uh ja das hab ich uh auch im spiel gelernt
<i>zurückkehren</i>	Quest angenommen: Viel Ärger in Mondbruch. Ich werde bald meinen Bericht schreiben und nach Sturmwind zurückkehren .	uh zurückkehren turn back return uh und ja ich hab das auch uh im kurs gelernt

Table 31

Eisenbarchen's linguistic constructions (GBC = 39; LC = 84; WP = 2188; ES = 1.50)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>abbrechen</i>	Default command to cancel any action in game.	Vocabulary test
<i>Erfahrung</i>	Kampfworg des Schwarzfels stirbt, Ihr bekommt 51 Erfahrung . (+1 EP-Bonus durch Erholt)	und uh und ich uh uhm ich ich lerne uh ihn uhm aber uhm meine uhm erfahrung
<i>Gasthaus</i>	Jeder Abenteurer sollte ausruhen, wenn ihn die Erschöpfung überkommt - und es gibt keinen besseren Platz für Ruhe und Entspannung als das Gasthaus "Zur Höhle des Löwen"!	Vocabulary test
<i>Hexenmeisterin</i>	Wilhelm Strang sagt: Seid begrüßt, Hexenmeisterin .	uh ich habe ein uh eine mensch uh hexenmeisterin und uh eine jägerin
<i>ihr habt eine neue Fähigkeit gelernt</i>	Ihr habt eine neue Fähigkeit gelernt: Sturmangriff.	Vocabulary test
<i>Kobold</i>	Koboldtunnelgräber stirbt, Ihr bekommt 60 Erfahrung.	wolves und uh und ich hat uh spionen und spioninen kobolden getötet
<i>Krieger</i>	Es scheint sich um einen versiegelten Brief mit den Insignien von Llane, unserem örtlichen Kriegerlehrer , zu handeln.	so uh ich ich uhm ich warst uh hexenmeister und jager und krieger und paladin
<i>Kristall</i>	Kristallsee entdeckt: 65 Erfahrung erhalten.	you know ich uh get uh goldstaube uhm i uh explore tiefenschachtmine tot prinzeßin uhm find kristall
<i>Kupfer</i>	Erhalten: 50 Kupfer .	ja und spion kanale kupfer
<i>Magier</i>	Dieses Siegelzeichen wurde mir durch einen Boten überbracht und stammt von unserer Magierlehrerin Rhyanda.	magier ja
<i>Paladin</i>	Es scheint sich um einen versiegelten Brief mit den Insignien von Bruder Sammuel, unserem örtlichen Paladinlehrer , zu handeln.	uh mein mein charakter uh ist ein paladin paladin
<i>plündern</i>	Plündern in "Plündern als Gruppe" geändert.	Vocabulary test

<i>Schmied</i>	Er ist direkt bei der Schmiede ; bringt ihm meine Notiz und nehmt dann einen Greifen nach Sturmwind.	und schmied you know haha
<i>Spion</i>	Im Wald nordwestlich sind Spione der Schwarzfelsorcs.	ja und spion kanale kupfer
<i>tief</i>	Quest angenommen: Die Tiefenschachtmine .	ich ich weiß tief
<i>Wache</i>	Quest angenommen: Suche nach den vermissten Wachen .	<i>Vocabulary test</i>

Communication factors

<i>Gilde</i>	Mogusha-Un'Goro schreit: SUCHE GILDE!!!!!!!!!!!!	ja ja ja ein ein pandarin wollte uh ein gilde machen
<i>Jägerin</i>	Ilthalaine sagt: Es tut mir leid, Jägerin . Keine der neuen Rekruten sind bereit. Sie müssen noch viel lernen.	uh ich habe ein uh eine mensch uh hexenmeisterin und uh eine jägerin
<i>questen</i>	Philbanks: die gilde alway ultra sucht noch member aller klasse und aller level sind ne halbe alte stammgrp aber auch für innis dailys und questen	und uh in in world of warcraft uh viel quests questen uh sagt toten dies toten das
<i>Rüstung</i>	Lichtpala-Garrosh sagt: ich kampf mit faust und ohne rüstung	<i>Vocabulary test</i>
<i>Schild unterschreib</i>	Littlepalaa-Un'Goro sagt: ohne schild Yttitti sagt: kannst du unterschreiben	<i>Vocabulary test</i> uhm ich sag unterschreib und ich sag uhm ich uh ich weiß nicht und und und ich sag ich sag ihr ihr uhm ich gebe dich geld
<i>Waffe</i>	Lichtpala-Garrosh sagt: mit waffe	<i>Vocabulary test</i>

Iteration factors

<i>Ahnung</i>	Ich habe keine Ahnung , wer es war und ich bin ganz bestimmt nicht gerne hier in diesem Loch	dungeons ja keine ahnung
<i>annehmen</i>	Nun sollte man logischerweise annehmen , dass da auch einige Troggartefakte aus dem Boden ragen! Leider scheinen Troggplünderer die meisten Artefakte bereits aufgesammelt zu haben.	<i>Vocabulary test</i>
<i>bisschen</i>	Vorsteherin Raelen sagt: Noch haben wir Tageslicht, also seht zu, dass Eure Axt noch ein bisschen Holz hackt!	und uh und so ich uh ich denn uh denn ich versteh uh ein bisschen und uh ich uh ich uh versuch uh die quest machen
<i>Dungeons</i>	Schwierigkeitsgrad des Dungeons wurde auf 'Normal' gesetzt.	dungeons ja keine ahnung

<i>Eisen getötet</i>	Erzá-Gilneas erschafft Eisen barren. Kurtok ist für den vor Kurzem erfolgten Einmarsch verantwortlich und muss getötet werden, wenn wir Frieden im Tal haben wollen.	und und eisen wolves und uh und ich hat uh spionen und spioninen kobolden getötet
<i>Hasen</i>	Ihr erhaltet Beute: Hasen pfotex2.	haha und uh wenn uh wenn ich uh erst spiel spiele uh ich uh ich hat un einen hasen getötet the uh wann ich uh wann die monat of the registration key
<i>Monat</i>	Wir hatten genug Munition, um den Bürgerkrieg einen weiteren Monat fortführen zu können.	
<i>Mond</i>	Elfeangelina scheint nach dem Genuss von Mondschein etwas beschwipst zu sein.	ich hatte uh einkauft uh rockets from uh whats the people theyre called moon mond something mondmensch err uh
<i>niedrig</i>	Unser Biervorrat hier in Ambossar ist bedenklich niedrig .	haha uhm in uhm mit die stufe uhm zehn oder niedrig uh or niedrig
<i>Prinzessin</i>	Prinzessin stirbt, Ihr bekommt 88 Erfahrung.	i uh explore tiefenschachtmine tot prinzessin uhm find kristall
<i>Quest</i>	Quest angenommen: Schlagt sie zurück!	und uh wann uh wann ich habe uh ein quest
<i>Quests</i>	Eisenbarcghen hat den Erfolg "50 Quests abgeschlossen" errungen!	und uh in in world of warcraft uh viel quests questen uh sagt toten dies toten das
<i>reise</i>	Wenn Ihr ohnehin vorhabt, nordwärts zu reisen , könntet Ihr ihm dieses Päckchen überbringen?	wenn ich uh ich uh reise die und ah und ich uh gucks gucks ich sehe uhm neue neue dinge
<i>Stufe</i>	Eisenbarchen hat den Erfolg " Stufe 10" errungen!	und uh ich uh habe uh ach achte stufe
<i>Verkäuferin</i>	Für eine kleine Spende könnt Ihr bei unserem Verkäufer farbenfrohe Raketen erwerben.	<i>Vocabulary test</i>

Gameplay factors, once again, prominently influence these two participants' SLD, with the majority of Föresty and Eisenbarchen's developed linguistic constructions being the result of gameplay experiences. With neither participant having prior experience playing *World of Warcraft* nor possessing a high level of German proficiency, it is understandable that gameplay would play such a large role for these two individuals. Factors related to iteration while playing the game have a relatively reduced role for these participants in comparison to these gameplay-

related factors examined, which again is likely attributed to both player's relative lack of experience with online games in general; although many linguistic constructions are observed through multiple iterations in the CAS, the novelty of the experience means that they are likely a result of gameplay factors.

Of specific interest for these two individuals, however, is the role that communication plays in facilitating DGBLL. This communication does not necessarily occur only within the confines of the digital game, but also in the out-of-game focus groups as a means of discussing in-game experiences. Föresty exhibits a thorough understanding of the game and a keen ability to discuss his experiences when communicating in non-gaming contexts. He utilizes many linguistic constructions that he claims to have developed while playing the game, employing them in abstract ways to demonstrate not only his knowledge of the construction, but his ability to apply it as well. As he relates his initial experiences when first playing the game, he mentions confrontations which occurred while playing with other players over game mechanics, stating that:

leider hab ich uh stoff uh genommen und mein charakter benutzt nur uh kette und leder... also ich müsste den stoff uh zurückgeben

Föresty does a number of things in this short interaction. While playing the game, he is forced through his mistake to understand the difference between the various types of equipment that can be used (*Stoff, Leder, and Kette*), realizing that his choice of character can only use chain and leather armour. This is a simple aspect of his learning to play development that subsequently impacts his SLD as well – understanding the game mechanics of how equipment functions through these various iterations reinforces the linguistic constructions as well. His use of these words in the out-of-game context as he narrates his experience is evidence of his development of these abstract constructions, which is further compounded by the amount of exposure he has to them while playing *World of Warcraft*.

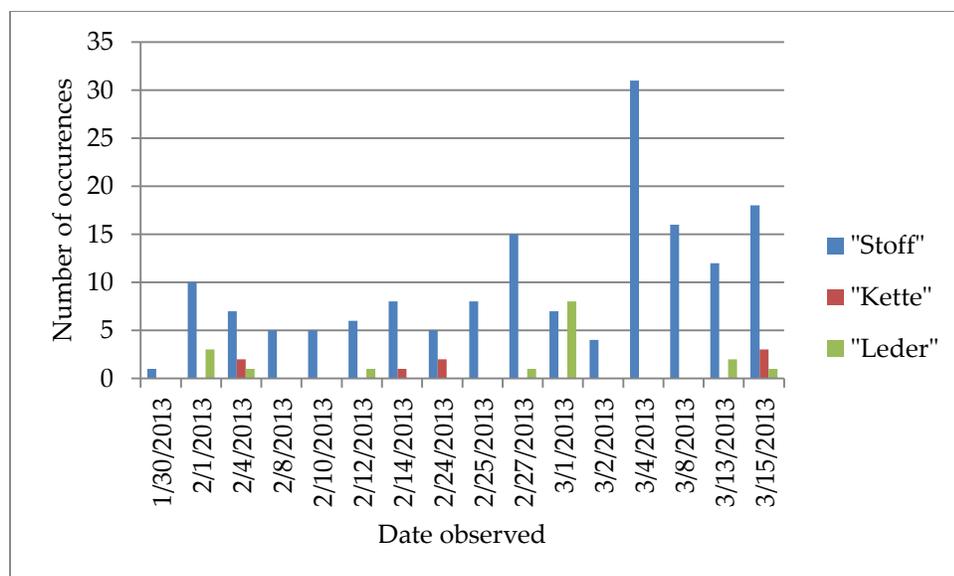


Figure 27. Development of constructions "Stoff", "Kette", and "Leder"

As can be seen, *Stoff* is overwhelmingly prevalent in the CAS, with upwards of 31 encounters throughout a single day of gameplay, and its emergence in these multiple iterations as he plays the game assists in the refined development of the linguistic construction. Although *Kette* and *Leder* are not as prevalent, their association as other types of armour is by extension reinforced as Föresty is so pervasively exposed to the construction *Stoff*. There remain other numerous items that can only be classified as fixed constructions due to his use of them when completing the vocabulary test, such as *rausschmeißen*, *Zwerge*, and *ausspähen*, all of which are self-proclaimed examples of growth and SLD, but are not used in a context which can demonstrate appropriate usage.

As evidenced in Föresty's list of linguistic constructions (Table 30), no aspect of his SLD can be directly attributed to communication factors, but this does not imply that he did not engage in communication, rather he did so in a limited manner and his interactions do not include linguistic constructions that can be associated with items outside of the 1k frequency list. Certainly his out-of-game conversations were crucial not only for his own SLD, but also for others', as his use of the construction *umgebracht* evoked Baerenjaeger's curiosity in a focus group as Föresty described an in-game experience:

*ich war in daihain und habe eine große questkette uh begonnen und uh ich müsste uh fünf verschiedene männer retten und danach uh müsste ich gegen den uh schwarzfeldorcchef kämpfen und wir haben diesen chef getötet und danach gab es eine große drache das wir uh töten müssen und uh leider hatte diese drache meine ganze team uh **umgebracht***

The narrative ability of Föresty to describe his in-game experience proved to be useful not only for his own recollection and ability to use the construction in an abstract manner, but also to assist other players in their own linguistic development and growth – Baerenjaeger attributes his learning of *umgebracht* directly to his discussion with Föresty. Communication in-game therefore can certainly be beneficial, but what proves to be fundamentally important is the opportunity to engage in meaningful conversation about the game, regardless of the context.

Eisenbarchen participates in meaningful discussion both in-game and out-of-game, and due to his proficiency in the L2, we can likely attribute more SLD to his interaction and conversations in the in-game environment. Specifically, one choice encounter can be attributed to the majority of SLD that occurs for Eisenbarchen. Similar to the experience detailed in Thorne (2008a), Eisenbarchen happens to meet another player at random and strike up a conversation. The discussion that emerges produces ample opportunity for contextualized language production and observation in real-time; the player does not have the affordance of reading the text at his leisure and looking up words in a dictionary.

The other player, Lichtpala, requests a duel with Eisenbarchen, which allows two players to fight one another in-game. Due to Eisenbarchen having never participated in one before, he is put at an immediate disadvantage, being unable to understand completely what the other player is requesting or know how to engage in a duel. The conversation is dominated by the other player as a result, but he uses very simplistic language after Eisenbarchen explains “*ich soll mehr lernen*”, at which point Lichtpala asks Eisenbarchen to follow him and a tutorial led by the other player begins. Throughout his instructions, he explains how to duel, stating that he will “*kampfe ohne Schild*” and “*ohne Rüstung*” (fight without a shield or armour), as to provide an advantage to Eisenbarchen. As Betz and Huth explain, “as students encounter people, texts, or particular social, political, or historical discourses through languages other than

their first, they are bound to process information from within and across the conceptual boundaries drawn up by the specific languages involved” (2014, p. 142). Eisenbarchen must work diligently to consider the many elements of the conversation that go beyond simple aspects of language, in the same vein as in Thorne’s (2008b) study. The subsequent interactions continue at length as the dueling request are largely initiated by the other player, and although Eisenbarchen is clearly overwhelmed at the combination of pace and lack of game knowledge, this interaction proves to be memorable as he recalls and lists these fixed constructions in the final focus group, long after they were the focus of this conversation.

Eisenbarchen relies primarily on these fixed constructions as evidence of his SLD. He mentions a variety of items that are integral to the gameplay experience, such as *Kupfer*, *Spion*, *Wache*, and *Schmied*. Each linguistic construction plays a significant role in the context of the game – copper (*Kupfer*) is a main ingredient needed to craft equipment with a blacksmith (*Schmied*), so any player investing time in the crafting component of the game encounters these constructions frequently. A spy (*Spion*) is a common enemy in early portions of the game, and each major city has guards (*Wache*) which patrol the city and keep the player safe. Eisenbarchen’s ability to recall these items and list them as newly learnt constructions further demonstrate the implicit SLD growth that occurs through simple gameplay; although Eisenbarchen himself is not actively producing these words, he understands them as fixed constructions and can associate them at least on a visual level in the context of the game.

The pertinence of these linguistic constructions is best realized through a visual depiction of their prominence when encountered while playing the game (Figure 28).

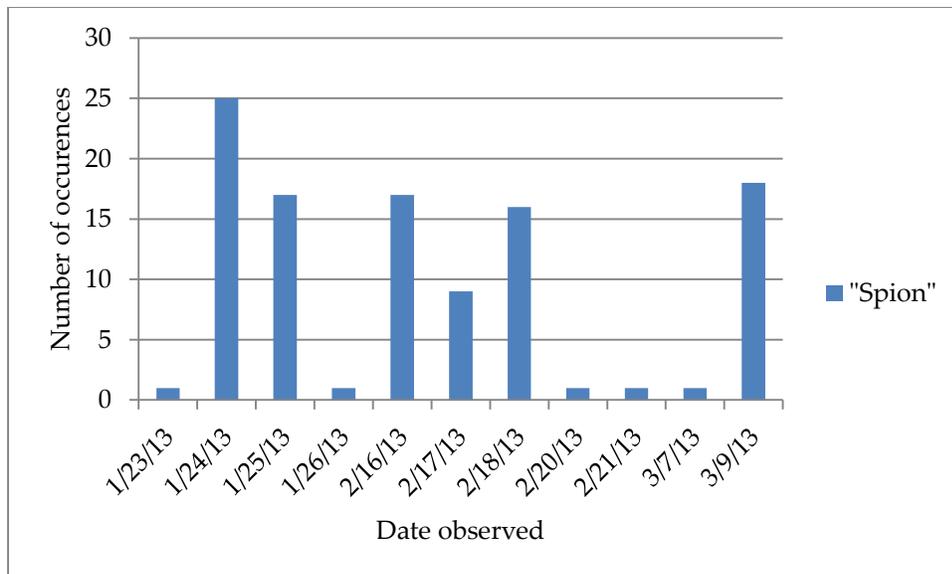


Figure 28. Development of construction "Spion"

As can be seen, Eisenbarchen is consistently exposed to the construction *Spion* throughout his time playing the game. In the first few days of gameplay, he had already observed it 43 different times and in various contexts, such as in the description of a quest that Eisenbarchen was asked to complete:

*Quest angenommen: Worgs im Schafspelz. Die einfallenden Orcs sind keine Narren. Sie schätzen uns ab, stellen sicher, dass ihre Angriffe zu ihrem Vorteil sein werden. Im Wald nordwestlich sind **Spione** der Schwarzfelsorcs. Sie spähen uns durch Handfernrohre aus, überwachen jeden unserer Schritte - und warten. Ich will, dass Ihr sie angreift! Tötet die **Spione** der Schwarzfelsorcs! Wir müssen ihnen zeigen, dass wir wissen, dass sie uns beobachten und dass wir vorbereitet sind! Tötet 8 Spione des Schwarzfels.*

Once completing the quest, feedback is provided after each successful step of the task in pithy messages:

***Spion** des Schwarzfels stirbt, Ihr bekommt 30 Erfahrung.*

As well, the spies themselves interact with the player as he completes the quest:

***Spion** des Schwarzfels sagt: Die Trauben waren SEHR LECKER!*

These various iterations of language exposure and use help to make such an item memorable based upon Eisenbarchen's chosen play-style. Föresty, in comparison, only observes the linguistic construction 13 times, compared to Eisenbarchen's 107 occurrences in total. Due to the frequency of the construction, as well as its repeated emergence in gameplay throughout the entirety of the study, it is safe to conclude that although he only recognizes it as a fixed construction, it is nonetheless evidence of SLD.

