

AGENTIC DEVELOPMENT IN ONLINE AFFINITY SPACES: REDDIT AS A PLACE FOR  
SECOND LANGUAGE LEARNING

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## **Abstract**

This work examines how social media users learn language alongside their progression of becoming active participants in online social spaces. Using an ecolinguistic view, it explores how the process of posting and commenting on Reddit (one of the world's most popular social sites) is both afforded and constrained by the unique sociocultural histories of online spaces, previous interactions with users in those spaces, and personal values. The results, in turn, also help to provide clear illustrations of ecolinguistic principles. Thereafter, it addresses how that process of participation can result in language learning by using examples drawn from the public data available on Reddit.

The participant pool of this work is comprised of 21 non-native English speakers who visited and contributed to Reddit while learning English. Their posting habits, their contributions, online participation statistics, and open-ended interviews make up the data for this project. Qualitative analyses demonstrate how users feel they learn language and highlight the position that community belonging relates to and encourages online participation. Users initiate their participation on Reddit by interacting with others in peripheral roles. Once they begin contributing and voting in specific communities, new actions are afforded. Using previous posts, comments, and experiences as co-authors, the users begin to modify the language in their contributions to both adhere to the sociocultural norms in the space and to effect predicted outcomes. This work looks deeper at how these modifications can then result in the agentic development of learners.

The online behaviors of one focal participant are highlighted to provide specific examples of modified linguistic behaviors. Fine-grained cognitive event analyses reveal several measurable developments in language. However, the kind of change and the language learned

which social media users experience is not readily assessed by standard measures of language acquisition, such as operationalizations of constructs like complexity or accuracy. This work applies both existing and new methods to help explain and measure the complex system of systems that make up language in online spaces.

The results of this study add to a growing body of evidence supporting claims made by ecolinguists in the field of second language learning. In addition, a new concept of agentic development is highlighted and defined. Learners who participate in activities that afford agentic development are shown to modify their real-world behaviors while, at the same time, learning language. Examples of language learning observed also demonstrate how new wordings are able to, in turn, afford new actions in a cycle of perception and action. The work finishes with a brief discussion aimed at helping practitioners apply some of the principles found in this project to encourage students in their agentic development.

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# CHAPTER 1

## Introduction

Language learning in informal online settings has, to this time, remained a largely understudied field (Sauro & Zourou, 2019; Zourou, 2020). While formal, classroom-based language learning has been well published, with scores of accepted and systematized methodologies for exploring a host of questions, there are far fewer peer-reviewed published works that look at how learners learn another language through uncontrolled participation in places such as social network sites, online forums, video hosting websites, and so forth (Sauro & Zourou, 2019, p. 1). This is due, in large part, to the kinds of language that appear in online spaces. Online language is notoriously different from written academic language (Herring, 2001, 2010, 2011; Kern, 2006). It shares aspects of written and spoken discourse, it is mediated by the technology used to create the written artifacts, and it can employ a variety of modes (e.g., audio, video, or images) inaccessible to speakers or writers using traditional methods of writing. Conventions common in the academic field are usually not adhered to, and socially accepted practices can vary greatly from one online place to another and from one time to another. This makes it incredibly difficult to create a prescriptive standard against which one can measure the correctness of language. By extension, this can make it difficult to argue what has been learned (Kern, 2006).

Many of the methods used to assess language learning simply do not apply to language that appears in online spaces, as grammar and other linguistic conventions for writing in text messages or social network spaces are often very different from those in academic English writing. Oftentimes, online spaces come with unique vocabulary or meaning-making patterns. Forms of media beyond text (e.g., emoji, GIFs, images, etc.) can also be used to share

experiences or to endow meaning. In controlled experiments in the physical sciences (which often serve as a sort of gold standard for scientific research), investigators are urged to maintain all variables constant except for one independent variable. However, the complexities of online spaces make the language appearing there difficult to assess and possible external variables nearly impossible to control. This has caused researchers to attempt and tackle the online language problem in a variety of ways, often defining new independent variables by modifying already existing measures of language proficiency, producing new scales for measuring accuracy, or even creating custom corpora to assess learner adherence to norms (e.g., Kranzlein et al., 2020). However, this work echoes the increasingly common position that the complexities of online places and the language in them should be studied and analyzed, rather than controlled or avoided altogether. Almost a century ago, Malinowski (1936) foresaw the movement to overlook the complexities of human interaction by focusing on systematic controlled investigation of written text. He wrote the following:

The dilemma of contemporary linguistics has important implications. It really means the decision as to whether the science of language will become primarily an empirical study, carried out on living human beings within the context of their practical activities, or whether it will remain largely confined to deductive arguments, consisting of speculation based on written or printed evidence alone. (p. 172)

Extending Malinowski's challenge to the present day, it is important for researchers of online and technology-mediated language to look beyond what is simply on the screen and toward the languaging activity and development of humans within the contexts of their practical lives.

Referring to the complex activities that happen in technology-mediated spaces, Sauro and Zourou (2019) write that "the possibilities afforded by digital artifacts, as well as to the

increasingly natural and fluid digitally-assisted human interaction, ... [enable] spontaneous, user-driven, bottom-up practices that support learning” (p. 1). This work aims to provide greater understanding of how online spaces support the process of becoming (Zheng et al., 2018) through these bottom-up practices and, consequently, language learning as well. It does so by taking an ecological, dialogical, and distributed look at language learning in online spaces.

To provide an outline of the current work, a short summary of each chapter follows. Chapter 2 below begins by summarizing the history of ecolinguistics. Then, it explains in detail how the theoretical underpinnings of the field apply to the context of online social spaces. It also provides a review of the literature dealing with ecological language research and online ecosystems, highlighting the need for more research focused on language learning in those ecologies. Chapter 3 presents a detailed summary of the methodology used in this work. It expounds on the procedures used to gather and interview a pool of participants from around the globe regarding their self-reflected experiences with language learning in an online social space. Afterward, details are included about the case study of a focal participant taken from the original participant pool. How data were gathered and analyzed is explained in great detail with the hope of informing and facilitating future ecological studies on language learning. Chapter 4 summarizes the results generated from the analyses of both the larger group analyses and the case study. Similarities between both parts of the work are highlighted, and recurring ideas are identified. Chapter 5 takes a deeper dive into the results and discusses how online communities impact language learners as they develop themselves in a new ecology. Examples from the case study serve to provide context for the conclusions drawn and demonstrate how the development of learners as agents occurs along with the process of language learning. Suggestions for future

directions of study are included, as well as a short discussion on the methodological and theoretical implications of the work.

## CHAPTER 2

### Review of the Literature

This section reviews the literature and history of ecolinguistics, explaining the theory's foundational principles, concepts, and basic constructs. Because this is a relatively new area in the larger field of linguistics, there are fewer researchers currently writing and publishing work relating to language learning. Thus, this chapter begins with a summary of the ecolinguistic model. A discussion of how an ecolinguistic ontology serves to understand online spaces and the language that takes place therein follows. A section reviewing published ecolinguistic research in online spaces and its findings is included. The chapter continues by summarizing the research that has yet to be completed in the fields of ecological and dialogical language research in the online spaces, providing a setting for the current work and highlighting the need for more research in the field. It finishes by introducing the research questions guiding this work.

### The Emergence of Ecolinguistics

Ecolinguistics, or ecological linguistics, is a language philosophy that was pioneered largely in the writings of Haugen (1972) and, later, Halliday (1993, 2001). The term *ecolinguistics* first appears in a work by Haugen (1972). He coined it to suggest a need for language researchers to consider how the phenomenon of language is impacted by the very ecology in which it appears. While such a plea may appear both reasonable and warranted, it had a more far-reaching impact on future linguistic research than perhaps even its creator envisioned, sparking the formation of new constructs, new theories, new research questions, and new ways of viewing the construct of language itself. To tackle the question of what ecolinguistics is and the impact it has in the field of second language (L2) research, scholars must first define an ecology and then identify the connections between ecologies and language. This work draws

heavily on the frameworks of notable ecolinguists such as van Lier (e.g., 2000, 2004), Linell (e.g., 2009), Cowley (e.g., 2011b, 2012, 2017), and Steffensen (e.g., 2013, 2015).

### **Ecology and Dialogue**

Ecolinguistics begins with the study of an *ecology*, or the totality of relationships that an organism has with all other organisms and objects it comes into contact with (Arndt & Janney, 1983). The key to defining ecologies lies in relationships, or the ways in which two or more entities are connected or impact each other's actions. In the case of human languages, the first entity is always going to be a human being, or agent. The second entity may be another person. However, ecolinguistics accepts that it can be any other force: physical or immaterial, alive or inanimate, past or future, social or individual, direct or indirect, and so on (Linell, 2009). Once an “*other*” (Linell, 2009, p. 12) comes close enough to the agent to be able to be observed or influenced, a relationship can be established.

Dewey, a philosopher who focused on human experience and learning, explains that “things” only gain meaning as agents interact with them and then reflect on the interaction (1905, 1925, 1938). Thus, experience with others (i.e., a relationship) is prerequisite for both meaning and future intentional action. Additionally, observation helps evaluate, or give value to, an experience. In his expositions on human interaction with the natural ecology, Dewey (1925) argues that meaning is based on experience. He writes that “everything that exists in as far as it is known and knowable is in *interaction* with other things” (p. 175, italics added). In other words, in order for something to be known, there must be an interaction or experience first.

Dewey (1925) then posits that the significance of something is the result of association with the said thing and the consequences of patterned interaction with it. For example, the artifact of a hammer can mean the same thing to one human as it does to another only if they

have a similar pattern of using it. If one person uses hammers only to scratch his or her back, *hammer* would not have the same significance to that agent. “Meaning is primarily a property of behavior, and secondarily a property of objects” (p. 179)—and not only the behavior itself, but the reaction of the *other*. This interaction between agents and others is what ecolinguists refer to as *dialogue*.

Linell (2009), a linguist with a background in ecological psychology, defines *dialogue* along similar lines as Dewey’s (1925) concept of experience with others, but he extends the notion of experience to contexts beyond the natural ecology. Linell (2009) states that dialogue can refer to “*any* kind of human sense-making, semiotic practice, action, interaction, thinking, or communication, as long as these phenomena are ‘dialogically’ understood” (pp. 5–6). In agreement with what has already been elaborated, Linell reiterates that this dialogue can occur internally within one agent, between current and past experiences, between ideas or ideals, among paradigms, with artifacts or objects in the environment, with other agents, and so forth. (For further discussions on the different kinds of dialogue that can occur in the phenomenon of human language, see Linell, 2005; Marková et al., 2007.) One of the most fundamental assumptions of ecological and dialogical theories is that all humans are “interdependent with others’ experiences, actions, thoughts, and utterances” (Linell, 2009, p. 11). In other words, a human is not an autonomous being that can think in a contextual vacuum. Epistemologically, all action is some form of interaction, or dialogue. The analysis of the totality this axiom is an important characteristic of ecolinguistic research.

Expounding on the complexity of language and its ecologies, Steffensen and Fill (2014) explain that while a physical artifact’s ecology can be defined in a fairly straightforward manner (e.g., by identifying the ways in which its physical influence can be physically observed by and

impacted by another agent), the ecology of a language is much less able to be demarcated. According to Steffensen and Fill, language exists among four distinct ecologies: the physical, natural ecology; the symbolic ecology (i.e., the relationships of languages and other systems of symbols in the same physical space); the sociocultural and historical ecology; and the cognitive ecology (i.e., the cognitive capacities of agents to do things such as evaluate outcomes, compare previous experiences, etc.). Each of these categories is a portion of the entirety of a language's ecology and exemplifies the types of dialogue that can occur when the phenomenon of language transpires. In addition, each carries with it different research aims that impact the way humans understand and analyze language (Li et al., 2020).

Considering both ecologies and dialogue, a unified description of the construct of *language* is required. van Lier (2004) defines language as “a meaning-making activity that takes place in a complex network of defines complex systems that are interwoven amongst themselves as well as with all aspects of physical, social, and symbolic worlds” (p. 60, italics added). Ecolinguistics assumes that language permeates, gives form to, and is connected with almost every aspect of human life. van Lier argues that it is not possible to sever language from most aspects of human life or human experience and have them continue to make sense (2004, p. 8).