Returning to the efficacy scores initially presented, there is a large discrepancy between the two. Föresty's score of 2.36 is strongest of all participants who completed the study, including those not focused on amongst these eight analyses. He is not a prolific speaker in conversations either within or external to the game, but when he does participate, he shares thoughts and experiences directly tied to his gameplay and makes associations that demonstrate a keen understanding of the game. Eisenbarchen's score of 1.50 is lower, evidence of his eagerness to speak German but having a lower proficiency, meaning that much of the language that he produces falls within the 1k frequency list (indeed, his 84 items outside of the 1k frequency list are second lowest amongst participants). He nonetheless still benefits from gameplay, and in his concluding interview he strongly agrees that he learnt new vocabulary playing the game and would be interested in playing the game again in the future.

By now tracing back the gameplay trajectories of Föresty and Eisenbarchen, we attempt to determine how these experiences in-game may have influenced these efficacy scores and the general SLD that occurs.

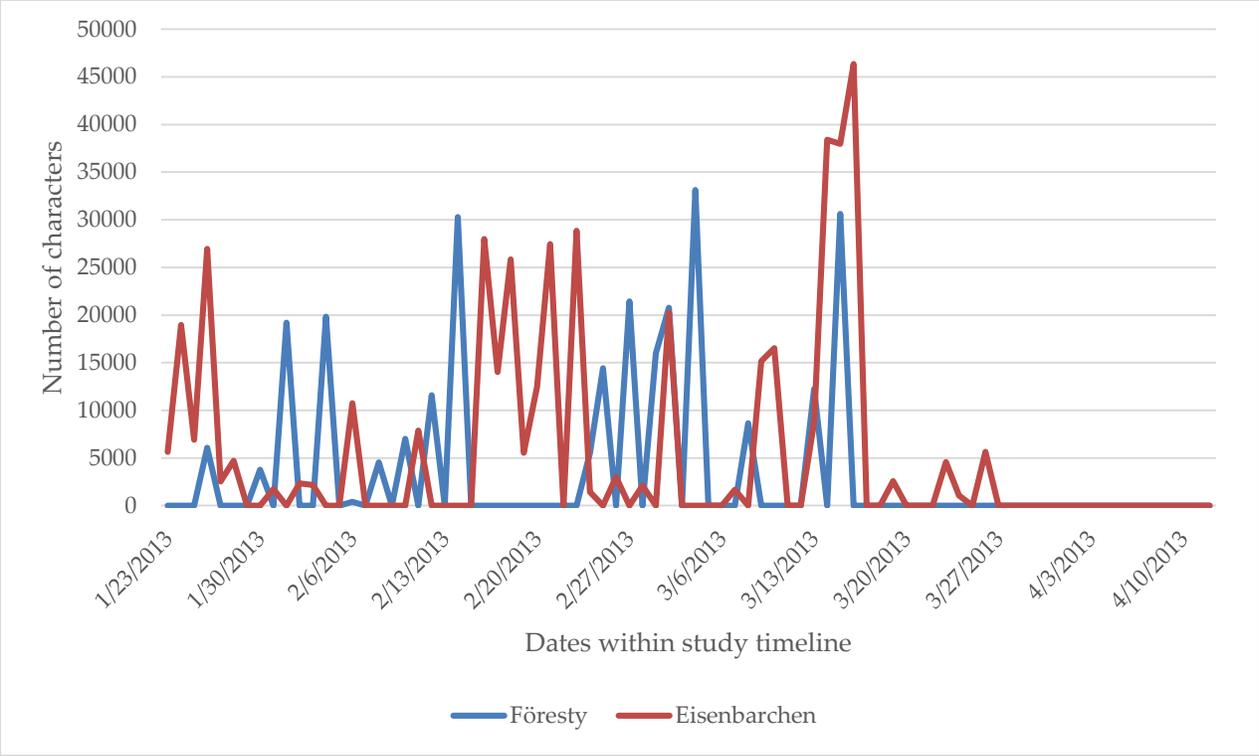


Figure 29. Chronological language exposure (Föresty and Eisenbarchen)

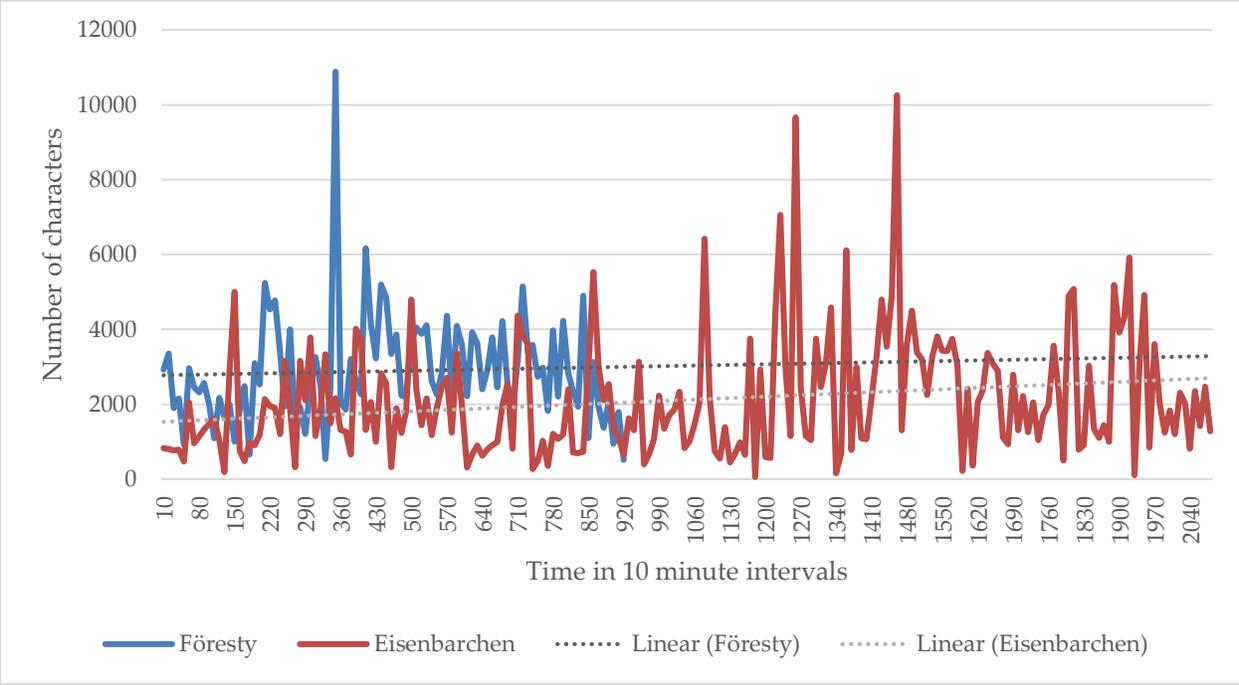


Figure 30. Exposure to language over 10 minute intervals (Föresty and Eisenbarchen)

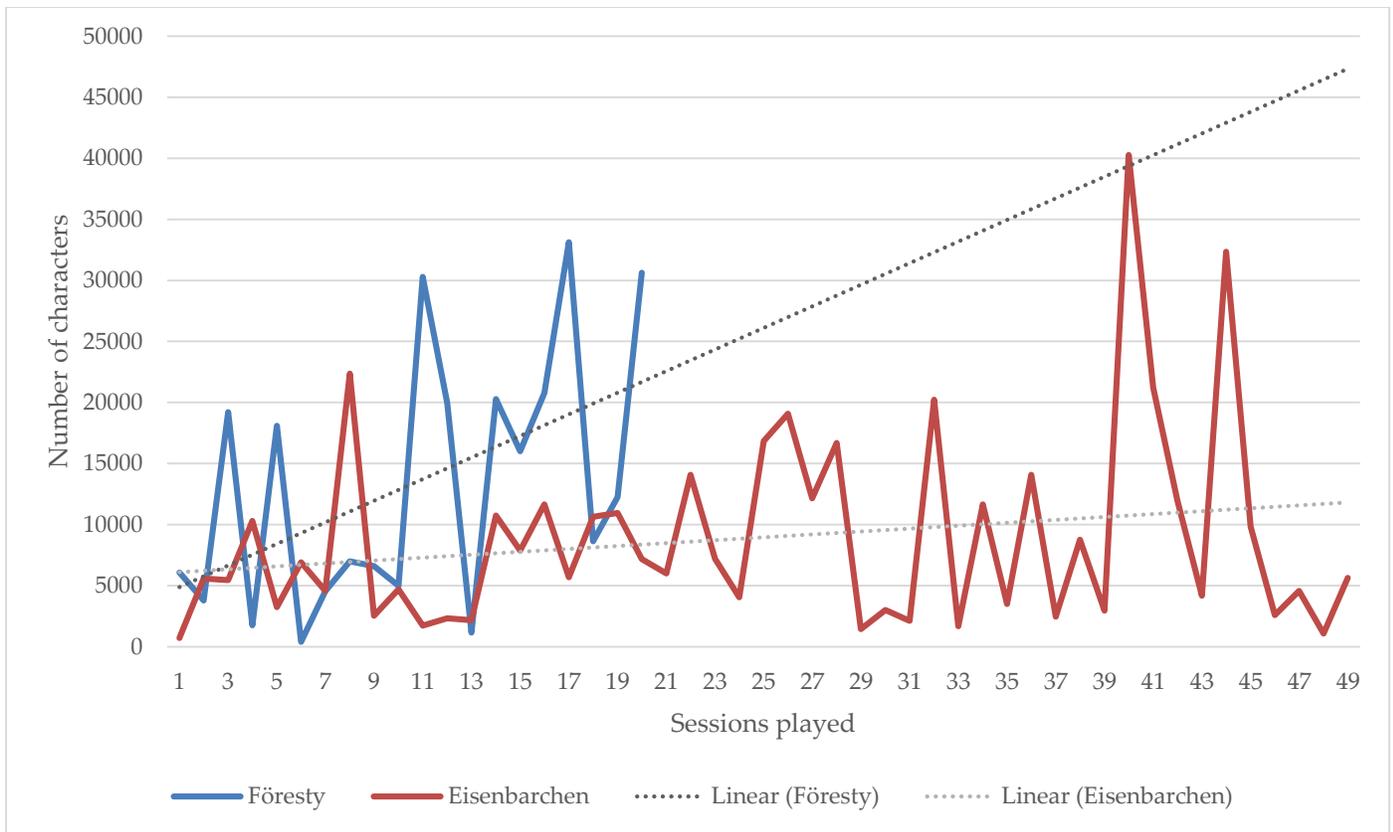


Figure 31. Exposure to language per session played (Föresty and Eisenbarchen)

Of the eight participants being analyzed as part of this chapter, this pairing played the game more often than any other (Figure 29). Interestingly, neither reaches the same level of exposure to characters in-game as the previous participants do, but their more frequent play times can prove effective as well. Eisenbarchen is the most frequent player, and exhibits some interesting spikes in his gameplay habits, the first of which occurs after the participants were given access to the whole game which in turn removed some of the communication restrictions that initially existed. As a result, Eisenbarchen is able to communicate with more players and this proves to provide an initial incentivization to play more on these dates. Föresty too plays on an impressive number of days; although he does not encounter as much language as his fellow participants do, his frequent interaction in the game proves to be an effective way to develop second language proficiency as well. Compared to Srfroggy and Obstfresser, whose efficacy scores of 2.35 and 2.05 respectively are the second and third highest of all participants, Föresty’s play style is drastically different, favouring frequent yet short playtimes. Although

varied approaches can encourage development, the more frequent approach to gameplay may be more effective for players of lower proficiency levels as iterations will naturally increase as well.

Föresty has much less exposure to language over the course of the study period when we observe their gameplay trajectories every in 10 minute intervals, and in comparison to Eisenbarchen, his average trajectory does not project as much growth as Eisenbarchen's does (Figure 30). Although there is evident complexity in each individual's trajectory of gameplay, Eisenbarchen's is most interesting as he plays more than any of the other seven participants, and as can be observed above, there is a clear trajectory of growth over the course of his playtime, reinforcing the learning to play paradigm.

The final perspective, looking at each player's gameplay on a session-per-session basis, portrays yet another aspect of their gaming trajectories that invites exploration (Figure 31). Föresty's average trajectory is misleading, as it is highly unlikely to continue to improve at such a pace, but it does depict a player who is increasingly becoming more comfortable playing the game and being exposed to the German language in this extramural setting. Again, these players had no instructional support to guide them in their play experiences; the only guidance or advice was provided by the game or their fellow players (both study participants and regular players of the game). And yet even without this formal level of support, Föresty was able to play and advance in the game very competently, affording additional opportunities to see more sophisticated language used (both by players and in quests). Eisenbarchen exhibits a similar growth, albeit not as substantially as Föresty. This is to some extent due to Eisenbarchen's game sessions being shorter on average than Föresty's, but also potentially a longer period of time needed to become fully accustomed to the game. Eisenbarchen, unlike the majority of other participants, could not decide on a single avatar to represent him and changed the character he played repeatedly. Having to start fresh each time and explore a new environment meant that he could not see steady progress to the extent that someone like Föresty was able to. While this did not inhibit his SLD (as can be seen starting at the 40th session played, he had a couple of

sessions with ample exposure to the L2), he did forfeit opportunities to interact in groups with other players by not reaching requisite levels which in turn make these options available.

These in-game experiences are largely reiterated in the self-reported responses derived from the concluding interview questionnaire (Table 32). Eisenbarchen, although playing as much and as often as he did, never fully embraced the gameplay experience and as a result, this affected his SLD opportunities. He largely found the game complicated to play and confusing to follow, whereas Föresty was able to play the game with relative ease, finding the quest and chat system easy to understand. Eisenbarchen, although actively trying to comprehend the quest texts, found little additional assistance outside of this source of language exposure, as other players were deemed to be of little help. The most striking difference between the two may be in their responses to whether or not they could express their opinions more freely than in a regular class and if the game encouraged them to use German more than in a regular classroom. Föresty generally agrees, and as was observed in his interactions in the focus groups, he easily expressed himself and gave detailed accounts of his in-game experiences. Eisenbarchen, although generally out-spoken in the focus groups, was not an active participant in his in-game interaction, even though he was certainly engaged in interesting discussions with other players. Nonetheless, Eisenbarchen and Föresty alike claim that they were able to learn new vocabulary while playing the game, but in the majority of other questions that were asked, Föresty routinely reflects more positively on his experiences than Eisenbarchen.

Table 32

Concluding Interview Questionnaire (Föresty and Eisenbarchen)

Question (Strongly Agree = 5, Strongly Disagree = 1)	Föresty	Eisenbarchen
1. The game was easy to play.	3	2
2. The chat system was easy to use	5	3
3. It was difficult to follow the quests/communication from other players	2	4
4. The quests were too difficult.	1	2
5. I actively tried to comprehend the text of the quests.	5	4
6. I experienced technical communication problems in the game.	4	1
7. There was not much feedback from other players.	2	3
8. Other players were helpful.	4	2
9. I could express my opinion more freely than in a regular class.	4	1
10. Having my own avatar made me feel more involved in the game.	4	4
11. Most of the discussion was not useful.	2	2
12. I could learn new vocabulary.	5	5
13. The game made me use my German more than in a regular class.	4	3
14. I enjoyed interacting in the game.	5	4
15. Chatting in the game was a good way to improve my German.	4	3
16. I would like to play the game again in the future.	5	4

When asked in the concluding interview about how they felt being encouraged to speak about their gameplay experiences in German, Föresty explained that he found it to be a relaxed atmosphere with less pressure than a traditional language-learning context due to the experiences being discussed easily relatable. Eisenbarchen, interestingly, perceived these experiences as being more anxiety-inducing, explaining that he felt it was good to be exposed to what others were experiencing in the game and being forced to say something to them. However, Eisenbarchen is encouraged by the ability of the game to provide an immersive experience that is otherwise difficult to attain unless the learner has a local German connection or is in the country itself. Both participants spoke to the repetition of certain key linguistic

constructions throughout the game as being incredibly helpful for their own SLD, which is seen in the number of linguistic constructions which are associated with iteration in the game.

With yet another pair of language learners playing World of Warcraft with very different results, we continue to see the means by which individuals interact in this CAS. Like Naturin and Obstfresser, an increased amount of time playing the game does not necessarily result in more beneficial experiences for SLD. Eisenbarchen's wealth of playtime still results in SLD, yet based upon efficacy scores and self-reported results, it is evidently not as efficient as Förresty's. Communication in the game, while certainly useful, also does not seem to unequivocally result in more SLD, but impromptu conversations with native speakers may prove to be memorable enough to help spur SLD as was the case in Eisenbarchen's interactions.

Kyrii and Trolinda – Gameplay factors and language learning experience

The final pair to be analyzed is unique in that of the 14 participants who completed the study in its entirety, only two were female, and for this reason, it is useful to analyze these two in relation to one another and to the other three pairs of participants to see how their trajectories of gameplay and SLD compare. I elect to concentrate on the role that gameplay factors and second language proficiency have on these two participants as they are most salient aspects influencing their trajectories in the CAS.

Like the second pair, Naturin and Obstfresser, Kyrii and Trolinda have rather different background information questionnaire results. Neither Kyrii nor Trolinda provide strong reasons for choosing to study German: Kyrii plans to eventually study abroad, whereas Trolinda is currently pursuing learning German out of self-interest. Kyrii does not have much experience learning German, having spent less than four months in Germany and engaging in some tutoring, whereas Trolinda had spent part of her childhood in Germany. Currently, however, Trolinda rarely finds opportunities to use the language, stating that although she does still have friends locally and in Germany who speak German, she rarely speaks with them in

German. Kyrii claims to use her German regularly for leisure, such as writing and reading, but has no external connection to the language beyond the irregular tutoring she participates in.

In terms of their gaming and computer proficiencies, they once again vary drastically. Kyrii proves to be quite competent in both areas, with ample experience playing many types of games and utilizing the computer for a variety of diverse reasons. Her gaming proficiency is highest amongst all of the other 14 participants in the study as she cites frequent gameplay and even experience playing other online games as contributing to her high level of gameplay proficiency. Her computer use encompasses programming, gaming, social media, and school use, but she has never utilized any form of language learning software or media before.