Defining language as an activity is key, as it impacts several other constructs defined by academics in the field of L2 acquisition. If language is an activity, it is something that can only be learned through active participation. Learners need to define the meanings of their own actions (e.g., utterances) within their own social contexts. They have to “experience ... bodily coordination with wordings that are heard as, together, people use the constraints of a cultural tradition” (Cowley, 2011a, p. 4) while analyzing the results of said language-infused coordination. Because meaning is tied to experience and inseparable from that experience, it can

never be the same for any two people. Therefore, when looking at concepts such as language instruction or language use, researchers must be cognizant of the totality of relations in play.

### **A Summary of Ecological Language Theory**

One key assumption of ecological language theory is that language is “a heterogeneous conglomerate; ... [it] emerges from the ecologically grounded dynamics of embodied, interpersonal coordination” (Steffensen, 2015, p. 108). This means that no one person, time period, or source is able to know, contain, or standardize the entirety of the complex system of systems that compose a language. For example, it can be argued that each human has a unique definition of each and every word they encounter and utilize, depending on her or his experience observing and employing the word in various contexts (Harris, 1981, 2002). Several language scholars outside the field of ecolinguistics have made similar observations. Bakhtin (1981) famously took the position that language is not one’s own:

As a living, socio-ideological concrete thing, ... language ... lies on the borderline between oneself and the other. ... The word in language is half someone else’s. It becomes one’s ‘own’ only when the speaker populates it with his own intentions. ... Prior to this moment, ... the word does not exist in a neutral and impersonal language, but rather it exists in other people’s mouths, in other people’s contexts, serving other people’s intentions. (p. 294)

Dewey’s (1925) thoughts on the subject echo a similar sentiment:

The sound, gesture, or written mark which is involved in language is a particular existence. But as such it is not a word, and it does not become a word by declaring a mental existence; it becomes a word by gaining meaning; and it gains meaning when its use establishes a genuine community of action. (pp. 184–185)

Thus, an ecological view looks at language as action. It is the way by which living bodies coordinate with each other and the world. It involves not only wordings, but also gesture, imagination, observation, and reaction. It is whole-bodied activity that shapes sense-making, which then, in turn, allows formulaic grammars, phrases, and words, to add meaning to the action being taken (Cowley, 2011a, p. 2). This view encases the codified aspects of language, such as syntax or phonetics, and adds to it the human experience of doing something in a certain place within a sociohistorical context.

This line of thinking leads to a second theoretical position in ecological language theory—namely, that language is inherently and inseparably tied to the (physical) environment in which it takes place. The experiences of the agents involved and the resulting cognition that takes place are both impacted by the many other systems surrounding where language takes place. For example, the bodily actions of others (e.g., pointing, raising an eyebrow, scrunching a nose, etc.) impact what listeners understand and ultimately the way they act (Thibault, 2011, 2012). Because language and the actions coordinated in part by it cannot occur in a contextual vacuum, language is always situated in the *now* and *here* (Steffensen, 2015). van Lier (2004) writes that “a word or an expression never means the same thing twice, in any conversation or across conversations” (p. 90).

Such a view of language does not refute any theory positing that parts of the phenomenon of language are codified. This is expounded by Thibault (2011), who writes that language can be conceptually divided into two parts: first-order languaging and second-order language—both of which serve to coordinate human action. Second-order language refers to the socially codified patterns that emanate from the cultural dynamics of a population. Some examples of this would be standardized vocabulary and grammar, which have, over the course of a shared sociocultural

history, come to evoke patterns of cognition and action from those who share said history. However, he also postulates that there is an underlying sense-making activity to communication—namely, first-order languaging. *Languaging* refers to the expressivity and interactivity of humans and involves bodily, cognitive, and emotional interactions with agents and the surrounding environment. The *interactivity* referenced in ecolinguistics encompasses “fast-scale actions that modify human–human relations and human–environment relations” (Steffensen, 2015, p. 108). Some examples can be micro-scale bodily movements, the use of the environment or objects in the environment, or even the sharing and perceiving of emotions—all with the purpose of coordinating action together. In other words, interactivity can be everything that is not said, but that creates, holds, and changes meaning (Thibault, 2011). Steffensen (2013) summarizes that the interactivity that composes part of the ecolinguistic view of language is dynamic and “sense-saturated coordination that contributes to human action” (p. 196). As humans interact over time, they share enough experiences that result in patterns of behavior that carry shared interpretations or understandings. And when agents coordinate their actions long enough in mutual places, that they can begin to predict what may come next.

A third assumption made by ecolinguistics is that accepting language as an activity means that language is not a system stored in the brain. When this concept is extended to language learning, it shifts a researcher’s focus toward providing learners with opportunities to develop their abilities to act and perceive in ways where the new language plays a part (Cowley, 2012, p. 13). This process is what Cowley (2012) terms *skilled linguistic action*. He defines skilled linguistic action as the management of “activity under material and cultural constraints” which then results in learners “[linking] linguistic patterns ... with affect, artifacts, and social skills” (p. 13). He then continues as follows:

Practitioners are thus urged to focus on learning environments, managing activities, and getting learners to reflect on wordings. Applied linguistics deals with learning-by-doing and, inseparably, presenting local resources to individual learners. Emphasis falls on interpersonal engagement and, crucially, how wordings contribute to values realizing. Instead of positing that learners “know” languages, learning is taken to emerge in experience-enriched encounters with the world. The language practitioner’s general project becomes that of developing potential for skilled linguistic action. (p. 13)

Again, the focus turns to developing meaningful experience with the language learned. Skilled linguistic action allows learners to combine elements of first-order languaging with the second-order language patterns. Subsequently, they should be able to reflect on the impact of their actions on the environment and the other agents within it. The entire process is language, or the embodied action of languaging. As Cowley (2014) summarizes, languaging is simply an “activity in which wordings play a part” (para. 15). The processes of speaking, writing, listening, and reading are indelible from, and not independent of, the processes of thinking, forming an identity, ordering a meal, sharing an opinion, and so on.

Building on the idea of language as action, Hodges (2007, 2009) writes that all actions (including language actions) are constrained and legitimated by multiple values. He defines values as “the real goods that actions must realize sufficiently for an ecosystem to exist” (2009, p. 631). In other words, they are the demands made or constraints set upon a person or group of people to define how a certain action is done. By definition, values are personal and not clearly definable, as they look differently to each person. Furthermore, there are many competing values (i.e., an array of values) that must be fulfilled for an action to be deemed successful. Hodges (2007) provides an example of how values can define the field of driving. When driving, the

human agent may place value on speed or time-saving, safety, obeying laws, providing others with space, and so forth. Each of these values cooperatively enhances the other. There is no fixed order or hierarchy of the values, as they can shift depending on the environment in which the driving occurs. To increase safety by escaping a dangerous situation, a driver may need to increase speed beyond the legal limit or brake, increasing the amount of time spent on the road. However, each of the competing values must be achieved in order for the action of driving to be successful.

Applying the concept of values arrays constraining action to language theory, Hodges (2007, 2009) writes that the act of conversing is constantly constrained and legitimated by values. Some of these values may be clarity, coherence, comprehensiveness, complexity, and caring (for an in-depth discussion of each of these values, see Hodges, 2009; Hodges & Baron, 1992). In situations where increased clarity is needed, coherence or complexity may decrease, and vice versa. Values are also generative, meaning that they make it possible for agents to reflect and then develop personal rules or preferences for their actions—the formation of second-order language patterns. As language learners (be they infants learning a first language or adult learners attempting to learn an additional one) find that they are unable to coordinate actions with others who speak the language being learned, they can modify their language patterns in an attempt to achieve the desired outcome or to realize the desired array of values. This constant cycle of action, followed by perception and evaluation, leading to new actions which best and most efficiently reify values, is what Hodges calls *values-realizing activity*.

A common thread through each of these three assumptions of ecolinguistics (i.e., that language is a distributed action, that it is tied to a person's experience within a physical ecology, and that it is learned through the reflection on values-realizing activity) is the cycle of perception

and action by an agent (Steffensen, 2015). As human learners act in patterned ways, they begin to economize, and they pattern their actions into second-order systems. In turn, these systems allow other agents in the ecology to predict possible outcomes of interaction with the learners, thus bringing the theory full-circle. This pattern is cyclical, and results in the development of roles, identities, and individuals. In ecological theory, each agent develops alongside all of the others in his or her ecosystem, and the development of the one is inseparable from the development of the whole.

Extending this theory of development to the field of linguistics, languaging is part of the way in which humans live in the world, evaluate their life in the world, and then develop as a person in that world. Hodges (2007, 2009) explains that the activity of languaging serves to help humans evaluate prospects for future action. As agents interact, or dialogue, with one another, they are in a constant state of evaluating future actions. Hodges (2007) explains that language might be thought of in similar terms to echolocation used by some species of animals, such as bats. Humans send out messages into the world and listen for what comes back to help them make informed decisions about what to do next. These decisions, made while dialoguing with previous experiences and observing the surrounding environment, then shape the role the agent plays in that ecology.

Ultimately, the position of ecolinguistics is that language is distributed. It cannot be contained in one autonomous location: not in one brain, not in one computer, not in one dictionary, not in one time period, and not in any one context (Cowley, 2011b, 2012, Steffensen, 2015). It is cognition. It is one of the processes by which agents perceive the world, act, develop, and become. Skilled linguistic action, experience, and reflection are what provide that knowledge, and wordings in part comprise each of these activities.

Despite the fact that the field of ecolinguistics has a well-established theoretical base, relatively few studies have been conducted to provide evidence for or against the existence of the claims and constructs which underpin the theory. For example, Cowley (2017) writes that languaging and interactivity have de facto priority over language and language systems. Instead of the position that language constrains activity, he writes that activity is what both leads to and gives meaning to language. Taking such a stance and applying it to L2 learning, Cowley suggests that learners should be allowed to experiment with second-order language patterns and gain experience as they participate in first-order languaging actions. However, the claim of first-order language primacy has not been systematically investigated. Such is the case for many of the constructs and claims made by ecolinguists—especially in the field of L2 learning and in the context of online environments.

When viewing ecological language perspectives from the larger field of second language acquisition, several similarities emerge with sociocultural language frameworks, such as language socialization or multiliteracies. However, not much has been written about the connection between these frameworks to date. One notable exception is the work combining language socialization and ecolinguistics by Kramsch and Steffensen (2008). Their work summarizes some of the key commonalities and differences between the two frameworks. Language socialization seeks to move beyond the concept of language use by incorporating notions such as symbolic mediation, collaborative learning, participation, and the achievement of common activities (p. 21). One key appendage of ecological theory is that social and cognitive processes are connected and co-occur together, inseparably from each other. This is demonstrated in a research project conducted from a hybrid language-socialization and ecolinguistic framework (i.e., Uryu et al., 2014). In the study by Uryu et al. (2014), four non-

native English-speaking participants (one from Germany, another from Russia, and two from Japan) interacted during a celebration of the U.S. holiday of Thanksgiving. The researchers recorded the interactions between all of the participants and conducted stimulated recall interviews to analyze how and why certain topics came up during their conversations. They conclude that intercultural competence is not “a normative, individual ability that one can exercise through politeness, tact and acceptance of the conventionally expected boundaries of speech” (p. 58). Rather, intercultural understanding should be seen as a “joint sense-making that emerges beyond the control of any one individual” (p. 58). Instead of socializing into any one prescribed set of cultural expectations, a novel, distributed philosophy emerged in the interaction and interactivity of the communication between the participants. Thus, it is valuable to observe similarities between ecological and sociocultural theories of language learning. Unfortunately, there is a paucity of publications in this area, and further discussions on commonalities between such frameworks may result in fruitful research opportunities.

### **Ecolinguistics and Online Ecologies**

As ecolinguistics is still a relatively nascent field of study (Li et al., 2020), few scholars have explained if and how the principles introduced in the previous section apply in technology-extended, online spaces. Even fewer have completed ecolinguistic research in such settings. Online spaces have many differing norms for communication (Herring, 2001, 2007, 2010, 2011), and newcomers to these spaces must learn how to language in them—regardless of what their first, or native, language may be. Heylighen et al. (2007) comment about the complexities of systems in the contemporary technologically driven world:

As [technology] advances, ... we interact with ever more people, organisations, systems, and objects. And as the network of interactions grows and spreads around the globe, the

different economic, social, technological, and ecological systems that we are part of become ever more interdependent. The result is an ever more complex ‘system of systems’ where a change in any component may affect virtually any other component, and that in a mostly unpredictable manner. (p. 117)

Certainly, this complex systems approach applies to language and language learning taking place in technology-extended spaces (de Bot & Larsen-Freeman, 2011; Larsen-Freeman, 2012). To connect the principles of ecolinguistics to online spaces, a clear definition of *space* is needed, followed by an explanation of how online learning is similar to or different from learning that takes place in physical environments. What follows is a short explanation of how ecological theory can serve to explain and understand online spaces.