Trolinda is in many ways the complete opposite of Kyrii, and exhibits some of the lowest scores of all participants in both categories. She rarely plays games, let alone online games of any sort, but does see the potential for playing games for SLD purposes. Her self-proclaimed computer skills are equally lacklustre, but she has had prior experience utilizing mobile apps and other digital media for language learning purposes, which may explain her optimism concerning DGBLL, as well as her rationale for participating in the study.

The two final lists of linguistic constructions developed by these two learners will provide further insight into how *World of Warcraft* may facilitate SLD (Table 33; Table 34).

Table 33

Kyrii's linguistic constructions (GBC = 37; LC = 72; WP = 1688; ES = 1.58)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>abbrechen</i>	Default command to cancel any action in game.	Vocabulary Test
<i>abgeschlossen</i>	Ihr habt überlebt! abgeschlossen .	Vocabulary Test
<i>ablehnen</i>	Found in all quest texts as a means to cancel the quest.	Vocabulary Test
<i>annehmen</i>	Damit Ihr Euch der Sache annehmen könnt, müsst Ihr zuerst Hilfe von den Toten aus Auberdine bekommen.	Vocabulary Test
<i>Belohnung</i>	Seen after completing a quest to indicate the reward.	Vocabulary Test
<i>entdeckt</i>	Am'menfluss entdeckt : 45 Erfahrung erhalten.	Vocabulary Test
<i>Erfahrung</i>	Erhaltene Erfahrung : 40.	Vocabulary Test
<i>Fass</i>	Ihr habt einen neuen Zauber erlernt: Fass!	like uh fass was ist fass
<i>Haustiere</i>	Collectable animals in game that the player sees in his or her main game menu.	und uh ich habe ein lets see reit heißen or no haustiere und uh eine reittier
<i>ihr müsst euch näher an diesem Ziel befinden</i>	Pop-up message signifying the player is too far away from his or her goal.	Vocabulary Test
<i>Jäger</i>	Auf Draenor würden unsere besten Jäger Tiere jagen, die den Mondweidenhirschen dieser Gegend sehr ähneln und den Namen Talbuk tragen.	uh die klasse ist uhm jäger
<i>jetzt</i>	Jetzt haben wir wieder genügend Heilkristalle, aber sie sind nicht der einzige Weg, wie wir den Verletzten helfen können.	uh jetzt uhm uh stufe dreizehn
<i>Kette</i>	Iszha-Area52 erschafft Kupfer ketten hose.	uh der or die kette clothing ist nicht so revealing
<i>Leder</i>	Beccac-Malygos erschafft Leichtes Leder .	Vocabulary Test
<i>Motte</i>	Man findet die Motten entlang des gesamten Tals, jedoch verstärkt im Nordwesten.	Vocabulary Test
<i>Pflanzen</i>	Zahlreiche Pflanzen und Tiere des Am'mentals sind deswegen mutiert.	Vocabulary Test

<i>plündern</i> <i>Reichweite</i>	Plündern in "Bedarf vor Gier" geändert. Goblinpilot sagt: Reichweite eingestellt.	<i>Vocabulary Test</i> und uh verglasen und uh reach reichweite uh i cant uh ich weiße nicht fu it was uh range or und uh ich habe ein lets see reit heißen or no haustiere und uh eine reittier
<i>Reittier</i>	Ihr habt das Reittier Gestreifter Frostsäbler zu Eurer Sammlung hinzugefügt.	<i>Vocabulary Test</i>
<i>Rüstung</i>	Beccac-Malygos erschafft Leichtes Rüstungsset .	<i>Vocabulary Test</i>
<i>Stoff</i> <i>Stufe</i>	Ihr erhaltet Beute: Leinen stoff . Erreicht Stufe 3, um 'Zuverlässiger Schuss' zu erlernen.	<i>Vocabulary Test</i> und uh the stufe ist uh dreizehn
<i>töten</i>	Wenn es Euch gelingen sollte, dort hinein zu gelangen und ihren Anführer zu töten , würde uns das vielleicht eine Gelegenheit zum Angriff verschaffen!	<i>Vocabulary Test</i>
<i>verkaufen</i>	Thomas Müller sagt: Frisch gebackenes Brot zu verkaufen!	uhm like uh jetzt und uh verkaufen
<i>zur</i> <i>Kontaktliste</i> <i>hinzugefügt</i> <i>zurückkehren</i>	Eisenbarchen zur Kontaktliste hinzugefügt . Malfurion Sturmgrimm schreit: Es ist vorbei, Azshara! Ihr und Eure Naga werdet auf den Boden des Meeres zurückkehren , wo Ihr hingehört!	<i>Vocabulary Test</i>

Communication factors

<i>Boss</i>	Zwielichtarbeiter sagt: Warum graben wir dieses Ding überhaupt aus, Boss?	und uh ein elite boss getötet mit kein helfen
<i>Druide</i>	Zwielichtarbeiterin sagt: Kämpft! Ich kann Eure Furcht riechen, Druide!	Druide
<i>Heiler</i> <i>Klasse</i>	Hottêd-Anetheron: bin heiler :P <i>Used in group conversations quite often to describe avatars and their chosen class.</i>	uhm uh un heiler sein und uh die klasse ist uhm jäger
<i>Tank</i>	Moónlight: DIE Gilde Himmelsstürmer sucht für ihre Gilde einen Tank und einen healer für ihre Raids.	wo ist der tank haha

Iteration factors

<i>bekommen</i>	<i>Every quest expresses its rewards to the player using bekommen</i>	<i>Vocabulary Test</i>
<i>Dungeons</i>	Schwierigkeitsgrad des Dungeons wurde auf 'Normal' gesetzt.	und uhm ich spiele die dungeons

<i>getötet</i>	Zahlreiche Furbolgs der Tannenruhfeste wurden bei der Verteidigung unseres Landes von der Bestie getötet .	uh und uh ich weiße ich weiße getötet
<i>helfen</i>	Ihr müsst uns helfen , sie zu retten, Kyrii!	und uh ein elite boss getötet mit kein helfen
<i>Quest</i>	Quest angenommen: Wiederaufladen der Heilkristalle.	und uh in einem quest ich reite ein großer luftballon
<i>reiten</i>	Ihr habt die Fertigkeit Reiten erhalten.	und uh reiten häus haustieren und uh talente

Table 34

Trolinda's linguistic constructions (GBC = 31; LC = 88; WP = 2440; ES = 1.12)

Construction	Exposure Example	Production Example
Gameplay factors		
<i>Begleiter</i>	Ihr habt einen neuen passiven Effekt erlernt: Begleiter kontrollieren.	aber ich habe einen begleiter eine hund und dieser hund hat mir geholfen
<i>besteigen</i>	<i>Command used to mount a horse.</i>	für mich neue wörter war besteigen und das würde ich jetzt wirklich uhm remember
<i>Beute</i>	Ihr erhaltet Beute : Ersatzteil.	<i>Vocabulary Test</i>
<i>Rüstung</i>	Ihr bekommt einen Gegenstand: Rüstungsgutschein der Armee von Sturmwind.	<i>Vocabulary Test</i>
Communication factors		
<i>Gnome</i>	Nevin Drallzang sagt: Wir müssen durch diese hirnlosen Lepragnome durchbrechen, wenn wir hier lebend wieder herauskommen wollen!	uh ein gnome gnomerin
<i>Jägerin</i>	Wilhelm Strang sagt: Sagt mir Bescheid, wenn ich Euch auf der Suche nach etwas behilflich sein kann, Jägerin .	uhm nu nur die jägerin oh
Iteration factors		
<i>abbrechen</i>	<i>Default command to cancel any action in game.</i>	<i>Vocabulary Test</i>
<i>abgeschlossen</i>	Eingekesselt abgeschlossen .	<i>Vocabulary Test</i>
<i>annehmen</i>	<i>Found in all quest texts as a means to accept the quest.</i>	<i>Vocabulary Test</i>
<i>Ausdauer</i>	Tullamôre-Garrosch erschafft Rolle der Ausdauer VIII.	<i>Vocabulary Test</i>
<i>Beweglichkeit</i>	<i>Common attribute found on many items.</i>	<i>Vocabulary Test</i>
<i>entdeckt</i>	Neu-Tüftlerstadt entdeckt : 70 Erfahrung erhalten.	und ja also ich mache die queste und ich habe entdeckt dass ich auch sterben kann das war haha
<i>Erfahrung</i>	Wahnsinniger Lepragnom stirbt, Ihr bekommt 40 Erfahrung .	haha okay uhm die beste erfahrung für mich war wenn ich gestorben bin haha nein nein das war
<i>erhalten</i>	Erhaltene Erfahrung: 80.	<i>Vocabulary Test</i>
<i>erstellen</i>	<i>Used when creating a new avatar and seen when starting the game.</i>	<i>Vocabulary Test</i>

<i>Gegenstände</i>	Eure angelegten Gegenstände verlieren 10% Haltbarkeit.	es gibt unterschiedliche gegenstände die uhm du sammelst aber es ist immer das gleiche
<i>ihr fühlt Euch normal</i>	<i>Often repeated when having rested in an inn while taking a break.</i>	<i>Vocabulary Test</i>
<i>ihr habt eine neue Fähigkeit gelernt</i>	Ihr habt eine neue Fähigkeit gelernt: Zuverlässiger Schuss.	<i>Vocabulary Test</i>
<i>ihr müsst euch näher an diesem Ziel befinden</i>	<i>Pop-up message signifying the player is too far away from his or her goal.</i>	<i>Vocabulary Test</i>
<i>kämpfen</i>	Wir haben noch genügend Kraft und Munition, um uns nach oben zu kämpfen , aber diese Überlebenden können nicht mithalten.	uhm auch hatte könnte ich nicht gut kämpfen
<i>plündern Quest</i>	Plündern in "Plündern als Gruppe" geändert. Quest angenommen: Eingekegelt.	<i>Vocabulary Test</i> uhm also nur nur uh das quest das war immer sehr leicht
<i>Quests</i>	Die täglichen Quests wurden zurückgesetzt!	aber ja aber vielleicht uhm wie das schade ist dass die quests immer so gleich ist
<i>Ruf</i>	Euer Ruf bei der Fraktion 'Gnomeregan' hat sich um 250 verbessert.	<i>Vocabulary Test</i>
<i>sammeln</i>	Sprecht mit den verschiedenen Obdachlosen, die auf Jansens Hof leben, um Hinweise über die Brauenwirbelmorde zu sammeln .	sind nur nur jemanden töten und etwas sammeln
<i>seid begrüßt</i>	Quest angenommen: Grenzschutz. Seid begrüßt , Trolinda.	<i>Vocabulary Test</i>
<i>Stärke Stufe</i>	Tullamôre-Garrosch erschafft Rolle der Stärke II . Ihr müsst mindestens Stufe 19 erreicht haben, um eintreten zu können.	<i>Vocabulary Test</i> und ich habe stufe vier erreicht
<i>töten</i>	Ihr müsst Euch dort hinbegeben und jeden Goblin töten , den Ihr zu Gesicht bekommt. Sie müssen kapieren, dass man sich nicht mit der Allianz anlegt!	das ist nur so so einfach nur jemanden finden und töten und das ist die ganze
<i>Waffe</i>	Solltet Ihr noch stark genug sein, um eine Waffe zu heben oder einen Zauber zu wirken, könntet Ihr uns helfen, ein paar dieser Lepragnome auszuschalten.	<i>Vocabulary Test</i>

One may initially notice the rather low efficacy scores of each participant. Although they seem low in comparison to the other participants previously analyzed, efficacy scores are themselves not a reflection of an unsuccessful gameplay experience, as will be seen in the discussion below. Rather, it is a function of their disparate gameplay experiences as influenced by the initial conditions of the CAS, which results in a unique trajectory of both gameplay and SLD.

Focusing now on the linguistic constructions influenced by gameplay-related factors, a clear disparity between the two participants exists, yet one which is relatively understandable given the initial conditions of the CAS. Kyrii begins the gameplay experience with rather low language proficiency, yet clearly wants to learn more German as is evident by the many activities she is currently engaged in learn the language. As a result, many linguistic constructions which may at first glance be associated with development outside of the game are actually the result of gameplay as Kyrii herself claims. A construction as simple as *jetzt*, meaning “now”, was observed in the game initially in the context of a quest and many times thereafter, and is then correctly utilized as an item-based construction by Kyrii in the first focus group. Then in the final focus group, she reflects on learning *jetzt* through gameplay, rather than in prior learning environments. Her experience learning German would potentially substantiate this too, as she has very little formal education aside from tutoring, and *jetzt* is used often and in many various contexts that its development is certainly supported in gameplay (Figure 32). The use of *jetzt* in these various contexts is not inventive, as can be seen below, but they nonetheless provide enough impetus for Kyrii to strive to determine what the construction means and then use it herself.

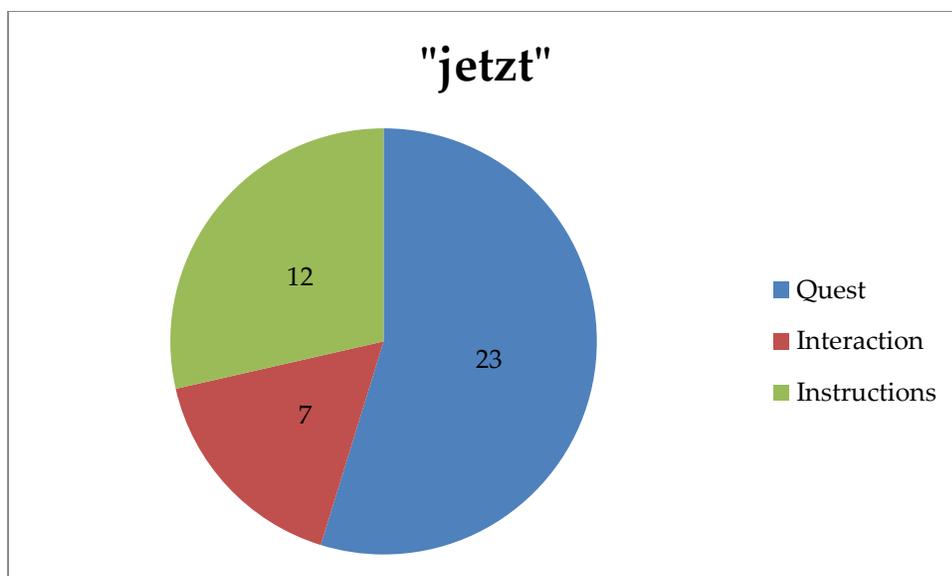


Figure 32. "jetzt" exposure in various contexts

*Quest – Quest angenommen: Eilige Lieferung! Da Ihr **jetzt** alles besorgt habt, was zum Wiederaufladen der Heilkristalle benötigt wird, müsst Ihr die Phiolen zu unserem Priester Zalduun bringen. Er kümmert sich um die Verwundeten innerhalb der zentralen Kammer des Schiffes. Bringt die Phiolensammlung zu Zalduun bei der Absturzstelle im Am'mental.*

*Interaction – Kräcka Aschebäscha sagt: Jau, Admiral. Lasst mich nachdenken... Äh... **jetzt** kommt's mir wieder.*

*Instructions – Einbuddler der Tiefentroggs wird von Blut vollgespritzt und ist **jetzt** bestrahlt!*

Kyrrii claims the development of many other fixed constructions as being the result of gameplay experiences, many of which are common amongst all participants, such as *abbrechen*, *annehmen*, and *Belohnung*. The frequency with which these are mentioned by other participants as being developed due to gameplay speaks to the relevance of the gameplay experience and the pertinence of certain constructions which are repeatedly fixated on through gameplay.

Trolinda attributes much less language development to specific gameplay factors. Only *Begleiter*, *besteigen*, *Beute* and *Rüstung* are the product of gameplay experiences, according to Trolinda, and the evidence provided by her in-game interactions. Many other linguistic constructions that are claimed by the majority of participants as being developed due to

gameplay are instead only reinforced through iteration for Trolinda, but this is perhaps to be expected due to Trolinda's experience with the German language and her childhood spent largely in Germany. She claims as well, in her concluding interview, that she often would rely solely on context when attempting to understand the content of a quest. This was evidently sufficient for her understanding the quests, but may have also discouraged her from seeking out linguistic constructions that were not as impactful as these four listed above. Participants in Sockett's (2013) study of English language learners in informal online learning contexts speak to the utility of focusing on the context of the language when unable to understand a construction within a text. Rather than reverting back to a dictionary, these students studying language didactics would attempt to determine the meaning of the word in another language, as Trolinda often did with her native language, Serbian.

The linguistic constructions which were developed as a result of gameplay are central to her experiences playing as a hunter in the game which gains control over a pet and can even mount the pet that the player has acquired. *Beute* and *Rüstung* are paramount to the game and are so unavoidable that if a player does not already understand the construction, he or she will very likely have developed it after some time playing the game. Other linguistic constructions, such as *erhalten*, which Trolinda and many others claim to have further developed due to their iteration while playing the game, are routinely fixated upon even for someone like Trolinda who has relatively lower efficacy playing the game itself. It is not merely utilized in its past participle form, but has many uses in the context of the game, such as:

Erhalten: 15 Kupfer.

Erhaltene Erfahrung: 80.

Neu-Tüftlerstadt entdeckt: 70 Erfahrung erhalten.

Erhaltener Gegenstand: Elektrostab.

Ihr erhaltet Beute: Ersatzteil.

Kyrii, having observed some form of the construction *erhalten* 364 times over the course of her gameplay experience, can likely attribute some form of development to the frequent and varying iterations experienced. The lemma *erhalten* occurs most frequently as a non-finite form, but also as conjugated verb and as a complex adjective; there is ample variability for students to reflect on. Because there is so much exposure to linguistic constructions such as this, there is ample variability as well for learners to reflect on.

Returning then to the efficacy scores produced by both players' experiences, it is arguably not surprising that Kyrii had more success in DGBLL. While initially low proficiency in the L2 may have appeared to be an impediment, in reality, it encouraged Kyrii to actively pay attention to the language as it was used in gameplay in order to progress. She cites using online translators, print dictionaries, and German wikis as resources to help her progress in the game and mediate her lower German proficiency. Her previous experience playing digital games likely contributed to her willingness to pay attention to the language employed for advancement and progression purposes as well. Trolinda may have consequently not paid as much attention due to her focus being on learning to play the game, rather than on understanding the quest texts, which clearly contained ample vocabulary that she was already familiar with. Nevertheless, iteration factors still played a prominent role for both participants, and just as likely factored into furthering SLD. Communication too, although to a lesser degree, played a role for Kyrii's DGBLL; her willingness to join groups with other players in order to accomplish the more difficult aspects of the game are noteworthy, as the emerging discussion which results from coordinating roles and theorizing strategies affords players like Kyrii additional situations in which the learner must be able to process the foreign language and understand how to appropriately and meaningfully respond or react to it.