### ***Space, Place, and Experience***

Tuan (1977), a noted Chinese geographer and philosopher, writes about the definitions of *space* and *place*. He defines space as any sort of area that is void of values. It is free of experience and intentional action. A space is an abstract and undifferentiated construct. According to Tuan, space becomes a place as soon as it is endowed with value through interaction with an agent. Thus, places are centers of that value where needs can be met or where wants can be satisfied. The concepts of spaces and places exist in the technology-extended realm (Graham, 1998). However, unlike natural space, any technological space exists solely because it was created by a person with a preconceived value system—namely, designers and coders who program possible inputs and outputs which are tied to previous experiences and future expected outcomes. Therefore, when discussing technology-mediated or *technology-extended spaces*, it is important to recognize that scholars are really addressing *technology-mediated places*, endowed with a priori meanings, values, practices, histories, and so forth.

While the focus of this work is not to question the terminology commonly used in the fields of applied linguistics and L2 learning, researchers should at least be aware that the ecology of a computer-mediated access terminal has an influence on the second-order language that is used in the online environment. Each technology-mediated place—even a blank computer with no code on it—already has human experience connected to it and it affords a more constrained set of potential actions. As Herring (2007) writes, the mere physical characteristics of computers, cell phones, keyboards, and so forth impact the actions that can be taken and therefore the language that can be used. As an example, domain names only allow characters from a handful of languages outside English. And if domain owners want to use international characters in their websites, they may lose access to a large part of search engine features and other services due to compatibility issues.

Experiences within a place innately carry with them a sociohistorical ecology, and that ecology is tied to a certain set of cultural values which can then shape, afford, or limit the actions of agents within that place (Tuan, 1977). As further experiences are added within a given place, joint undertakings between agents begin, and patterns of actions begin to emerge (e.g., reading and writing information about a topic on Wikipedia, sharing past experiences in a vlog, looking at pictures of cute puppies on a forum, etc.). These undertakings then result in joint anticipation (Dewey, 1925), or expectations from agents regarding what actions will take place. For example, after visiting an online space several times, a user can begin to anticipate the kind of language that will appear within a cooking website versus what appears in a blog about education.

### ***Affordances***

Examining the topic of agents deciding what actions to take, a central construct to the field of ecological psychology must be discussed—that of an *affordance*. This term was coined

by Gibson (1975, 1979) and refers to “what [an environment] offers the animal, what it provides or furnishes, either for good or ill. ... It implies the complementarity of the animal and the environment” (1979, p. 127). In other words, an affordance is a property of the environment (or an object in the environment) perceived by an agent as allowing a certain kind of action (Chemero, 2003; Heft, 1989; Turvey, 1992). This perception results in a relationship. A simple example is that of a person and a laptop computer. Upon perceiving an open laptop, an average university student would be afforded the actions of writing a paper, visiting a website, and so forth. However, a human that had never seen a computer before would be afforded a much more limited set of actions, perhaps using the laptop screen as a source of light. Yet, if given the time to interact with the computer, new sets of actions would be enabled for this hypothetical person—many of which (e.g., pushing the Shift key five times on a PC keyboard in order to make a sound) university students who have encounters with computers would probably not consider, as their experiences are often constrained by already-established social norms.

It is critical to note that a characteristic, feature, or quality of an object is not an affordance all by itself. It may be thought that because a website has a chat feature, it affords synchronous communication. Similarly, instructors may believe that they can afford their students the ability to create art by simply giving them access to Photoshop in a course. Features only become affordances if the agent perceives them as opportunities for action. Lamy and Hampel (2007) explain that there needs to be a perception, or relationship with something in the ecology for an object to have an affordance:

Concerning affordances, user perceptions are more pertinent than the object itself. So, it is not just the material affordances of CMC that play a role in enhancing or limiting

communication, but also how people see them and the different practices that result from their different perspectives. (p. 43)

This quote also touches on how novel practices enter an ecology. As users coordinate action with others who have different perspectives and unique histories, new actions are afforded. As they are repeated and as valued outcomes are predictably realized, a second-order routine can emerge. Central to this process are the users, their perceptions, and their reflections on their experiences.

An instructor, website, or computer (by itself) does not afford anything. Only after an agent foresees a potential action does the environment gain an affordance (Lamy & Hampel, 2007). Anderson (2003) explains how the meanings of words—in this instance, *chair*—is grounded in real-world experience and tied to several other human systems:

Grounding the symbol for ‘chair’, for instance, involves both the reliable detection of chairs, and also the appropriate reactions to them. ... The agent must know what sitting is and be able to systematically relate that knowledge to the perceived scene, and thereby see what things (even if non-standardly) afford sitting. In the normal course of things, such knowledge is gained by mastering the skill of sitting (not to mention the related skills of walking, standing up, and moving between sitting and standing), including refining one’s perceptual judgments as to what objects invite or allow these behaviors; grounding ‘chair’, that is to say, involves a very specific set of physical skills and experiences. (pp. 102–103)

This example sheds light on the complexity of how ecology and past embodied experience work together to provide meaning and context for an object. Extending this example to language in online settings, grounding common internet jargon, such as *OP* (or *original poster*), requires one to understand how online posting works; how comments are related to an

original post, both in discourse and in mechanics; how posts and comments are traditionally organized in an online space; the act of posting; and so forth. Just because an English speaker knows the meaning of the word *OP* does not mean that he or she is afforded to use that word in face-to-face or in all online settings. The context, in large part, is what affords the jargon to be used, and experience in that context is requisite before the word can be used at all.