We again turn to the various depictions of their gameplay trajectories as a means to substantiate what can be observed through the linguistic constructions developed by each participant.

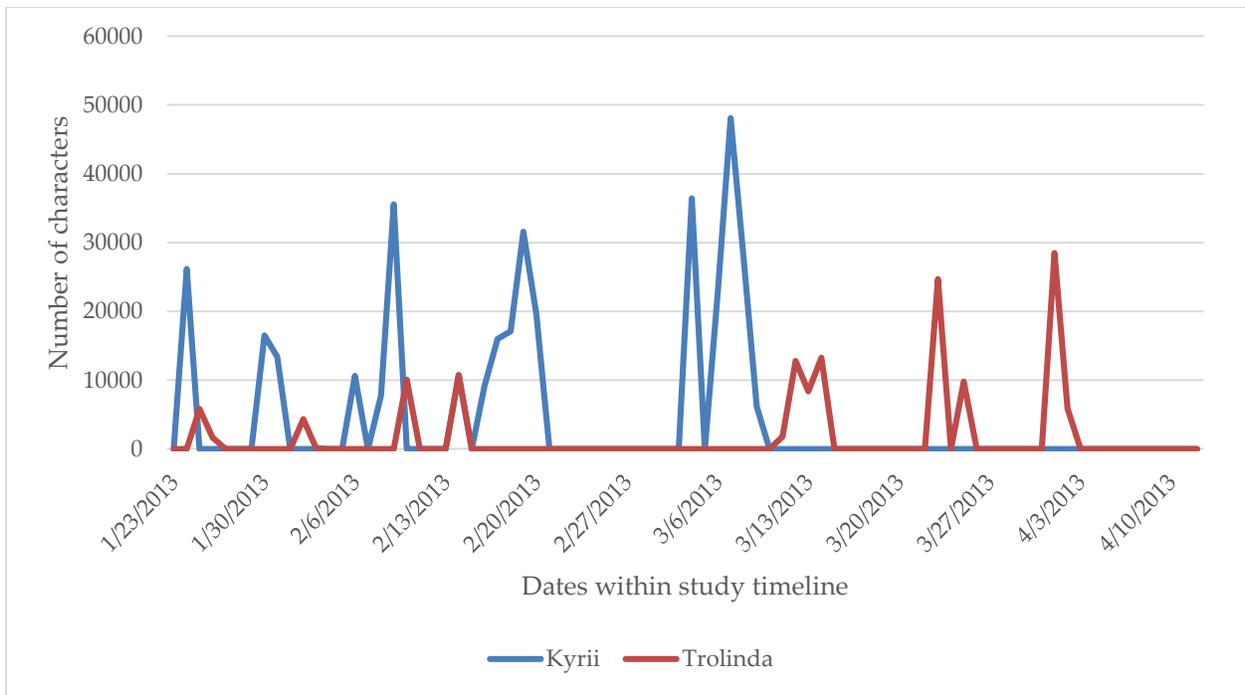


Figure 33. Chronological language exposure (Kyrii and Trolinda)

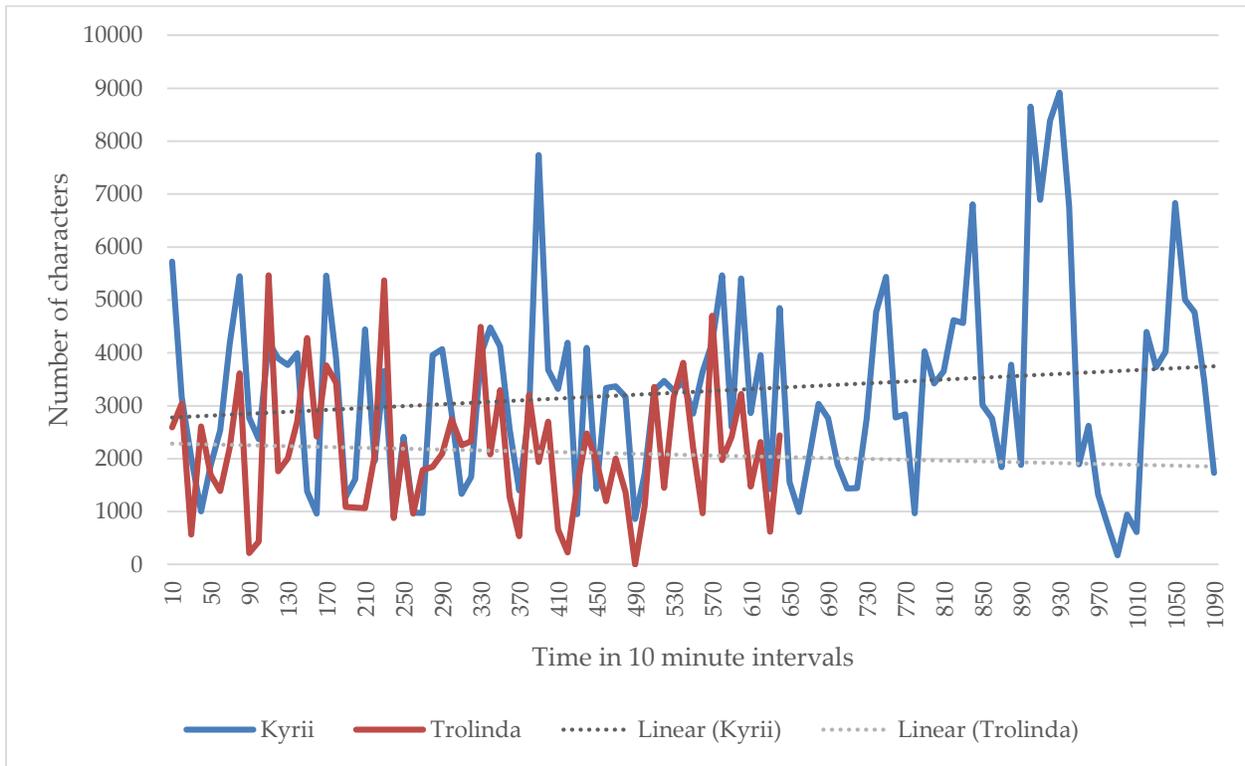


Figure 34. Exposure to language over 10 minute intervals (Kyrii and Trolinda)

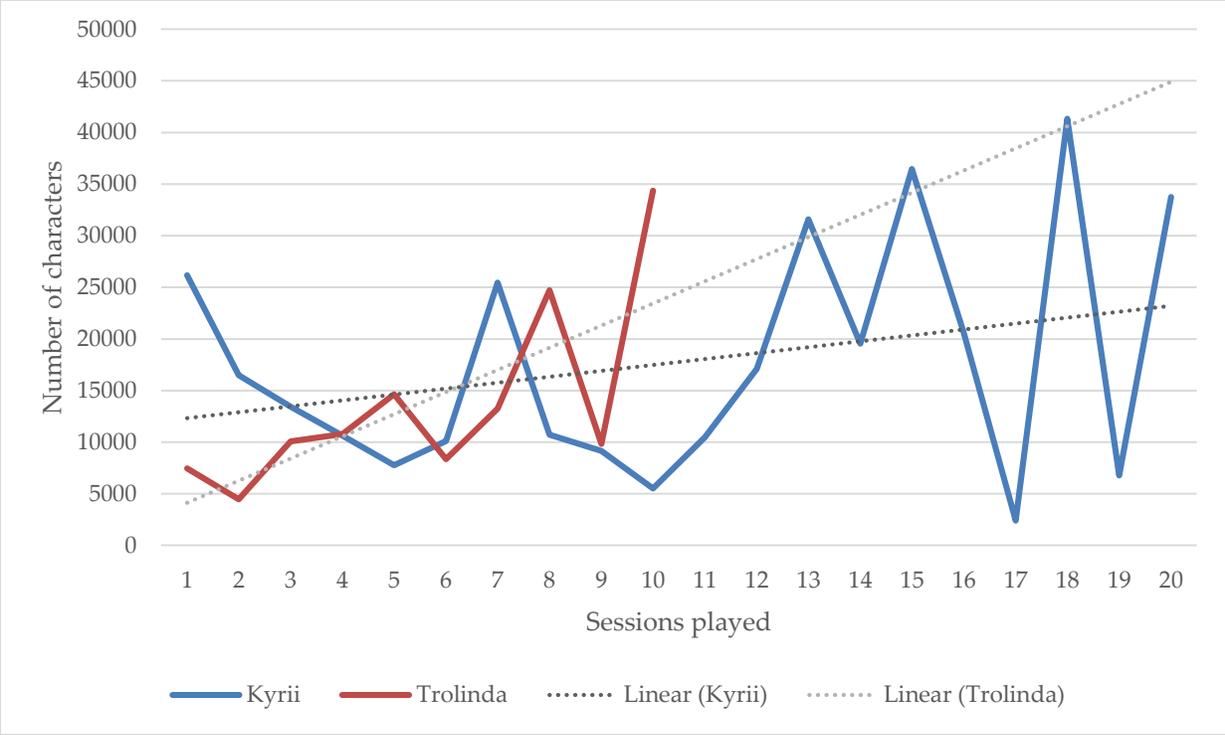


Figure 35. Exposure to language per session played (Kyrii and Trolinda)

As disparate as their initial conditions are in the CAS, their gameplay experiences show closer similarities than one may expect. Trolinda does admirably well considering her complete lack of experience playing digital games, playing fewer actual sessions than Kyrii, yet in each session playing longer on average than Kyrii did (Figure 35). As with other participants such as Naturin and Srfroggy, Kyrii’s previous gameplay experience allows her to immediately step into the game environment and navigate it with ease. Although she had not played *World of Warcraft* specifically, previous online gaming experience assisted her in understanding the mechanics of this game. By looking at both the amount of language exposure on a session-by-session basis, as well as in 10 minute intervals, her average trajectory suggests growth occurring as she becomes more accustomed to the game (Figure 34). The inherent complexity in these varied gameplay experiences naturally follows with some sessions and intervals being less effective than others in terms of language exposure, yet over time we still can observe clear development.

Trolinda's gameplay trajectories differ not only from Kyrii's, but from many of the other participants already analyzed (Figure 33). The dates on which she plays the game are relatively normal, with the rather large break from mid-February to mid-March being explained as necessary to take care of work related to her Master's thesis. When she did play, however, the amount of language exposure every 10 minutes and on a session-by-session basis tell two contrasting stories. Her average trajectory when analyzing her gameplay in 10 minute intervals is actually declining over time, but it is rapidly growing if we look to how her gameplay and associated language exposure develop over numerous sessions of play. Although this seems contradictory, it may well be explained with her lack of gameplay experience. Whereas Kyrii could rely on past experiences to assist her in learning to play the game, Trolinda had very little game-related experience to support her initial foray into the game. It is no surprise then that we observe stark increases in the amount of language exposure in each subsequent play session, yet when examining exposure in 10 minute intervals, there is notably less language exposure than Kyrii and the majority of other players. Yes, she certainly plays more often as she becomes more accustomed to the game, thereby giving her greater opportunities to receive more language exposure, but she remains unable to play the game in an efficient manner when compared to Kyrii. When she does play, she is largely focused on exploring the game world – when asked about her general experiences at the end of the study, she notes that *“ich mag dass es so viel sachen gibt dass es so uh es ist wirklich wie ein eine welt”*, implying that the game experience itself felt like a whole new world that was meant to be explored, and as a result, Trolinda placed much less emphasis on gameplay progression. This approach to playing the game is not necessarily inappropriate, but it may lead to fewer opportunities for interaction in the game with other players.

As a result, Trolinda's SLD potential is inhibited where Kyrii's is not. No single factor alone will account for this inhibition, but when a lack of gameplay experience is combined with a gameplay mentality focused on exploration, the drive to consistently play the game and the opportunity to be exposed to language learning opportunities is reduced. Whereas players like Kyrii root their gameplay fundamentally in progression, Trolinda's focus on exploring the game

meant that her concentration was driven away from SLD and was more on the game itself. Furthermore, her already established proficiency ensured that the language she was being exposed to was either already a part of her vocabulary, or was paid less attention to due to her ability to understand what was asked based upon what she could already discern from the text.

Interestingly, although there is quite a degree of disparity in the two experiences, their concluding interview questionnaire responses are remarkably similar (Table 35). Both players express that the game was easy to play, which due to the questionnaire being provided at the end of the study may have captured the emerging gameplay behavior of Trolinda. They also agreed that the game was beneficial for learning new vocabulary, and interestingly, that the game encouraged language use more so than a regular classroom would. This is however understandable, as the feedback learners receive is specific for their immediate actions in the game and therefore may feel more appropriate and meaningful to them. While Kyrii agreed that chatting in the game was useful for learning and she would like to play the game again in the future, Trolinda was less convinced. Of course, her communication in the game was very limited, and her gameplay trajectories would likely reinforce her stated opinion about playing again in the future. Trolinda did express that she would likely play again within a context such as this, however, implying that having the setting within which players can talk about their experiences in the target language is most beneficial.

Table 35

Concluding Interview Questionnaire (Kyrii and Trolinda)

Question (Strongly Agree = 5, Strongly Disagree = 1)	Kyrii	Trolinda
1. The game was easy to play.	5	5
2. The chat system was easy to use	4	4
3. It was difficult to follow the quests/communication from other players	2	2
4. The quests were too difficult.	1	1
5. I actively tried to comprehend the text of the quests.	4	5
6. I experienced technical communication problems in the game.	1	1
7. There was not much feedback from other players.	3	3
8. Other players were helpful.	4	3
9. I could express my opinion more freely than in a regular class.	3	3
10. Having my own avatar made me feel more involved in the game.	4	4
11. Most of the discussion was not useful.	2	2
12. I could learn new vocabulary.	4	5
13. The game made me use my German more than in a regular class.	4	5
14. I enjoyed interacting in the game.	4	4
15. Chatting in the game was a good way to improve my German.	4	3
16. I would like to play the game again in the future.	4	3

Both Kyrii and Trolinda acknowledged in the concluding interview that it was initially difficult to express themselves in German when describing their experiences; for Kyrii this was due to her lack of German proficiency, whereas Trolinda did not have sufficient command of the game mechanics to be able to accurately and effectively describe her gameplay. Afterwards, however, both expressed that it was relatively easy to discuss these in-game experiences, at least in contrast to less relatable concepts that may be found in a regular language classroom. For Kyrii, her German gameplay experiences encouraged her to already attempt playing other games in the German language, as her preconceived notions about the difficulty of understanding digital games in a foreign language were found to inconsequential. Trolinda, although not being entirely convinced of playing digital games in general, was more likely to attempt playing other games in German as well in the future.

Sex, being the initial reason for this pairwise comparison, was evidently a non-factor. No aspect of Kyrii or Trolinda's SLD or gameplay progression can be tied to sex; although the efficacy scores are among the lowest of these participants, this is largely a result of Kyrii's low German proficiency, and Trolinda's lack of previous gameplay experience. Their gameplay trajectories are similar to those already observed in the other six participants, and the linguistic constructions which were observed and produced during the study were similar in quantity to others' as well, although the exact compilation of developed linguistic constructions of course varies. Finally, as will be argued in the forthcoming discussion, aspects pertaining to the gendered nature of the game are not perceived to be deterrents to the play of these two participants.

With these various and unique gameplay and SLD trajectories outlined, it is worth looking back to the group and determine how these experiences can inform our understanding of DGBLL in extramural contexts.

Discussion

By now it should be evident that digital games can be utilized for SLD in various capacities and by individuals with differing language learning, gaming, and computer experiences. Based upon this data and the preceding analysis, a discussion concerning the growth conditions that result in effective gameplay experiences and best encourage SLD in this CAS will be discussed, as well as the conditions which generally result in less favourable DGBLL experiences.

Examining the group of 14 participants who completed the study in its entirety, and the experiences they had when playing the game, much can initially be said concerning their effectiveness. Returning to the initial results presented in *Chapter IV: Methodology and Group-Level Results*, it is evident when examining the diverse play styles and the variability in language exposure that not only is there ample exposure to the target language available for the learner to observe and make sense of, but that each participant does so with his or her own unique trajectory. The dendograms and correlograms presented in *Group Results and*

Characteristics help depict the variability between participants, both at the beginning and end of the study, again implying that gameplay in *World of Warcraft* is a nonlinear process that cannot be understood in terms of predicted end-states based upon common learner attributes, but rather must be conceptualized as a CAS, paying particular attention to its initial conditions, collective variables, internal and external resources, and the resulting change of these various constituents interacting with one another.

When discussing the role of the CAS in understanding learner's approaches to gameplay such as this, it is useful to examine it in juxtaposition to a traditional learning experience, such as the language learning classroom. Aspects like the amount of text that is observed in 10 minute intervals are impressive, and the extensive time periods during which the participants were exposed to this amount of text (the average gameplay session length being an hour and eight minutes) results in ample additional opportunities for SLD that are not afforded to the student in the classroom. Beyond simple accounts of the observable quantity of language exposure as evidence of potential SLD, the meaningfulness of the interaction and content of the game, and the immediate provision of feedback by the game, also serve to create a playing experience that aptly reinforces the learning to play paradigm (Arnseth, 2006; Sykes & Reinhardt, 2012) without requiring intentional instructor intervention.

The extramural setting in which *World of Warcraft* and other online digital games can be played functions primarily as a means to encourage sustained SLD outside of institutional contexts. Due to the wealth of time argued to be necessary to develop proficiency in a second language (according to the *Deutsche Welle*, a B1 level in the Common European Framework entails approximately 300 hours of German language instruction⁶), extramural situations or digital artifacts which encourage learners to seek out opportunities to further engage in the target language are incredibly valuable. As is evident in previous studies concerning digital media and its use in extramural contexts (see Rama et al., 2009; Sundqvist and Sylvén, 2012a; 2012b; 2014; Sockett, 2011, 2013; Sockett and Toffoli, 2012), learners often demonstrate a keen

⁶ http://deutschkurse.dw-world.de/dw_static_content/langerklaerung_en.html

willingness to explore these out-of-class digital experiences due to the fact that they are already sources of entertainment or social interaction in their daily lives; the only potential necessary modifications are to access the digital artifact in the target language and to source an appropriate community with which to discuss the lived experiences. In some instances, even keeping a journal to record and reflect on the learning process (as was the case in Sockett's [2011] study) can function as the means to encourage the level of reflection in the target language that leads to beneficial SLD processes.

To this extent, any additional practice with the foreign language is arguably beneficial, especially when it is done in such a way that the learner genuinely wants to engage in it. As is evident in the concluding interview questionnaires, the majority of participants (n = 8) enjoyed the gameplay experience and would play *World of Warcraft* again in the future. Some even acknowledged that the focus group and in-game conversations encouraged more language use than a traditional language classroom (n = 7), further emphasizing the potential for combining extramural language learning with deliberate and intentional practice of the foreign language, whether in-person or online.

Each gameplay experience is uniquely tuned to the player experiencing it, and as a result, adequately supports and motivates the player to continue playing. Those who are experienced with similar game genres will find that the game encourages progression at quicker speeds by presenting the player with increased challenges and more complex texts, typically requiring careful attention to the instructions provided. Players seeking to communicate with other players will find opportunities to do so, and the resulting dynamic conversations reflect the proficiency level of the learner. Individuals who prefer to play in solitude and at their own pace may do so as well, and as such, the various NPCs throughout the game serve as their main point of contact with lengthy quest texts. Regardless of the approach, I would argue that *World of Warcraft* and other MMORPGs can provide the learner with suitable and appropriate opportunities for target language exposure that are conducive to growth in SLD and can concurrently supplement second language classes (see Rankin et al., 2008), or in some instances, act as the sole source of German language exposure if the learner has already had ample

German language instruction (as was the case for Baerenjaeger and Föresty). As Sockett (2013) explains, English language learners engaging in informal online learning would begin to notice specific patterns in the language that emerge after copious observation of language, such as when watching films or television shows, resulting in the development of new vocabulary. We can observe a similar phenomenon in the gameplay experiences of these participants and the variety and frequency of the linguistic constructions that are used.

Factors Influencing DGBLL Efficacy

There are numerous factors which influence the efficacy of the DGBLL process, based upon the initial conditions of the CAS, individual gameplay experiences, and the type of interaction occurring in game. These three factors, and the resulting SLD that emerges when considering their influence within the CAS, will be summarized.

Initial conditions of the CAS. The initial conditions of the CAS and those that the player brings to the gameplay experience have certain relevance, at least for some of the characteristics that factor into how a language learner begins the DGBLL process, especially with regards to prior gameplay experiences. Whereas one might expect that prior online gaming experience would be beneficial, it is in fact not the case. Rather, two extremes are potentially inhibitory for DGBLL. Players with very little gaming experience of any kind, such as Trolinda, may be at a disadvantage – not because they must learn to play a new game, but rather, because basic game characteristics that constitute good games (goals, interaction, feedback, content, and endgame [Sykes & Reinhardt, 2013]) are so foreign to the individual that core mechanics of the game take precedent and may inhibit the learner’s approach to the language learning potential of DGBLL. Although Trolinda does over time become more accustomed to the gameplay experience, her gameplay trajectories do not exhibit the same growth as others and she is left having only begun to scratch the surface of the game by the time the study had concluded. Sundqvist and Sylvén (2012a) explain that novice gamers may not experience the same success as more proficient game players when playing certain MMORPGs, and to some extent this resonates in this study as well. I would argue, however, that success is relative, and a player like Trolinda, although possibly not as efficient as her fellow participants,

claims to not only have found the experience beneficial, but does nonetheless develop a number of linguistic constructions that can be attributed to her gameplay experience.

At the other end of this spectrum, players with ample experience playing MMOPRGs, such as Naturin, may also be at a disadvantage due to the relative ease at which they are able to pick up the game and immediately become immersed in its gameplay by harkening back to past experiences. As a result, whereas new players have to learn to play the game, focusing on in-game commands, tutorial instructions, and the multitude of quests that provide varied and increasingly complex tasks, players with previous gameplay experience can jump right in and may miss (at times purposefully) much of the rich language that is meant to be focused on and carefully read. Although Naturin is a strong contributor in the focus groups and demonstrates his proficiency in the German language, much of what he discusses is not rooted in his gameplay experiences and as a result, he can only discuss these in broad terms as he admits to relying on previous gameplay experience and neglecting to read the quest texts.

Yet those players who begin playing the game with at least some gaming experience, whether digital or traditional, have the best perspective approaching this type of SLD opportunity. They are sufficiently familiar with gaming conventions and can appreciate the gameplay experience without being so bewildered that it takes multiple hours to become comfortable playing the game. As a result, their attention is focused where it matters most: learning to play the game.

The relevance of a category such as computer proficiency is less pronounced, which is likely due to the similarities almost all participants have in this category, with the exception of Trolinda, who claimed to have little experience in basic computer usage or tasks. A learner's previous experience with other language learning digital media proved to have no connection to one's likelihood of experiencing positive and effective DGBLL, as players such as Srfroggy and Kyrii who expressed no experience of any kind still were able to learn to play the game and utilize it for SLD purposes, and players like Trolinda and Eisenbarchen, each of whom had used mobile language learning applications in the past to try and further develop their foreign

language proficiency in an extramural setting, did not fare any better than those with no experience at all.

A participant's rationale for studying German may impact the gameplay experience to an extent as well, as those individuals who claim to presently study German only for interest-sake may not be sufficiently committed to investing the necessary amount of time playing the game to see positive development. Baerenjaeger and Trolinda both indicate only interest as their rationale for learning German, and as was observed through their gameplay experiences and resulting efficacy scores, neither participant excels in the gameplay experience and neither is particularly convinced to continue playing the game outside of the study for future advancement and sustained development of German language proficiency. Srfroggy is the only other participant to indicate interest in German as the sole rationale for his German language learning, but his extraordinarily keen interest in the game and his immediate family speaking German are likely sufficient to sustain his gameplay.

Language learning experience on its own does not directly relate to one's success or inability to benefit from DGBLL, but it would appear that it is associated with an individual's rationale – a language learner who lacks experience in one of these two categories actually finds incentivization to play the game and benefits from the gameplay experience as a means to mediate either a lack of experience or sufficient rationale to invest time learning German. Srfroggy, for example, has limited rationale for studying German, citing only interest in the language, but with such robust language learning experience, he finds *World of Warcraft* an additional compelling reason to substantiate his interest in the foreign language. Föresty, another participant who benefitted from the DGBLL process, exhibits a compelling rationale to study German, but little opportunity to further learn the language now that his studies have finished. His gameplay experiences therefore present an otherwise unattainable opportunity to engage in interaction with other German speakers.

This trend is further pronounced in the data: of the 24 participants who initially indicated an interest in participating in the study, seven indicated responses which resulted in language learning experiences and rationale for studying German which were lower than the

average of all participants who completed the background information questionnaire (see *Group Results and Characteristics*). Of these seven, five did not complete the study, likely not having the requisite enthusiasm or drive to continue playing the game. The other two, Putags and Shaftgs, likely only continued playing as they were friends beforehand and played with one another in a shared office, which resulted in additional rationale that the background information questionnaire could not predict. It should be advised however that all participants did self-select to participate in this study, and therefore had some interest in either DGBLL or learning German in general.

Emergent gameplay experiences. Progressing from the initial conditions of the system to the gameplay experiences that emerge from interacting in *World of Warcraft*, we can observe some patterns that lead us to make claims about which type of experience may prove most beneficial to language learners. Returning to the gameplay experiences as outlined in the previous pairwise comparisons, and looking back to the 14 participants who completed the study in its entirety, a select few gameplay factors play a specific role in ensuring that DGBLL is as beneficial as possible. Aspects such as the amount of time spent playing the game or the number of gameplay sessions are not indicators of beneficial SLD, as was seen by the efficiency of Föresty's gameplay experiences when contrasted to Eisenbarchen, Kyrii or Naturin's. Nonetheless, the 15 hours which Föresty spent playing were still above the minimum amount of time required for participation in the study, and of those participants who spent 10 hours or fewer (in the case of lost data or too much time spent idle in the game) – Einpanda, Putags, Shadowsflame, Shaftgs, and Wolfköder – all exhibited fairly unremarkable gameplay experiences after thorough analysis, thereby confirming the selection of the eight participants who were the focus of this study. Common amongst these five participants is a lack of language learning experience, which likely also impacted their ability to invest sufficient time in the gameplay experience – the level of German proficiency required to adequately play the game may have inhibited their initial experiences and failed to motivate them sufficiently to continue playing to the extent that would be required to see beneficial SLD.

Otherwise, what is immediately apparent from the varying gameplay trajectories that emerge is not that a fixed number of gameplay sessions, time spent playing the game, or total amount of observed text lead unequivocally to beneficial SLD, but rather, that a trajectory of increased development in the L2 over an extended period of time signifies a participant's ability to learn to play the game, and necessitates sufficient time in order to understand the game and its use of language in order to progress. To this extent, more than 10 hours may in fact be required to reach a point in which meaningful communication in the game, and about the game in extramural contexts, can be expected. Some individuals may reach this point sooner if they have sufficient language learning or gameplay experience – as was the case for Obstfresser – but otherwise, one must overcome the initial hurdles present in learning these online games and develop enough confidence and interest in order to effectively communicate about them. Many of the participants show some of the greatest development in the last few gameplay sessions as they have just reached the point in which they understand the game sufficiently. This is not to say that SLD cannot occur early on; rather, in order to encourage discussion about the game, a structured community (in the form of a classroom discussion or online discussion forum) may be required to provide learners the welcoming environment in which they can talk about their limited gameplay experiences.

Communication in- and out-of-game. Finally, the types of communication that occur surrounding the game play an integral role with many factors contributing to an effective DGBLL experience. As is evident by the efficacy scores of each participant, no variable alone is sufficient to explain how well a learner's gameplay experience aids in assisting SLD; combining the number of game-based linguistic constructions produced, as well as those which are found outside of the 1k frequency list, and furthermore, examining the sheer number of words produced in out-of-game discussions does however provide evidence to support claims concerning SLD in DGBLL. This, like the factors beforehand with respect to the learners' initial conditions and individual gameplay experience, implies that simply being a proficient speaker and excessively playing the game will not unequivocally result in better SLD. While it remains advantageous to play more than very little (Srfroggy is evidence of this), efficient playtime that

actively focuses on the game's narrative and various modes of interaction will be a better use of time than sheer quantity of gameplay (as can be observed by Föresty and Obstfresser's experiences). Those who elect to play as little as possible miss out on valuable opportunities for interaction through the completion of quests or playing with other individuals, and by extension will have difficulty expressing themselves and their gameplay experiences in conversational settings.

The type of communication in which players engage, whether within the confines of the game with L1 speakers/gamers, or in out-of-game contexts with other language learners, does not appear to have great implications for improving the quality of SLD, so long as communication exists. Such flexibility is one of the strongest points of embracing DGBLL, as learners are afforded a multitude of means in which they can interact, choosing an appropriate community (whether digital in the form of an affinity space, or physical as in a classroom or focus group setting) to engage in discussions concerning gameplay. Some players choose to communicate often with other players in the game, going as far as to join guilds of like-minded players and thus providing an immediate and persistent group of individuals with whom they can chat. Spontaneous interaction with random interlocutors occurs at times as well, and if the player is so inclined (as was observed with Eisenbarchen and Obstfresser), meaningful communication can emerge. Other learners, should they be more hesitant to interact in game due to the speed at which communication is expected, may feel more inclined to discuss their experiences in a setting that is either asynchronous, such as a discussion forum or wiki, or in-person, such as with friends or in a classroom setting where they may feel more comfortable speaking (as many indicated in the concluding interview).

The Larger Group: Conditions Leading to and Inhibiting SLD

If we return to the initial group of 24 participants who had agreed to take part in the study, there are some conclusions that can be drawn that already begin to speak to the relevance of certain initial conditions that predict success in the CAS. Overwhelmingly, the participants who either chose not to participate after realizing the level of German that is required to play, or who began to play but found they couldn't dedicate the necessary time

needed to complete the 10 hours, had learner-related results which fell below the average of all 24 participants in numerous categories (see *Group Results and Characteristics*). Of the 10 who did not complete the study, only two had results in 3 of the 4 categories that were above the average of all participants; two demonstrated strong results in 2 of the 4 categories, and the remaining six only had 1 category (and in the case of 2, none at all) that were above the average of all participants.

This suggests that interested individuals should demonstrate meaningful interest/ability in a combination of at least 2 of the 4 potential influences (rationale to study German, language learning experience, gaming proficiency, and computer proficiency) to ensure enthusiasm to continue playing the game exists. This is encouraging, however, as it suggests that prerequisite gameplay experience is not necessary; participants such as Eisenbarchen, Trolinda, Putags, Shaftgs, and Shadowsflame, all successfully completed the study and invested sufficient time in the gameplay experience. Of these, only Putags and Shaftgs had less than two categories rank above the average, but in relation to the remaining 12 who had completed the study in its entirety, the gameplay and learning trajectories are some of the least advanced, and as was suggested previously, this is likely a result of their continuous playtime together and unwillingness to invest considerable time in gameplay experiences that were not rooted in the local setting of their shared office. I would argue that these are however nonetheless beneficial experiences as they invest considerable time playing the game and do indeed further develop their L2 proficiency, which cannot be said for those who elected not to continue.

Five of the participants who did not complete the study had neither a compelling rationale to learn German, nor a wealth of language learning experience, and as a result, neither factor could compensate for the other as was the case for numerous other participants, such as Srfroggy, Föresty, Kyrii, Baerenjaeger, and Trolinda. Of the remaining five, four exhibit neither strong computer nor gaming proficiency, which likely affected their ability to maintain interest in the game experience itself. The last of these participants, P21, Hawksparr, who actually exhibited rather positive initial conditions in the CAS, began playing the game and even attended the first focus group, but her academic obligations became overwhelming and her

strong German proficiency may not have been sufficiently challenged to continue investing time into playing *World of Warcraft*.

Those participants with the highest efficacy scores after completing the study held in common the ability to express their gameplay experiences in extramural settings most effectively. Two of them (Srfroggy and Obstfresser) found ample opportunity to engage in conversation in-game with other players, but Föresty, after initially having little success communicating with his fellow research study participants, chose to focus on the interaction between himself and the various NPCs which provide quests. Regardless of this in-game form of communication, each participant spoke at length about the quests he or she had completed and the various experiences undertaken that made their time spent playing *World of Warcraft* meaningful. Those participants who found themselves unable to accurately describe the events experienced did not engage as well as the others.

The Role of Gender and Violence in DGBLL

An aspect not touched upon, yet which deserves mention due to its potential influence on DGBLL, is that of gender, and to a lesser degree, violence, and their conceptualizations as represented in digital games, and especially *World of Warcraft*. Overwhelmingly, the participants themselves indicated that they did not perceive issues of sexual representation, gender, or violence as a pervasive or distracting element of the game. The artistic style of *World of Warcraft* is fantastical and any violent acts (which the game admittedly emphasizes) are masked by the aesthetic of the game such that these participants did not find them offensive, and in no way did the violence found within the game act as an impediment to any player. Baerenjaeger makes the distinction between violence in reality as compared to in the game, stating that:

und about das gewalt ja entweder ist es eine computerspiel oder ja wie ich gesagt habe in das leben uh ich denke es ist besser aber uh es ist besser uh outlet uh in einem computerspiel (Focus Group 2)

If violence is to act as an outlet, then as he rightfully states, it is better to be in a game. Forestry makes a similar case for the fantastical element of the game as he claims that the violence is not distracting and is rarely even thought of, claiming:

uh für mich ist die gewalt nicht ablenkend uh ja ich kann uh den spiel immer spielen und uh mir ist es egal wie viel gewalt es gibt uhm weil uhm die gewalt ist ein bisschen wie ein fantasie es ist nicht so wie realität (Focus Group 2)

Zheng, Newgarden, and Young (2012) speak to the use of violence within games of this genre, and rather than condemn it, they instead discover that when analyzing timescales of gameplay, killing actions within the game (such as hunting animals to complete a quest) were to some extent mitigated by the everyday language utilized between players when engaged in the violent act; the violence in the game therefore takes a reduced role, as indeed, it ultimately serves as a undertone of the more prevalent narrative which focuses on much more than just acts of violence.

Gender assumes a similarly reduced role in the eyes' of the participants, and according to statistics from the Entertainment Software Association, 42% of players interacting in these types of online games are female (ESA, 2010; Brehm, 2013). In particular, many participants expressed that they chose to construct avatars of both sexes due to gameplay reasons, such as a desire to see the game environment through a different perspective and encounter new content, rather than due to a specific judgment on the validity of the gender within the game.

Participants like Trolinda simply thought the choice itself was arbitrary, and the value of the gameplay comes from the experiences in-game, regardless of the sex of the avatar or the player. Kyrii admitted that she believed there was a gender-bias of sorts, as some female characters within the game may be less dressed, but that it didn't bother her as the player is given the option to identify as either male or female while playing the game with no repercussions. This reaction is rather common; Breuer, Kowert, Festl, and Quandt (2015) examined German game players over the course of three years as they played various digital games and discussed their beliefs concerning gendered roles in society and gaming, finding that sexist beliefs did not emerge through gameplay. Although they are careful to indicate that other studies have

examined specific games for their effect on gender stereotyping and promoting certain beliefs, and their looks at digital games in general, *World of Warcraft* genuinely promotes the choice to position one's identity and does not inhibit a player's choice to identify with whatever sex they choose.

The use of violence in the game may however be related to gender, as the gendered nature of games like *World of Warcraft* are perceived as being an inherently masculine domain, and as a result, female participants may have been less inclined to participate in the study from the beginning due to these preconceptions. While we cannot state with any certainty that gendered perceptions of *World of Warcraft* played a role for the participants who elected to not participate or to continue participating once having begun, we can also not completely ignore their possible relevance. For those who did complete the study and shared their thoughts concerning the role that gender and violence play, however, they were found to be decidedly less of an issue as would otherwise be perceived.

Strategies for Intervention

With these various factors considered, instructors who see the relevance of DGBLL and are encouraged by the results and possibilities may want to encourage language learners to engage in extramural DGBLL. The extent to which their intervention may be viable must be considered, however. The role of the researcher/gameplay facilitator is helpful to ensure learners are given proper initial guidance, but otherwise, the player should be given complete autonomy to play the game in the way that he or she sees fit. If our goal is to provide a gameplay experience that is as authentic as possible, in order to provide sufficient inclination to continue to play and learn, then it is imperative that administration plays as limited a role as possible. In this study, my primary role as the researcher throughout the gameplay portion of the study was to ensure that all participants had the necessary technology and background information to begin playing. This was vital for the purposes of this research study where individuals of varying gameplay experience were invited and welcome to participate; in actuality, and since the conclusion of this study, the game now does a much better job of explaining the basics of gameplay and walking the player through the initial steps of the game

until he or she reaches a stage where a certain level of comfort is achieved. Afterwards, in an effort to embrace the complexity of gameplay and interaction that does occur in a game like *World of Warcraft*, I consciously took a reduced role and allowed each participant to play the game in whatever way they felt was most meaningful, motivating, and ultimately enjoyable.