The theoretical concept of an affordance has not been studied centrally very often in technology-extended spaces. In one study, McNeil (2014) observed students using an asynchronous computer-mediated communication (ACMC) platform, Voxopop. He then analyzed what actions were afforded in that space and how different affordances impacted the anxiety of students as they recorded their opinions on weekly topics discussed in class. By doing pre-test and post-test analyses and comparing mean scores of anxiety, several studies (e.g., Poza, 2011; Song, 2009; Sun, 2009) had previously concluded that ACMC can lower anxiety in interpersonal communication. However, McNeil (2014) observed that anxiety levels were affected in part by whether or not students knew that they could re-record their assignments. Similarly, some students enacted the affordance of looking up outside resources while making their recordings, while others did not. Others recognized that they could use a dictionary when they could not understand a word that one of their peers used. Several students became more anxious because they knew that the space afforded their peers the ability to listen to their recordings, and they were worried about pronouncing words correctly. Finally, some students admitted that because they knew that their participation was for research, and not for a grade, they did not really care about what they said online.

McNeil's (2014) study shows how the complexity of the environment surrounding participants and their perception of affordances in that space can impact the actions and anxiety levels of people. This study exemplifies what Greeno (1994) wrote about ecological research:

This theoretical shift [toward ecological research] does not imply a denial of individual cognition as a theoretically important process. It does, however, involve a shift of the level of primary focus of cognitive analyses from processes that can be attributed to individual agents to interactive processes in which agents participate, cooperatively, with other agents and with the physical systems that they interact with. (p. 377)

Thus, ecological studies of language must consider the many interactions that occur within the place where the languaging happens. There is a myriad of others in technology-extended spaces, and each of them can have a different, yet significant, impact on the actions taken by another user. Two additional frameworks for learning (i.e., communities of practice and affinity spaces) can help to shed light on how learning through interaction can take place in online places.

### ***Practice and Grammars***

Technology-extended places become reified through the values and actions of people (Tuan, 1977; Wenger, 1999). Value-laden actions can be posts on a website, text messages sent to others, calls made on Skype, and so forth. As products are reified in a space, the construct of *practice* emerges. Wenger (1999) defines a practice as something that is done “in a historical and social context that gives structure and meaning to what [is done]” (p. 46). The practice, in turn, serves as a source of coherence to people that visit or participate in the online place. The practice leads to engagement, dialogue, and furthering of the joint undertaking. Roles begin to emerge (e.g., someone has to post pictures; others can like a favorite picture; some can just visit the site,

increasing its traffic and revenue; etc.). As practices become solidified and historical, *grammars* form.

Technology-extended places have two types of grammars: internal and external grammar (Gee, 2004, 2005). *Internal grammar* refers to the types of signs, or language, which are used in a certain space and the relationships between the signs. For example, in a forum about building computers, users use certain kinds of abbreviations, jargon, or pictures, and they form their posts in certain ways (i.e., according to the practice). In Gee's (2005) theory of online language learning, second-order language patterns would be included in the category of signs. *External grammar* refers to the thoughts, beliefs, values, and so forth of the users that interact in the space. In the previous example, it is assumed that users who interact in the place prefer PCs over Macs (as Macs cannot really be built from scratch), that they have a certain level of competency with computer parts, and that they do not want to use the online place to repair broken cell phones. The external grammar comprises the values (Hodges, 2007, 2009) which drive first-order action (Thibault, 2011). These actions would then be mediated by the internal grammars, loosely comparable to second-order language.

A defining characteristic of online places is that the external grammar of the users in the place can often modify the internal grammar of that place and vice versa (Gee, 2004, 2005). To extend the aforementioned example, if a user would like to modify a Mac computer, he or she may find that others in the online place are willing to help. If other people follow the movement of posting about Macs on the forum, it can modify other people's views about Macs, and in turn, the practice of posting about Macs can be added to the place. The next theoretical question that remains to be explained then is how users in online settings move from being outsiders who do

not understand the internal and external grammars of an online place toward being a member of that place with the skills necessary to actively participate in the interactions occurring there.

### ***Communities of Practice***

A framework in the field of social and cognitive science that can serve to explain how practices are adopted in online ecologies is that of the *community of practice* (CoP). Simply put, CoPs are “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger, 2011, p. 1). They form around a common interest, and members of the CoP work together to create something—the product can be physical, such as a piece of jewelry, or abstract, such as a specific mood in a conversation. Wenger (1999) explains how this process of social interaction creates spaces for learning to occur. The active process of *participation* refers to taking part in an activity and also to the relations with others (p. 55). As the activity occurs, a process of giving form to experience by producing objects, or *reification*, happens (p. 58–59). Participation and reification work together to create a *practice*; that is, doing something “in a historical and social context that gives structure and meaning to what we do” (p. 46). This practice then becomes the source of coherence for members of a community by forming mutual engagement, joint enterprise, and a shared repertoire.

After a CoP has been established and products have been reified, newcomers generally pass through a period of time where they learn how to participate in that community and how to correctly reify objects until they become full members of the community. Experts can guide novices through a process of negotiation helping them learn the norms of the CoP. Lave and Wenger (1991) explain that newcomers to a community begin by participating in simple tasks that are productive for and necessary to the community. The pattern of slowly working toward

more central and important roles in a CoP is referred to as *legitimate peripheral participation* (LPP). As new members contribute through LPP, they become acquainted with the tasks, vocabulary, and organizing principles of the community (Wenger, 1999, pp. 94–95).

The CoPs described above are plentiful and salient in the ecologies which comprise the *digital wild* (Sauro & Zourou, 2019; Thorne et al., 2015). Social sites such as Facebook and Reddit include thousands of subgroups, each focused on unique interests. Every group has its own unique practice, including the language used, the ways in which comments are made, the topics that are discussed, the manner in which those topics are debated, and so forth. Agents who participate in any given subgroup must learn all the unwritten (and sometimes even explicitly written) rules to be able to relate to the other users in it. Each post or comment in an online social space is a reification of its practice. Negotiation occurs as other users upvote posts they like and comment on them. Gunawardena et al. (2009) explain that these kinds of interactions with individuals of similar interests create opportunities to expand knowledge by sharing ideas, experiences, and stories—in a manner that is similar to the concept of the zone of proximal development (Vygotsky, 1978). When novice members of a social media space make contributions to the space, they can observe how those who are more experienced, hold prestige, or serve as models respond. They can observe the actions of these experts and then mimic them or take advice from them as it is given. Sometimes, they can even receive explicit guidance or instruction from experts that can help to shape their future actions. As users work together in the process of practice, skills—including the use of second-order language patterns—are developed (Duffy, 2011). Many users of online communities such as Facebook and Reddit, specifically English language learners, perceive the lingua franca of these sites to be English (Chen, 2013; Honeycutt & Cunliffe, 2010). They feel that the CoPs found in these online places require an