As a result, the role of the gameplay facilitator (whether a researcher or instructor) is primarily two-fold: one, if students demonstrate an interest in gaming, or are interested in exploring digital games for language learning, having the requisite knowledge in order to make a recommendation as to which game is best suited for their L2 proficiency level is crucial. There are vast possibilities available to choose from, and uninformed opinions are of little use, if not detrimental to the language learner's development; being aware that *World of Warcraft*, for example, provides a virtual environment conducive to SLD is a good start, and emphasizing that learners should be prepared to be initially challenged as they learn to play the game will help assuage potential concerns.

The second role that a gameplay facilitator should adopt in order to help ensure that gameplay is meaningful and beneficial for SLD is to provide or inform students of spaces in which they can discuss their game experiences in the target language. Gameplay alone is likely insufficient to result in observable SLD (see Rankin et al., 2008), as learners need opportunities to use the language that they observe (either due to its saliency or frequency) in authentic situations. Ideally these situations can occur in-game as players discuss strategies or quests, as well as topics external to the game, such as where each player lives and their own language learning experiences (see Thorne, 2008a). If these opportunities are not available, or if conversation in the game is unsuccessful, finding or creating affinity spaces which the players can utilize to discuss their experiences is a worthwhile contribution by the facilitator. This may entail allotting time in-class to speak about what occurred in-game, or organizing meetings for students outside of class to do the same. Consequently, simply inviting learners to seek out discussion boards or wikis that focus on the game that they are playing, and are in the target language (which for games as successful as *World of Warcraft* is a relatively easy task), are excellent opportunities for contributing to discussion and playing an active role in sharing their

own knowledge and experiences of the game, as affinity spaces are apt to encourage. Due to the inherent interest players of these games share, discussion flows naturally and the most rudimentary of questions are often answered within minutes, leading to excellent opportunities for communication if the player seeks them out.

As a researcher, I elected to concentrate on this second role, as the first was a non-factor in this study – participants expressed interest in the study and I had already chosen *World of Warcraft* for the various reasons listed earlier in this dissertation. This approach also underscores the rationale for not including a control group in this study. Due to the inherent interest in my participants to join the study and the choice to have disparate individuals, there was no need to control for specific characteristics. Indeed, such an approach contrasts with the main tenets of the CAS theoretical framework, which is to analyze the system within its specific context and avoid a reductionist approach that attempts to eliminate certain aspects that may be hypothesized to not play a role (de Bot et al., 2007; Larsen-Freeman & Cameron, 2008a; Van Geert & van Dijk, 2002). Other tests, such as pre- and post-tests were deemed unnecessary as the richness of the data obtained through the regular chat transcripts and in-person conversations far outweighed what would be captured in these snap-shot tests; this approach allows analysis of language exposure and SLD at any point in time which is ultimately necessary for research in CAS (see *Chapter IV: Methodology and Group-Level Results*; Larsen-Freeman, 1997). Attempting to replicate and honour the vernacular nature of these games implies that any directives for gameplay would have the potential to impact the player's otherwise preferred method of gameplay; it is these individualized trajectories of gameplay that this research attempts to explicitly analyze in order to understand how change in gameplay over time relates to SLD.

Chapter Summary

This analysis has shown that DGBLL and the language learner's SLD can indeed be analyzed as a CAS within a complexity theory framework, and that learners are able to transfer language observed while playing the game (written reception/production) to non-gaming contexts when given the opportunity and space to discuss these game-based experiences (oral

reception/production). As was explored, each language learner's learning and gameplay trajectories vary, yet each results in SLD, albeit in varying capacities. We can nevertheless identify specific growth conditions in the CAS which best lead to SLD while playing the game.

It is evident that we should concentrate on learners who are knowledgeable about digital games yet not already proficient in the game of choice, with either a strong rationale for studying the target language, or ample language learning experience to draw upon, to inspire the requisite enthusiasm to play the game. The amount of playtime acts as a growth condition as well – 10 hours over the course of four months may not be sufficient to supplement the additional sources of language learning that a learner is already involved with, yet it is also not necessary to invest upwards of 25 hours playing the game. Players should however leave themselves sufficient time to become accustomed to the game environment and learn to play the game; those with less experience playing digital games will by necessity then require more time to develop the necessary skills to play adequately and succeed. Finally, although communication does not necessarily need to occur in-game, it is imperative that the player finds avenues to communicate about the game, either on his or her own volition, or with the assistance of a gameplay facilitator to guide the learner through this process. An instructor may be ideal for this, but an affinity space can equally serve this purpose by promoting discussion between players. Each participant in the affinity space is believed to be able to contribute knowledge based upon his or her unique experiences, and thus, language learners are able to find an environment which emphasizes game experience rather than language proficiency as an entry point. In order to discover the affinity spaces which exist for a digital game such as *World of Warcraft*, it is however necessary for the language learner to seek out advice from other players, or be moderately knowledgeable about these types of games in general to the extent which they know the appropriate forums or wikis to utilize.

Should these conditions be met, then the language learner will likely be able to find SLD possible within the confines of a MMORPG such as *World of Warcraft*. Of course, this is not to generalize the gameplay experience or suggest that any individual adhering to these conditions will see success, but considering the overwhelmingly complex nature of gameplay that

transpires, many other factors that could not be accounted for within this study may play a role as well. These results however demonstrate that a wide range of learners can successfully benefit from these gameplay experiences and indeed develop L2 proficiency

Chapter VI: Conclusion

Returning to the Research Questions

In the preceding discussion and analysis, I have attempted to demonstrate that by transferring linguistic constructions from online gaming contexts to non-gaming contexts, learners with diverse language learning and gameplay experiences can successfully further develop their L2 proficiencies by playing *World of Warcraft*.

MMORPGs like *World of Warcraft* act as immersive virtual worlds which function as language learning environments should the learners approach them with a willingness to learn how to play the game and an eagerness to engage with all aspects of the game in the target language. Due to the complexity of the game, however, each player who approaches the gameplay process will interact with it in various and unique ways. In order to understand how and why learners engage in DGBLL the ways that they do, and what SLD occurs as a result, we return to the three core research questions that have guided this dissertation study:

- I. To what degree do language learners' trajectories of gameplay interact with their trajectories of SLD?
- II. Can the near transfer of linguistic constructions be observed in the language that players speak in contexts that are removed from the online gaming environment? If so, what kind?
- III. How can complexity theory substantiate and corroborate the nature of online games for SLD?

To address the first research question, we can observe that although the various trajectories of gameplay and SLD do indeed vary between participants, there are some shared features of their individual trajectories which may lead to a more beneficial experience for the language learner. Whereas ample prior experience playing the MMORPG of choice may detract from the language employed in the game, very little gaming experience of any kind may present a challenging barrier to overcome. As well, although neither the learner's rationale for studying the language, nor his or her prior experience learning the language alone may

positively or negatively impact the trajectory of gameplay or SLD, poor results in the two factors combined can impede progress, as an individual who neither has a strong conviction to learn the language nor has had ample time and space to learn the language previously will be at a disadvantage. As a result of these findings, yes, trajectories of SLD and gameplay do interact with one another, but neither necessarily will result in the failure of the other due to their nonlinearity and disproportionate development. Even participants like Trolinda or Eisenbarchen, both of whom had relatively low efficacy scores, still developed L2 proficiency and evidently found self-reported value in the experience, suggesting that varying gameplay trajectories will at the very least contribute to the development of the L2, if not wholly support it.

In response to the second research question, ample evidence suggests that the language observed in the gaming environment is indeed transferable to non-gaming contexts, especially when the context that the language is being transferred to is directly related to the in-game experiences of each learner. Implicit in this as well is the ability of the learner to transfer written receptive/productive language use to an oral context when discussing these experiences with one another as part of the focus group. A central finding is that regardless of the trajectories of gameplay that each learner participates in, SLD will occur. Various emerging factors contribute to this development, such as the amount of communication a player engages in with other players or the individual's willingness to share his or her experiences in the non-gaming context. By establishing an efficacy score which details the overall effectiveness and quality of the gameplay experience and its implications for SLD outside of the game, we can determine to what degree the experience was impactful for the player while considering the multitude of learner- and gaming-related factors that also impact the process.

Finally, with regards to the third research question, complexity theory does help to understand the trajectories of SLD and gameplay that each player/learner experiences. Due to the nature of MMORPGs such as *World of Warcraft*, and the wide variety of potential avenues by which to interact with the game, it is in fact necessary to take such an approach to understanding online games for SLD purposes. Aspects such as the emergence of a learner's L2

as he or she engages in the process of playing the online game, the many iterations of sub-processes in the system, and the internal and external resources that lead to change in the system are all crucial components of a CAS and playing in an MMORPG like *World of Warcraft*. Considering and analyzing them helps to fully understand how and why each learner engages with the game in a unique fashion.

Although there is evidently no best way to approach DGBLL in an extramural setting such as this, the results and discussion surrounding these research questions suggest a number of contributions to the current research on DGBLL which should be emphasized, and which may help future researchers meaningfully analyze online gameplay for SLD purposes.

Importance of Research

The results of this dissertation highlight a number of factors which meaningfully contribute to current thought concerning the role and efficacy of DGBLL.

This research examines a group of individuals with varying characteristics that also lend insight into how different individuals may approach gameplay of this nature. With the vast majority of participants being current university students at a Canadian institution, we examine individuals with strong academic backgrounds and an eagerness to learn. Participants ranged in their proficiency levels in the German language from intermediate to advanced, and had varied reasons to both learn German and play games such as *World of Warcraft*. Their experience levels varied as well, with some having played this exact game before (yet in English), and others rarely playing games at all. Such diversity helped to ensure that the resulting analysis could reflect a diverse level of play and language learning approaches and add to the current discussion on DGBLL practices.

Due to the relative novelty of this field of research, specifically in terms of vernacular games used in extramural learning contexts, there remains a continual need to simply engage in and share research that pertains to this particular approach to language learning. As was stated initially, scholars continue to argue for further research to substantiate the claims that gaming is indeed beneficial for SLD (see Cornillie et al., 2012b; Sykes & Reinhardt, 2013; Godwin-Jones,

2014). Particularly research that is empirical in nature, and thus demonstrates the validity of gaming for SLD purposes based upon player/learner experience, rather than player/learner reflection, is required to understand the complexities of DGBLL. The research that has been conducted and shared as part of this dissertation supports this call and provides necessary insight into the learner/player experience and begins to address the factors which may play a substantial role in this process. The methodological and analytical approaches employed in this dissertation lead to comprehensive and thorough results which provide a level of analysis on individual L2 learner trajectories of SLD and gameplay that have yet to be explored in DGBLL. The wealth of game-related results, as derived from the in-game transcripts, and the amount of L2 production done in the focus groups enables in-depth discussions concerning the validity of this approach, which again speaks to the necessity to have empirical results to substantiate the otherwise encouraging responses often heard from the L2 learners themselves.

This is largely accomplished by applying a complexity theory framework to the study of DGBLL, an approach that has yet to be considered in this field of research, yet which seemingly has ample benefit to fully understand the nature of digital gaming for SLD purposes. This is especially true when considering the extramural context (see Sockett & Toffoli, 2012; Sockett, 2013), as the entire process of learning in a setting removed from the classroom (and the presence of an instructor or observer) suggests an entire layer of factors and conditions which may impact the DGBLL experience. To avoid a reductionist approach, a complex adaptive systems framework can account for the numerous factors which may play a role and considers each of them as they impact change in the system. This coincides with the necessity to examine learner/player experience in DGBLL, as the experience is itself a multitude of connected factors that enact change on the system. Neglecting factors simply because learners may reside in unobservable settings is not sufficient, but games such as *World of Warcraft* mediate this difficulty by enabling automatic transcription of all actions by the player and thereby capturing all interaction observed and produced in the gameplay experience. Because this study considers both the learner/player experience as elucidated by the transcript, as well as learner/player reflection in the group conversations in the foreign language, the concluding interview, and the

questionnaire, it presents a unique opportunity to understand as comprehensively and integratively as possible the many contributing factors that lead to distinct and individualized gameplay and SLD experiences.

The longitudinal and extramural nature of the study provides additional evidence and support of this research and its approach to DGBLL. Whereas previous research has elected to look at short segments of gameplay (due to time restrictions) or has situated the gameplay experience within the classroom context (as required to facilitate observation), this study removes all restrictions and allows learners to play the game where, when, and with whom they choose. This is intended to replicate the experience of playing a vernacular game in one's free time, doing so primarily for entertainment purposes and learning to play the game. Playing these games in the classroom context is therefore inherently difficult, and doing so – even if the game is played on a weekly basis – still cannot accurately portray how these games would be utilized in contexts removed from this controlled environment. Studies such as this, which retain the integrity and authenticity of the gaming experience as best as possible, serve to illuminate the potential benefit of DGBLL as a supplementary approach to language learning.

A retrodictive qualitative modeling (Dörnyei, 2014) approach to the wealth of data collected by examining all aspects of interaction in gameplay was deemed necessary to track and give credence to the change occurring in the CAS. Rather than attempt to hypothesize how an individual will develop based upon the type of learner he or she is, retrodictive qualitative modeling begins at the end – the approach is to examine where a learner is at the conclusion of the process, and what variables may have incited change in the system. This methodology encourages complexity and helps to support the goals of this dissertation research in being non-reductionist by analyzing as many contributing factors as possible that affect and determine change in the trajectories of gameplay and SLD.

Subsequently, in order to capture the complexity of the gameplay and language learning experience, the participants had to be equally understood in detail in order to determine what initial conditions may have led to the change experienced in the CAS. Language learning is a nonlinear process, and the potential factors that may contribute to the nonlinearity of each

individual's SLD need to be outlined as the initial conditions of the CAS before the gameplay experience begins in earnest. Understanding a learner's rationale for studying the target language and previous experience doing so, as well as his or her general inclination towards gaming and computer-use is imperative to fully understand which factors play a role in DGBLL.

Another means of evaluating the relative benefit of the gameplay experience is to establish an efficacy score. The efficacy score takes into account not only the language that the learner produces or indicates knowledge of, but more importantly, how much of that language is proportional to what the learner contributed to group conversations or the overall amount of language observed while playing *World of Warcraft*. The efficacy score addresses two potentially problematic results derived from the gameplay experience. Firstly, participants who enjoyed speaking and dominated conversations are not unnecessarily deemed better learners due to the ostensibly higher number of game-based linguistic constructions which are produced; just because a learner likes to talk does not mean that his or her DGBLL experience was more effective. Secondly, the efficacy score attempts to be non-reductionist by taking into consideration all interaction that occurs in the CAS, whether it is situated in the gaming or non-gaming context. The participant's game-based constructions which were uttered when either playing or discussing the game are fully understood when analyzing them in relation to the amount that individual spoke in out-of-game contexts, which is furthermore best contextualized when considering the total number of linguistic constructions which were produced outside of the 1K frequency range.

These compounding variables contribute to an accurate representation of the efficacy of the gameplay experience. Learners who simply enjoy speaking more will not necessarily benefit more from the gameplay experience, and their enthusiasm to contribute to conversations about their gameplay experiences will not necessarily depict them as better language learners. Instead, learners who thoughtfully use the language encountered while playing the game and are able to demonstrate their knowledge of this language by transferring it between contexts will be better represented by a higher efficacy score. Subsequently, by not applying an efficacy score, research

risks being reliant on learner/player reflection or incomplete data that doesn't take into account the many factors which contribute to one's success playing games of this nature.

Finally, encouraging learners to reflect and speak about their experiences while playing the game is necessary. This does not need to be facilitated by an instructor, necessarily, but learners must have the space to do so. The researcher-facilitated group conversations which were a core part of this study provided participants the space to converse with one another about their gameplay experiences, as well as other topics such as representations of sex and violence in the game. These discussion opportunities need not necessarily be facilitated, however, as learners can find compelling affinity spaces (Gee, 2005) online (such as discussion forums or wikis) in which they can share their thoughts and lend insight into their gameplay experience. Regardless of the medium of communication, a space in which the learner is welcome and able to use the target language to reference and build upon the language observed in-game is highly valuable.

These many contributions to the field of DGBLL both underscore and support current research, as well as lending insight to innovate future research. Of course, aspects of the study which have limitations must be discussed as factors to consider in similar research cases.

Limitations

There exist limitations that should be addressed when considering the impact of this research study and its relevance to the broader field of DGBLL. While these factors do not problematize the results gathered, they do suggest that with changes to planning and the overall approach of the study that better data could have been collected.

Firstly, the number of participants who took part in the study was limited. As was discussed in *Chapter IV: Methodology and Group-Level Results*, although initial interest in the study was relatively poor, once the study was advertised to a wider population, more than 40 individuals expressed interest. This level of reception was, however, unsustainable, and as individuals began to understand the extent of their participation or the simple fact that a high intermediate level of German language proficiency would be required, participant retention

subsequently declined. With 14 participants completing the study in its entirety, the suggested impact of DGBLL should be tempered with the understanding that more research in a similar vein would be beneficial. The final participant count of 14 remains however impactful due to the amount of data collected on each participant's gaming and SLD trajectories, yet nevertheless, more participants would provide even more data and help to further understand what type of gameplay experiences best lead to SLD, and what type of learning experiences are best suited to embracing this form of DGBLL.

A second limitation pertains to the representation of sex, as only two females participated in the study and completed the 10 hours of requisite playtime, skewing the representation of both males and females. This was not intentional, and based upon the original 40 participants, the representation was much more even (at the offset of the study, 15 participants were female and 25 were male). Furthermore, although only two females did participate in the entirety of the study, as can be seen in the analysis, their gameplay and SLD trajectories were comparable to the others; certainly there were differences similar to those experienced by all participants, but no aspect of their gameplay trajectories could be described as a difference due to their sex. However, a better representation of sex in this study would have been helpful in further combatting certain stigmas attached to playing digital games. A participant like Kyrii does well to portray herself as an individual who cares about gaming and shows demonstrable improvement in her SLD, whereas Trolinda is more relaxed in her approach to gameplay and does not invest as much effort as many of the other participants. She still exhibits and sees improvement in her SLD, but her gameplay and learning trajectories may have been impacted by her sex and subsequent orientation to the game to some degree. Although the impact is uncertain, future studies should seek out better ways to incentivize participation by female players. The monetary remuneration offered to participants was ultimately a non-factor to many, yet the initial appeal of the \$50.00 remuneration was certainly beneficial to attract participants and may be crucial to encourage participation by individuals who would otherwise not show an interest in this type of gameplay.

The advanced language featured throughout this game necessitated that language learners participating in this study had at the very least an intermediate command of German, if not a more advanced level of proficiency in German. To this extent, the results of this dissertation cannot be applied to beginning or lower intermediate language learners, and further research on other games of this genre would be necessary to determine what effect extramural DGBLL has on these early learners.

A final limitation can be observed when examining the length and design of the study. As was seen in some of the analyses of the participants' gameplay trajectories, certain participants (Trolinda and Obstfresser) were less inclined to play the game initially. As the study neared its end and they were required to reach the 10 hour minimum, both participants found the game to be more enjoyable and entertaining than they had initially imagined. More time to continue playing, or enforcing a specific amount of time to have been played at certain points throughout the study may have helped these participants come to this realization sooner, and as is discussed in the Analysis & Discussion chapter, learners playing closer to 15 hours benefited more from the experience overall. To a certain degree this conflicts with the extramural nature of the study, whereby learners were given complete freedom to play whenever they chose to do so, but researchers should consider the potential drawbacks to providing complete freedom to the participants if that freedom has negative consequences.

As was stated initially, although these limitations do not harm the integrity of the study or its results, changes which combat these issues would only serve to garner more effective and valuable results pertaining to a larger group of learners in the future. To that extent, suggestions for future research will be shared that also may help to ensure that DGBLL studies conducted in the future will gather the results which are needed to advance the field.

Suggestions for Future Research

The results discussed in this dissertation have considerable implications for future research endeavours in the field of DGBLL.

Returning to the distinction made initially between learner/player reflection and learner/player experience approaches to research, I would suggest that both have value for studies concerning the effect that gameplay has on SLD. When discussing gameplay, an individual's inclination to play the game remains a compelling contributor that determines the value of the gameplay experience. Examining chat transcripts and analyzing the results of the gameplay and conversations concerning gameplay are alone at times insufficient; to truly understand why a particular learner approached the game in such a way does require explanation and reflection by the player. The opposite remains equally valid, if not more so. Learner/player reflection tells but one side of the story when examining the complex interactions and process of playing a game. What a player thought was beneficial or useful may not be as valuable in reality – a highly motivated player who invests ample time into the game may claim his or her experience was incredibly meaningful, yet in practice, playing less frequently or focusing more on other elements of the game (such as interacting with others) may provide more benefit. To support the call for more empirical research in DGBLL (see Cornillie et al., 2012b; Sykes and Reinhardt, 2013; Godwin-Jones, 2014), it is paramount to ensure that learner introspection and reflection are supported by an analysis of the actual experience of playing a game and a means by which to determine the effectiveness of that experience, as was operationalized in this study through the efficacy score and the learner's ability to transfer linguistic constructions between gaming and non-gaming contexts.

To this extent, future researchers may choose games that not only support communication between players in the target language, but that also have readily available means by which to record and transcribe the communication which players engage in. Many MMORPGs do not support this feature, and it would be unwise to allow learners to play these as otherwise they would need to be observed at all times.

As can also be seen, a CAS framework may be helpful in understanding how players approach gameplay for SLD purposes. Due to the nature of many digital games, and especially MMORPGs, it is necessary to acknowledge and represent all aspects of the gameplay experience. Interaction between players and non-player characters, on-screen commands, quest

directions, and any other form of language that the player may observe through gameplay should be considered as possible influences for the emergence of SLD. Complexity theory accommodates the varying gameplay trajectories that each player will experience and attempts to understand what change occurred as a result, ensuring that no potential factors are overlooked.

One area not focused upon as part of this dissertation, yet which would prove to be a fruitful avenue for additional analysis, is a detailed textual analysis of the interactions between players and learners in-game, and between learners in out-of-game conversations concerning gameplay experiences. Situations such as the spontaneous discussion Eisenbarchen had with the other player while being invited to engage in a duel, or Baerenjaeger's ability to learn new linguistic constructions from Föresty while chatting about an in-game experience are on their own evidence of SLD, but further research could be done to examine how exactly these conversations emerge, and what specifically happens in these discussions. Just as Thorne (2008a) looks closely at how the two players interact with one another in this spontaneous conversation, similar textual analyses could reveal insight into how SLD emerges in a CAS such as this, and with the wealth of data that exists as part of this dissertation, would be an avenue of research with ample potential.

Finally, the extramural nature of DGBLL and MMORPGs in particular needs to be investigated further. With the proliferation of social media and online communication, and ever-present technologies that learners today have grown-up with, finding ways to integrate the experiences they have out-of-class with the target language that is being studied can be incredibly valuable. Although there is certainly room to incorporate DGBLL directly into the classroom, if the core characteristics of what makes games so effective (goals, interaction, feedback, context, and end game (Sykes & Reinhardt, 2013)) are to be wholly realized, constrained gameplay in the classroom may inhibit the authenticity of the gameplay experience. Although extramural research is time-consuming and challenging to conduct, it provides insight into a reality which needs to be explored.

Final Thoughts

Playing games for the purposes of further developing an L2 can indeed be beneficial. This does not mean that any individual can sit down and start playing a game in the foreign language and expect to start learning new vocabulary or grammar; on the contrary, the simple act of playing a game alone is insufficient. To truly benefit from the gameplay experience, the language learner must not only choose the correct game and monitor his or her gameplay approach, but a dialogue between players or learners should ideally accompany the gameplay experience so that the individual has the opportunity to utilize the language encountered in-game and other non-gaming contexts. If done so, learners may engage in a SLD experience that supplements the traditional classroom experience and may in fact provide the drive to continue exploring and using the language beyond the classroom and the formal language learning experience.

At the very least, learners should feel comfortable pursuing digital games as a means of demonstrably developing further proficiency in an L2. With the guidance of an instructor to motivate individuals to explore games for SLD purposes, or by discovering applicable affinity spaces to act as loci of communication, language learners can engage in meaningful interaction and enjoyable play in extramural spaces and ultimately further develop their second language.

Works Cited

- Allen, L. K., Crossley, S. A., Snow, E. L., & McNamara, D. S. (2014). L2 writing practice: Game enjoyment as a key to engagement. *Language Learning & Technology, 18*(2), 124–150.
- Ang, C. S., & Zaphiris, P. (2006b). Developing enjoyable second language learning software tools: A computer game paradigm. In *Computer Aided Language Learning* (pp. 1–21). Hershey, PA: Information Science Publishing.
- Arnseth, H. C. (2006). Learning to play or playing to learn - A critical account of the models of communication informing educational research on computer gameplay. *Game Studies, 6*(1). Retrieved from <http://gamestudies.org/0601/articles/arnseth>
- Barnett, S. M., & Ceci, S. J. (2002). When and where do we apply what we learn? A taxonomy for far transfer. *Psychological Bulletin, 128*(4), 612–637.
- Beckner, C., Blythe, R., Bybee, J., Christiansen, M. H., Croft, W., Ellis, N. C., Schoenemann, T. (2009). Language is a complex adaptive system: Position paper. *Language Learning, 59*, 1–26.
- Beckner, C., & Bybee, J. (2009). A usage-based account of constituency and reanalysis. In *Language as a Complex Adaptive System* (pp. 27–46). United Kingdom: Wiley-Blackwell.
- Benson, P., & Reinders, H. (2011). *Beyond the Language Classroom*. New York, NY: Palgrave Macmillan.
- Betz, E., & Huth, T. (2014). Beyond grammar: Teaching interaction in the German language classroom. *Die Unterrichtspraxis/Teaching German, 47*(2), 140–163.

- Bikowski, D., & Kuhn, J. (2014). *Mining student engagement: Minecraft in the writing classroom*. Presented at the CALICO, Athens, Ohio.
- Blake, R. (2011). Current trends in online language learning. *Annual Review of Applied Linguistics, 31*, 19–35.
- Blin, F. (2004). CALL and the development of learner autonomy: Towards an activity-theoretical perspective. *ReCALL, 16*(2), 377–395.
- Blythe, R. A., & Croft, W. A. (2009). The speech community in evolutionary language dynamics. *Language Learning, 59*, 47–63.
- Brehm, A. L. (2013). Navigating the feminine in massively multiplayer online games: Gender in World of Warcraft. *Frontiers in Psychology, 4*, 1–12.
- Breuer, J., Kowert, R., Festl, R., & Quandt, T. (2015). Sexist games = sexist gamers? A longitudinal study on the relationship between video game use and sexist attitudes. *Cyberpsychology, Behavior, and Social Networking, 18*(4), 1–6.
- Brown, A. L. (1989). Analogical learning and transfer: What develops? In S. Vosniadou & A. Ortony (Eds.), *Similarity and analogical reasoning* (pp. 369–412). New York: Cambridge University Press.
- Bytheway, J. (2011). *Vocabulary learning strategies in massively multiplayer online role-playing games*. Victoria University of Wellington, Wellington, New Zealand.
- Bytheway, J. (2014). In-game culture affects learners' use of vocabulary learning strategies in massively multiplayer online role-playing games. *International Journal of Computer-Assisted Language Learning and Teaching, 4*(4), 1–13.

- Carroll, S., Swain, M., & Roberge, Y. (1992). The role of feedback in adult second language acquisition: Error correction and morphological generalizations. *Applied Psycholinguistics*, 13(2), 173–198.
- Casanave, C. P. (2012). Diary of a dabbler: Ecological influences on an EFL teacher's efforts to study Japanese informally. *TESOL Quarterly*, 46(4), 642–670.
- Chapelle, C. A. (2005). Interactionist SLA theory in CALL research. In *Research Perspectives on CALL* (pp. 53–64). Mahwah, NJ: Lawrence Erlbaum Associates.
- Chatfield, T. (2010). *Fun Inc.: Why Games are the 21st Century's most Serious Business*. London: Virgin Books.
- Chen, H. H.-J., & Yang, C. (2011). Investigating the effects of an adventure video game on foreign language learning. In M. Chang, W.Y. Hwang, M. P. Chen, & W. Müller (Eds.), *Proceedings of the 6th International Conference on E-learning and Games, Edutainment 2011* (pp. 168–175). Berlin: Springer-Verlag.
- Cheung, A., & Harrison, C. (1992). Microcomputer adventure games and second language acquisition: A study of Hong Kong tertiary students. In M. C. Pennington & V. Stevens (Eds.), *Computers in Applied Linguistics: An International Perspective* (pp. 155–178). Clevedon: Multilingual Matters Ltd.
- Chik, A. (2012). Digital gameplay for autonomous foreign language learning: Gamers' and language teachers' perspectives. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 95–114). Great Britain: Palgrave Macmillan.
- Chik, A. (2014). Digital gaming and language learning: Autonomy and community. *Language Learning & Technology*, 18(2), 85–100.

- Cobb, T. (2002). Web Vocabprofile, an adaptation of Heatley, Nation & Coxhead's (2002) Range. Retrieved July 21, 2015, from <http://www.lexutor.ca/vp/>
- Colpaert, J. (2013). Peripatetic consideration on research challenges in CALL. In P. Hubbard, M. Schulze, & B. Smith (Eds.), *Learner-Computer Interaction in Language Education* (pp. 272–279). San Marcos, Texas: Computer Assisted Language Instruction Consortium.
- Cornillie, F., Clarebout, G., & Desmet, P. (2012). Between learning and playing? Exploring learners' perceptions of corrective feedback in an immersive game for English pragmatics. *ReCALL*, 24(3), 257–278.
- Cornillie, F., Jacques, I., De Wannemacker, S., Paulussen, H., & Desmet, P. (2011). Vocabulary treatment in adventure and role-playing games: A playground for adaptation and adaptivity. In *Interdisciplinary Approaches to Adaptive Learning. A Look at the Neighbours* (pp. 131–146). Berlin: Springer-Verlag.
- Cornillie, F., Thorne, S. L., & Desmet, P. (2012). Editorial: Digital games for language learning: from hype to insight? *ReCALL*, 24(3), 243–256.
- Coxhead, A., & Bytheway, J. (2015). Learning vocabulary using two massive online resources. In *Language Learning Beyond the Classroom* (pp. 65–74). New York, NY: Routledge.
- Csikszentmihalyi, M. (1997). *Finding Flow: The Psychology of Engagement with Everyday Life*. New York: Basic Books.
- Culley, G., Mulford, G., & Milbury-Steen, J. (1986). A foreign-language adventure game: Progress report on an application of AI to language instruction. *CALICO*, 4(2), 69–87.
- Cvetek, S. (2008). Applying chaos theory to lesson planning and delivery. *European Journal of Teacher Education*, 31(3), 247–256.

- Das Wortschatz-Lexikon. (2001). Retrieved from <http://wortschatz.uni-leipzig.de/Papers/top1000de.txt>
- Davis, B., & Simmt, E. (2003). Understanding learning systems: Mathematics education and complexity science. *Journal for Research in Mathematics Education*, 34(2), 137–167.
- Davis, B., & Sumara, D. (2008). Complexity as a theory of education. *Transnational Curriculum Inquiry*, 5(2), 33–34.
- De Bot, K., & Larsen-Freeman, D. (2011). Researching second language development from a dynamic systems theory perspective. In M. H. Verspoor, K. de Bot, & W. Lowie (Eds.), *A Dynamic Approach to Second Language Development* (pp. 5–24). Amsterdam: John Benjamins.
- De Bot, K., Lowie, W., Thorne, S. L., & Verspoor, M. H. (2013). Dynamic systems theory as a comprehensive theory of second language development. In M. del P. Garcia Mayo, M. J. Gutierrez Mangado, & M. Martinez Adria (Eds.), *Contemporary Approaches to Second Language Acquisition* (Vol. 9, pp. 199–220). Amsterdam: John Benjamins.
- De Bot, K., Lowie, W., & Verspoor, M. H. (2007). A Dynamic Systems Theory approach to second language acquisition. *Bilingualism: Language and Cognition*, 10(1), 7–21.
- De Bot, K., Verspoor, M. H., & Lowie, W. (2005). Dynamic systems theory and applied linguistics: The ultimate “so what”? *International Journal of Applied Linguistics*, 15(1), 116–118.
- De Haan, J. (2005). Acquisition of Japanese as a foreign language through a baseball video game. *Foreign Language Annals*, 38(2), 278–282.

- De Haan, J., Reed, M., & Kuwada, K. (2010). The effect of interactivity with a music video game on second language vocabulary recall. *Language Learning & Technology, 14*(2), 74–94.
- Delwiche, A. (2006). Massively multiplayer online games (MMOs) in the new media classroom. *Educational Technology & Society, 9*(3), 160–172.
- Dörnyei, Z. (2009). Individual differences: Interplay of learner characteristics and learning environment. In *Language as a Complex Adaptive System* (pp. 230–248). United Kingdom: Wiley-Blackwell.
- Dörnyei, Z. (2014). Researching complex dynamic systems: “Retrodictive qualitative modeling” in the language classroom. *Language Teaching, 47*(1), 80–91.
- Ellis, N. C., & Larsen-Freeman, D. (2006). Language emergence: Implications for applied linguistics - Introduction to the special issue. *Applied Linguistics, 27*(4), 558–589.
- Ellis, N. C., & Larsen-Freeman, D. (2009). Constructing a second language: Analyses and computational simulations of the emergence of linguistic constructions from usage. In *Language as a Complex Adaptive System* (pp. 90–125). United Kingdom: Wiley-Blackwell.
- ESA. (2010). Sales, Demographics, and Usage Data: Essential Facts About the Computer and Video Games Industry. Retrieved from http://www.theesa.com/facts/pdfs/ESA_Essential_Facts_2010.PDF
- Filsecker, M., & Bündgens-Kosten, J. (2012). Behaviorism, constructivism, and communities of practice: How pedagogic theories help us understand game-based language learning. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 50–69). Great Britain: Palgrave Macmillan.

- Gee, J. P. (2003). *What video games have to teach us about language and literacy*. New York: Palgrave Macmillan.
- Gee, J. P. (2004). Learning by design: Games as learning machines. *Interactive Educational Multimedia*, 8, 15–23.
- Gee, J. P. (2005). Semiotic social spaces and affinity spaces: From the age of mythology to today's schools. In D. Barton & K. Tusting (Eds.), *Beyond Communities of Practice: Language, Power, and Social Context* (pp. 214–232). Cambridge: Cambridge University Press.
- Gee, J. P. (2006). Why game studies now? Video games: A new art form. *Games & Culture*, 1(1), 1–4.
- Gee, J. P. (2008). Learning and games. In K. Salen (Ed.), *The Ecology of Games: Connecting Youth, Games, and Learning* (pp. 21–40). Cambridge, MA: MIT Press.
- Gleick, J. (1987). *Chaos*. Great Britain: Cardinal.
- Godwin-Jones, R. (2014). Games in language learning: Opportunities and challenges. *Language Learning & Technology*, 18(2), 9–19.
- Harrigan, K. A., Collins, K., Dixon, M., & Fugelsang, J. (2010). Addictive gameplay: What casual game designers can learn from slot machine research. *Futureplay '10: Proceedings of the International Academic Conference on the Future of Game Design and Technology*, 127–133.
- Hays, R. T. (2005). The effectiveness of instructional games: A literature review and discussion. In *Technical Report No. 2005-004* (pp. 1–63). Orlando, FL: Naval Air Warfare Center Training Systems Division. Retrieved from

<http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA44193>

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Heatley, A., Nation, P., & Coxhead, A. (2002). RANGE and FREQUENCY programs. Retrieved from <http://www.victoria.ac.nz/lals/staff/paul-nation.aspx>

Hirsh-Pasek, K., Golinkoff, R., & Hollich, G. (1999). Trends and transitions in language development: Looking for the missing piece. *Developmental Psychology*, 16, 139–162.

Holden, C. L., & Sykes, J. (2012). Mentira: Prototyping language-based locative gameplay. In S. Dijkers, J. Martin, & B. Coulter (Eds.), *Mobile Media Learning: Amazing Uses of Mobile Devices for Teaching and Learning* (pp. 111–131). Pittsburgh, PN: ETC Press.

Holden, C. L., & Sykes, J. (2013). Complex L2 pragmatic feedback via place-based mobile games. In N. Taguchi & J. Sykes (Eds.), *Technology in Interlanguage Pragmatics Research and Teaching* (Vol. 36, pp. 155–183). Amsterdam: John Benjamins.

Hubbard, P. (2009). *Computer-Assisted Language Learning: Critical Concepts in Linguistics*. London: Routledge.

Hyland, K., & Hyland, F. (2006). *Feedback in Second Language Writing: Contexts and Issues*. Cambridge: Cambridge University Press.

Ito, M. (2008). Education vs. entertainment: A cultural history of children's software. In K. Salen (Ed.), *The Ecology of Games: Connecting Youth, Games, and Learning* (pp. 89–116). Cambridge, MA: MIT Press.