advanced level of proficiency in English (or at least of the register of English used within the subgroup). From an ecological perspective, the actions that language learners value are observed to occur in English. In order to participate and interact with others in the ecology, they are afforded a certain set of actions, and those require employing the historically established, de facto practices of the environment. To do so, they begin by participating in peripheral roles through LPP. Doing so yields experience which, when reflected upon, can yield new ways of participating. As the learners see what is happening in the online community and as they observe or discover new features of the online place, they are afforded new future actions. This cycle continues indefinitely, as each action, reified product, or second-order language pattern results in a response (or lack thereof). Through this process, novices identify what patterns of action result in their desired or valued outcomes. After enough practice, they become experts. Thus, the process of learning is inextricably connected to the process of acquiring and fulfilling new roles.

### *Affinity Spaces*

Some of the tenets of CoP theory do not apply directly in online ecologies. For example, one notion is that each CoP is comprised of several unique roles (e.g., apprentice, novice, expert; buyer, seller, agent; executive chef, sous chef, senior chef; etc.). In digital places, participant roles are often nebulous or fluid, and they can shift quickly. Users can take multiple roles on different occasions, and hierarchies of expertise may be very loose—if, in fact, they exist at all. The barriers to entry of an online community are comparatively very low (Jenkins et al., 2006), often requiring nothing more than the creation of an account. Similarly, users can leave a community very easily with relatively little or no impact on the overall practice. In addition, some people choose to only lurk in an online space without ever contributing actively to a community, raising the dilemma of how to define whether one is a member of that community or

not. To better explain participation in online communities, Gee (2005) proposed the framework of affinity spaces.

Gee (2005) defines an *affinity space* as any place that is especially focused on a limited type of content, or a *common endeavor*. The space must also have a certain internal grammar (i.e., signs and their relationships) and external grammar (e.g., the thoughts, beliefs, values, and actions of the users in that space). Lastly, affinity spaces have portals, or methods in which users can access and interact in the space (pp. 217–221). Clear examples of affinity spaces in online social places can be observed in commonplace situations, such as Facebook interest groups or Reddit subreddits. To use examples from Reddit, each subreddit (or subgroup of the larger online network) is based around a certain interest that defines what content can be found there. Each subreddit has certain rules and language that gets used in the space (internal grammar) and a common value system, mindset, and set of expected actions allowed in the space (external grammar). Reddit also has several portals, such as simply visiting the subreddit’s website via an internet browser or app, upvoting liked content, posting content, and even being a moderator of the subreddit, among others.

Paradigmatic affinity spaces are further characterized by experts, novices, and everyone else sharing a common space. In each subreddit, all users interact together, regardless of role, notoriety, or length of membership. Long-time users and newbies alike are equally able to generate content for the space—although that does not mean that it will be equally accepted by the community as a whole. For acceptance to happen, the grammars must either be adhered to or modified. As participation happens, the internal grammar can be transformed by the external grammar, and vice versa. Many different forms and routes to participation and status exist. The barriers to leadership and expert positions are porous and experts are more accessible as

resources for newcomers (Gee, 2005). Each of these characteristics provide opportunities for experiences to occur, reflection to arise, and dialogue to transpire.

Online ecologies are socioculturally complex places, dense with the natural, symbolic, historical, and cognitive dialogue (Steffensen & Fill, 2014). Because physical interactions via online spaces are limited, there is a greater dependence on second-order language patterns to coordinate human action. Through participation in CoPs, users grow and develop a variety of skills, being afforded new actions. Wordings play a part in a large portion of these new activities (Cowley, 2014), and opportunities for language learning abound. Barriers to entry are low, and experiences can be had in many more ecologies than in the physical realm. And because previous comments and posts can be looked up and referenced again in the future (i.e., they can be dialogued with more easily than spoken language where each linguistic action is ephemeral), learners are able to actively maintain a larger network of distributed resources and experiences which they can draw upon to guide, constrain, and afford future actions taken.

### ***L2 Research on CoPs and Affinity Spaces***

Several studies have centrally addressed the concepts of CoPs and affinity spaces in conjunction with student learning, albeit not from an ecolinguistic perspective. Mills (2011) describes how university students learning French used Facebook to form an online community as part of the course requirements. She observed how the groups shared posts on Facebook, causing deep discussion about cultural topics. While language learning was not the focus of the group, over 70% of her students reported having paid attention to grammatical accuracy and vocabulary while participating online. Blattner and Fiori (2009) provide a review of how social networking sites (SNSs) can aid in the development of complex aspects of language, such as pragmatics and cultural competence. They write that exposure to online language in all its

varieties and contexts can help students see when certain speech acts should and should not be used. Vie (2007) spends a portion of her dissertation explaining how SNSs can aid L2 learners in gaining and understanding rhetorical awareness. Using technological literacy as a framework, she posits that the popularity of social network sites and the quantity of written language that appears there can help students gain proficiency in rhetoric and composition. Chen (2013) describes how L2 learners can develop online identities in SNSs. The participants in her study were two graduate student English learners. Chen analyzed their posting behaviors on Facebook over time while studying in the US. The focus of her article is on the identities that the participants portrayed online. Her conclusions are that both portraying and participating in different roles (e.g., that of a foreign student, that of a graduate student in the US, that of a member of a larger friend group, etc.) in a social media space allow for the appropriation of new vocabulary as part of a larger self-identity. She concludes that language learners cultivated L2 literacy skills that enabled them to navigate a variety of communication channels—all while developing multiple identities through different types of literacy activities and social interactions (cf. Lam, 2004).

A comprehensive volume, edited by Lamy and Zourou (2013), explains how learners can construct and develop their own (real-world and online) identities in online communities. Several chapters explore how students develop their multiliteracies, which in turn allow them to progress in their language development. The authors also address how certain aspects of SNSs foster certain types of discourse. Many of the chapters contain suggestions for how teachers could implement SNS learning in the classroom (cf. Lomicka & Lord, 2009; McBride, 2009). Warner and Chen (2017) explain why SNS interactions might make for fruitful investigation in classroom settings. They write that, by themselves, online conversations are not necessarily more

complex than face-to-face interactions. However, the fact that they occur as literacy practices in a highly contextualized setting may help increase language gains because “texts generated through SNS-mediated communication can provide classroom opportunities for critical, stylistically sensitive reflection on the nature of talk in line with multiliteracies approaches” (p. 121).