Jakonen, T. (2014). Building bridges - How secondary school pupils bring their informal learning experiences into a Content and Language Integrated (CLIL) classroom. *APPLES: Journal of Applied Language Studies*, 8(1), 7–28.

- Johnson, S. (2001). *Emergence: The Connected Lives of Ants, Brains, Cities, and Software*. New York: Scribner.
- Johnson, W. L. (2007). Serious use of a serious game for language learning. *International Journal of Artificial Intelligence in Education*, 20, 175–195.
- Johns, T., & Wang, L. (1999). Four versions of a sentence-shuffling program. *System*, 27(3), 329–338.
- Jones, G. (1986). Computer simulations in language teaching - The kingdom experiment. *System*, 14(2), 179–196.
- Kessler, G. (2013). Collaborative language learning in a co-constructed participatory culture. *CALICO*, 30(3), 307–322.
- Kobayashi, E., Kobayashi, M., & Fujimura, T. (2014). A functional analysis of EFL students' discourse in the social practice of learning to play a board game, 1–19.
- Koo, D.-M. (2009). The moderating role of locus of control on the links between experiential motives and intention to play online games. *Computers in Human Behavior*, 25, 466–474.
- Kramsch, C. (2002). *Language Acquisition and Language Socialization: Ecological Perspectives*. New York, NY: Continuum.
- Kramsch, C. (2009). *The Multilingual Subject*. New York, NY: Oxford University Press.
- Kramsch, C. (2011). The symbolic dimensions of the intercultural. *Language Teaching*, 44(3), 354-367.
- Kuhn, J. (2014, May). *Constructivist Writing with Minecraft*. Prezi. Retrieved from <https://prezi.com/4y8ttfnndytk/constructivist-writing-with-minecraft/>
- Lakoff, G. (1987). *Women, Fire, and Dangerous Things. What Categories Reveal about the Mind*. Chicago: University of Chicago Press.

- Larsen-Freeman, D. (1997). Chaos/complexity science and second language acquisition. *Applied Linguistics*, 18(2), 141–165.
- Larsen-Freeman, D. (2002). Language acquisition and language use from a chaos/complexity theory perspective. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization: Ecological Perspectives* (pp. 33–46). London: Continuum.
- Larsen-Freeman, D., & Cameron, L. (2008a). *Complex Systems and Applied Linguistics*. Oxford: Oxford University Press.
- Larsen-Freeman, D., & Cameron, L. (2008b). Research methodology on language development from a complex systems perspective. *The Modern Language Journal*, 92(2), 200–213.
- Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation*. Cambridge: Cambridge University Press.
- Legenhausen, L., & Wolff, D. (1990). CALL in use-use of CALL: Evaluating CALL software. *System*, 18(1), 1–13.
- Levy, M. (1997). *Computer-Assisted Language Learning: Context and Conceptualization*. New York: Oxford University Press.
- Liang, M.-Y. (2012). Foreign ludicity in online role-playing games. *Computer Assisted Language Learning*, 25(5), 455–469.
- Liou, H.-C. (2012). The roles of Second Life in a college computer-assisted language learning (CALL) course in Taiwan, ROC. *Computer Assisted Language Learning*, 25(4), 365–382.
- Lorenz, E. N. (1993). *The Essence of Chaos*. Seattle: University of Washington Press.

- Marek, M. W., & Wu, W.-C. V. (2014). Environmental factors affecting computer assisted language learning success: a Complex Dynamic Systems conceptual model. *Computer Assisted Language Learning*, 27(6), 560–578.
- Meara, P. (2009). *Connected Words. Word Associations and Second Language Vocabulary Acquisition*. Amsterdam/Philadelphia: John Benjamins.
- Meara, P., & Buxton, B. (1987). An alternative to multiple choice vocabulary tests. *Language Testing*, 4(2), 142–154.
- McGarry, M., & Schmenk, B. (2013). The autonomous lifelong learner as an economized subject of education. In A. Berndt (Ed.), *Fremdsprachen in der Perspektive lebenslangen Lernens* (pp. 61–74). Frankfurt am Main: Peter Lang.
- Miller, M., & Hegelheimer, V. (2006). The SIMs meet ESL: Incorporating authentic computer simulation games into the language classroom. *Interactive Technology and Smart Education*, 3(4), 311–328.
- Molla, S. R., Sanders, A. F., & Sanders, R. H. (1988). Artificial intelligence in a German adventure game: Spion in PROLOG. *CALICO*, 6(1), 9–23.
- Morrison, D. M. (1984). GAPPER: A microcomputer-based learning game. *System*, 12(2), 169–180.
- Neville, D. O., Shelton, B. E., & McInnis, B. (2009). Cybertext redux: Using digital game-based learning to teach L2 vocabulary, reading, and culture. *Computer Assisted Language Learning*, 22(5), 409–424.
- Palmberg, R. (1988). Computer games and foreign-language vocabulary learning. *ELT Journal*, 42(4), 247–252.

- Peterson, M. (2010a). Learner participation patterns and strategy use in Second Life: An exploratory case study. *ReCALL*, 22(3), 273–292.
- Peterson, M. (2010b). Massively multiplayer online role-playing games as arenas for second language learning. *Computer Assisted Language Learning*, 23(5), 429–439.
- Peterson, M. (2012). Language learner interaction in a massively multiplayer online role-playing game. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 70–92). Great Britain: Palgrave Macmillan.
- Peterson, M. (2013). *Computer Games and Language Learning*. New York, NY: Palgrave Macmillan.
- Pirainen–Marsh, A., & Tainio, L. (2009). Collaborative game-play as a site for participation and situated learning of a second language. *Scandinavian Journal of Educational Research*, 53(2), 167–183.
- Piper, A. (1986). Conversation and the computer: A study of the conversational spin-off generated among learners of English as a foreign language working in groups. *System*, 14(2), 187–198.
- Polat, B., & Kim, Y. (2014). Dynamics of complexity and accuracy: A longitudinal case study of advanced untutored development. *Applied Linguistics*, 35(2), 184–207.
- Prensky, M. (2001). *Digital Game-Based Learning*. New York: McGraw-Hill.
- Purushotma, R. (2005). Commentary: You're not studying, you're just... *Language Learning & Technology*, 9(1), 80–96.
- Quasthoff, U., & Wolff, C. (1999). Korpuslinguistik und große einsprachige Wörterbücher. *Linguistik Online*, 3.

- Rama, P. S., Black, R. W., Van Es, E., & Warschauer, M. (2012). Affordances for second language learning in World of Warcraft. *ReCALL*, 24(3), 322–338.
- Ranalli, J. (2008). Learning English with The Sims: exploiting authentic computer simulation games for L2 learning. *Computer Assisted Language Learning*, 21(5), 441–455.
- Rankin, Y., Gold, R., & Gooch, B. (2006). 3D role-playing games as language learning tools. In E. Gröller & L. Szirmay-Kalos (Eds.), *Proceedings of EuroGraphics 2006* (Vol. 25). New York: ACM.
- Rankin, Y., McNeal, M., Shute, M. W., & Gooch, B. (2008). User centered game design: Evaluating massive multiplayer online role playing games for second language acquisition. In *Sandbox '08: Proceedings of the 2008 ACM SIGGRAPH Symposium on Video Games* (pp. 43–49). New York, NY: ACM.
- Reinders, H. (2012). Introduction. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 1–8). Great Britain: Palgrave Macmillan.
- Reinders, H., & Wattana, S. (2012). Talk to me! Games and students' willingness to communicate. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 156–188). Great Britain: Palgrave Macmillan.
- Reinders, H., & Wattana, S. (2014). Can I say something? The effects of digital game play on willingness to communicate. *Language Learning & Technology*, 18(2), 101–123.
- Reinhardt, J. (2012). Potentials for digital game-mediated foreign language teaching and learning. *Fremdsprachen Und Hochschule*, 85, 157–173.
- Schoenemann, P. T. (2009). Evolution of brain and language. In *Language as a Complex Adaptive System* (pp. 162–186). United Kingdom: Wiley-Blackwell.

- Scholarly Activities in Computer-Assisted Language Learning: Development, Pedagogical Innovations, and Research. (2001). Retrieved July 26, 2015, from <https://calico.org/page.php?id=506>
- Schulze, M. (2008). Interfaces in intelligent CALL. *Computer Assisted Language Learning*, 21(4), 301–304.
- Schulze, M., & Penner, N. (2008). Construction grammar in ICALL. *Computer Assisted Language Learning*, 21(5), 427–440.
- Schulze, M., & Scholz, K. W. (2016). Complex adaptive systems in CALL research. In C. Caws & M.-J. Hamel (Eds.), *Learner-Computer Interactions: New Insights on CALL Theories and Applications*. Amsterdam: John Benjamins.
- Smith, B. (2003). Computer-mediated negotiated interaction: An expanded model. *Modern Language Journal*, 87, 38–58.
- Sockett, G. (2011). From the cultural hegemony of English to online informal learning: Cluster frequency as an indicator of relevance in authentic documents. *Asp*, 60, 5–20.
- Sockett, G. (2013). Understanding the online informal learning of English as a complex dynamic system: An emic approach. *ReCALL*, 25(1), 48–62.
- Sockett, G., & Toffoli, D. (2012). Beyond learner autonomy: A dynamic systems view of the informal learning of English in virtual online communities. *ReCALL*, 24(2), 138–151.
- Squire, K. (2011). *Video Games and Learning: Teaching and Participatory Culture in the Digital Age*. New York: Teachers College Press.
- Steinkuehler, C. (2007). Massively multiplayer online gaming as a constellation of literary practices. In B. E. Shelton & D. A. Wiley (Eds.), *The Design and Use of Simulation*

- Computer Games in Education* (pp. 187–212). Rotterdam, The Netherlands: Sense Publishers.
- Stevens, A. (2010). *Study on the Impact of Information and Communications Technology (ICT) and New Media on Language Learning*. European Commission. Retrieved from http://eacea.ec.europa.eu/llp/studies/documents/study_impact_ict_new_media_language_learning/final_report_en.pdf
- Suh, S., Kim, S. W., & Kim, N. J. (2010). Effectiveness of MMORPG-based instruction in elementary English education in Korea. *Journal of Computer Assisted Learning*.
- Sundqvist, P. (2009). *Extramural English matters: Out-of-school English and its impact on Swedish ninth graders' oral proficiency and vocabulary*. Karlstad University, Karlstad.
- Sundqvist, P., & Sylvén, L. K. (2012a). Similarities between playing World of Warcraft and CLIL. *APPLES: Journal of Applied Language Studies*, 6(2), 113–130.
- Sundqvist, P., & Sylvén, L. K. (2012b). World of VocCraft: Computer games and Swedish learners' L2 English vocabulary. In *Digital Games in Language Learning and Teaching* (pp. 189–208). Great Britain: Palgrave Macmillan.
- Sundqvist, P., & Sylvén, L. K. (2014). Language-related computer use: Focus on young L2 English learners in Sweden. *ReCALL*, 26(1), 3–20.
- Sykes, J., Oskoz, A., & Thorne, S. L. (2008). Web 2.0, synthetic immersive environments, and mobile resources for language education. *CALICO*, 25(3), 528–546.
- Sykes, J., & Reinhardt, J. (2012). Conceptualizing digital game-mediated L2 learning and pedagogy: Game-enhanced and game-based research and practice. In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 32–49). Great Britain: Palgrave Macmillan.

- Sykes, J., & Reinhardt, J. (2013). *Language at Play: Digital Games in Second and Foreign Language Teaching and Learning*. New York: Pearson.
- Sykes, J., & Reinhardt, J. (2014). Special issue commentary: Digital game activity in L2 teaching and learning. *Language Learning & Technology*, 18(2), 2–8.
- Sykes, J., Reinhardt, J., & Thorne, S. L. (2010). Multiuser digital gaming as sites for research and practice. In F. Hult (Ed.), *Directions and Prospects for Educational Linguistics* (pp. 117 – 135). New York: Springer.
- Thomas, M. (2012). Contextualizing digital game-based language learning: Transformational paradigm shift or business as usual? In H. Reinders (Ed.), *Digital Games in Language Learning and Teaching* (pp. 11–31). Great Britain: Palgrave Macmillan.
- Thomas, M., Reinders, H., & Warschauer, M. (2013). *Contemporary Computer-Assisted Language Learning*. London/New York: Bloomsbury.
- Thorne, S. L. (2008a). Mediating technologies and second language learning. In J. Coiro, M. Knobel, C. Lankshear, & D. J. Leu (Eds.), *Handbook of Research on New Literacies* (pp. 417–449). Mahwah, NJ: Lawrence Erlbaum Associates.
- Thorne, S. L. (2008b). Transcultural communication in open internet environments and massively multiplayer online games. In S. Sieloff Magnan (Ed.), *Mediating Discourse Online* (pp. 305–327). Amsterdam: John Benjamins.
- Thorne, S. L., Black, R. W., & Sykes, J. (2009). Second language use, socialization, and learning in internet interest communities and online gaming. *The Modern Language Journal*, 93(s1), 802–821.
- Thorne, S. L., Fischer, I., & Lu, X. (2012). The semiotic ecology and linguistic complexity of an online game world. *ReCALL*, 24(3), 279–301.

- Thorne, S. L., & Reinhardt, J. (2008). "Bridging activities," new media literacies and advanced foreign language proficiency. *CALICO*, 25(3), 558–572.
- Tobias, S., & Fletcher, J. D. (2011). *Computer Games and Instruction*. New York: State University of New York.
- Toffoli, D., & Sockett, G. (2010). How non-specialist students of English practice informal learning using web 2.0 tools. *Asp*, 58, 125–144.
- Tomasello, M. (2003). *Constructing a Language: A Usage-based Theory of Language Acquisition*. Cambridge, MA: Harvard University Press.
- Tomasello, M. (2006). Acquiring linguistic constructions. In R. Siegler & D. Kuhn (Eds.), (pp. 1–101). Wiley.
- Turgut, Y., & Irgin, P. (2009). Young learners' language learning via computer games. *Procedia: Social and Behavioral Sciences*, 1, 760–764.
- Vandercruyse, S., Vandewaetere, M., & Clarebout, G. (2012). Game-based learning: A review on the effectiveness of educational games. In M. M. Cruz-Cunha (Ed.), *Handbook of Research on Serious Games as Educational, Business, and Research Tools* (pp. 628–647). Hershey, PA: IGI Global.
- Van Dijk, M., Verspoor, M. H., & Lowie, W. (2011). Variability and DST. In M. H. Verspoor, K. de Bot, & W. Lowie (Eds.), *A Dynamic Approach to Second Language Development* (pp. 55–84). Amsterdam: John Benjamins.
- Van Eck, R. (2009). A guide to integrating COTS games into your classroom. In R. E. Ferdig (Ed.), *Handbook of Research on Effective Electronic Gaming in Education* (pp. 179–199). Hershey, PA: Information Science Publishing.

- Van Geert, P. (1991). A dynamic systems model of cognitive and language growth. *Psychological Review*, 98, 3–53.
- Van Geert, P., & van Dijk, M. (2002). Focus on variability: New tools to study intra-individual variability in developmental data. *Infant Behavior & Development*, 25, 340–374.
- Van Lier, L. (2002). An ecological-semiotic perspective on language and linguistics. In C. Kramsch (Ed.), *Language Acquisition and Language Socialization: Ecological Perspectives*. New York, NY: Continuum.
- Van Lier, L. (2004). *The Ecology and Semiotics of Language Learning: A Sociocultural Perspective*. Boston, MA: Kluwer Academic.
- Verspoor, M. H., de Bot, K., & Lowie, W. (Eds.). (2011). *A Dynamic Approach to Second Language Development*. Amsterdam: John Benjamins.
- Wood, D. J., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17, 89–100.
- Zhao, Y., & Lai, C. (2009). MMORPGS and foreign language education. In R. E. Ferdig (Ed.), *Handbook of Research on Effective Electronic Gaming in Education* (pp. 402–421). New York: IDEA Group.
- Zheng, D. (2012). Caring in the dynamics of design and languaging: Exploring second language learning in 3D virtual spaces. *Language Sciences*, 34, 543–558.
- Zheng, D., Newgarden, K., & Young, M. F. (2012). Multimodal analysis of language learning in World of Warcraft play: Languaging as Values-realizing. *ReCALL*, 24(3), 339–360.
- Zheng, D., Young, M. F., Wagner, M. M., & Brewer, R. A. (2009). Negotiation for action: English language learning in game-based virtual worlds. *The Modern Language Journal*, 93, 489–511.

Appendices

Appendix A

Background Information Questionnaire

Please fill out the following questions to the best of your ability and in as much detail as possible. When finished, save a copy of this questionnaire and email it to me (Kyle Scholz) at kwscholz@uwaterloo.ca

Name:

Age:

Sex:

Year of Academic Study and Program:

Rationale for studying German (major, minor, interest, etc.):

Foreign Language Proficiency:

Please list all languages you can speak and the proficiency with which you can speak them (1 = with great difficulty; 4 = Can use the language with no difficulties in this context):

Language	Reading				Writing				Listening				Speaking			
German	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
English	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4

1. What experience do you have studying the German language (high school, university, exchanges, etc.)?

2. How often do you use German (in any of the four major skills) on a regular basis? In which settings do you use the language?

3. Do you have any connection to the German language external to the foreign language classroom (family, friends, trips, etc.)?

4. Please describe your proficiency with using the computer. How comfortable are you with computers? What do you typically use them for?

5. What are your experiences with gaming in general (video games, table-top games, card games, etc.)? How often do you play games of any sort? Please list the games you play most frequently.

6. Please describe your proficiency with online computer games. How often do you play them? Do you enjoy communicating with others online while playing games? Please list the games you play most frequently.

7. Have you previously used forms of digital media (online games, language learning websites, etc.) to try to learn a foreign language? If so, which ones have you used? Did you find them useful?

8. Do you envision online computer games as being useful for foreign language learning? Why or why not?

Appendix B

	Kennst du das Wort/den Satz?	Auf Englisch?	Woher kennst du dieses Wort/die sen Satz?	Schon gelernt	Vielleicht	Wahrscheinlich	Unbedingt	Schon aber neu im Spiel gelernt
Greif								
Ausdauer								
Stärke								
Waffe								
Rüstung								
Reittier								
Beute								
abbrechen								
erstellen								
Beweglichkeit								
Verkäuferin								
Erfahrung								
Ruf								
abgeschlossen								
ihr fühlt Euch normal								
annehmen								
entdeckt								
plündern								
zurückkehren								
bekommen								
sterben								
ihr habt eine neue Fähigkeit gelernt								
erhalten								

zur Kontaktliste
hinzugefügt
seid begrüßt
ihr müsst euch näher an
diesem Ziel befinden
ablehnen
Belohnung