Fewer studies have incorporated quantitative methods of assessing language gains after participating in online communities (Stevenson & Liu, 2010; Zourou, 2012). There are several reasons why this might be the case. For instance, pre-test and post-test measures are difficult (if not impossible) to be gathered from participants in the wild without direct researcher intervention. Additionally, online settings are naturally uncontrolled, inhibiting traditional assessment instruments. The kind of language found online does not follow the same strict grammatical rules as academic text, making it more difficult to set a standard for correctness (cf. Kern, 2006). For example, assessing the complexity or accuracy of common internet phrases, such as “U wot m8?” (Smith, 2017), can be quite challenging, as it follows no academic English standards. One published study looking at quantitative L2 gains after SNS use is authored by Lin et al. (2016). They measured perceived gains and actual gains in L2 proficiency using a 23-item survey and T-unit analysis (aimed at assessing syntactic complexity and accuracy of the texts), respectively. The results showed that while SNS users perceived language gains through their participation in online communities, they showed no clear statistically significant quantitative gains in language production. Students did write more complex sentences, but they also produced more errors per T-unit. However, the data analyzed in their study included homework assignments submitted over the course of several months and not the SNS posts themselves. While the study by Lin et al. showed few quantitative gains, the authors did not comment on

qualitative changes in the learners' writings. This makes it difficult to know exactly what was counted as an error and what did not. It also provides little insight into the development of the participants as agents or as people who act in certain roles.

In the studies cited above, a common topic is that of the difficulty of quantifying, measuring, or assessing language accuracy, complexity, or empirical gains. This is, in large part, due to the fact that second-order language patterns found in online affinity spaces is often quite different from that found in academic settings (Herring, 2001). What might be considered acceptable in one setting, might not even be comprehensible in another (Kern, 2016). Banov (2021) provides an example of English taken from an online affinity space focused on gaming. In his example, a user in the space posted the following in a public chatroom: "vCR+3 HM LFM 1 heal, 1 DPS, then gtg. Min 75K on 21mil!! Discord req." This post was a representative sample of language that led to the successful coordination of action by other users in the affinity space, but that, once again, did not follow academic English standards. In an earlier project, Banov (2018) reported having used corpus analysis software (cf. Kyle et al., 2018) to measure the change in language sophistication over time by users of the online platform Reddit. However, due to the corpora referenced being harvested from ecologies different from the source of the data, no significant results were found in any of the analyses. This has led scholars, such as Lin et al. (2016) to call for the use of "more robust measures to examine students' language development in these environments" (p. 143). However, finding better ways to assess correctness, fluency, competence, or sophistication still requires looking at language as a coding system used to transmit messages from one effectual robot to another. Doing so overlooks the process of language learning that humans undergo as they develop their ability to achieve their goals. This process requires activity in a CoP and reflection on that experience.

### *Co-Authorship*

Taking the position that language is driven by relations in an environment, it can be concluded that language must be dialogical before it is systematic (Linell, 2000, 2009). In other words, the desire to dialogue or establish a relationship is fundamental to the principle of language—or, for that matter, any other semiotic system. As has been explained, an ecological and dialogical view of language states that dialogue can also exist between speakers and listeners, speakers and non-present others, speakers and inanimate artifacts, or even speakers and other situations (real or imagined). For example, when choosing what to say in a response to a question, speakers formulating their answers may consider not only the prompt eliciting a response, but also previous experiences in similar situations, what other speakers and listeners have already said and heard, the opinions of the others, and so forth. This process of meaning making through dialogue with others (be it internal or observable dialogue) is known as *co-authorship* (Linell, 2009; Rommetveit, 2003).

Co-authorship is comparable to the sociocultural construct of intersubjectivity. Simply put, intersubjectivity refers to “the sharing of experiential content (e.g., feelings perceptions, thoughts, and linguistic meanings) among a plurality of subjects” (Zlatev et al., 2008, p. 1). Because intersubjectivity refers to shared knowledge or common ground, it carries assumptions that there is a primary separation between the minds of the self and others and that cognition is developed from the inside out (Zlatev et al., p. 2; see also Gillespie & Cornish, 2010). However, co-authorship differs from intersubjectivity in the fact that the dialogue that occurs with others is considered the core of cognition, and that it cannot happen without an “other” (Linell, 2009, p. 12). An additional difference is that intersubjectivity is based on shared or common knowledge, while co-authorship acknowledges the fact that knowledge is socially distributed, or unequally

accessed and accessible to people, due to their life circumstances or experiences (Marková et al., 2007). This allows for individual humans to be able to make their own unique meanings even while co-authoring together. The important takeaway from this concept is that any human action is dependent on and co-authored by previous experience. The first text message sent to a new acquaintance is authored by the person sending it, and it has the potential to be co-authored with all the previous text messages and social interactions that person has experienced. This concept can help guide the understanding of how users in technology-extended spaces choose what language to use.

Albeit a relatively recent construct, co-authorship has been studied in several language settings. Vitanova (2010, 2013) explains how the personal narratives of immigrants are co-authored by their previous experiences and by the people in their histories. She argues that the narratives created by her participants were constructed, in part, upon the borrowed words of their new surroundings. She also writes that their identities, practices, and even agency was dialogically co-authored by others (2010). In a separate study, Amhag (2009) addresses how 40 in-service teachers used dialogue to develop and refine their thoughts and opinions on key issues during a problem-based course on pedagogy. She describes how co-authorship in asynchronous online dialogues contributed to student learning and the formation of argumentative stances (Amhag & Jakobsson, 2009). She writes the following:

Meaning is first created when two or more voices encounter each other by means of the reading or listening voice answering or reacting to the writing or speaking voice.

Therefore, every utterance also becomes a link in a chain of voices since each utterance can be considered as an answer to preceding utterances. (Amhag, 2009, p. 2)

Amhag (2009) argues that it is more than just the prompt of one post that determines how her students replied. They considered and responded to a multiplicity of previous experiences before answering. Similar results were found by Helgevold (2016). Drawing on her research, she argues for the creation of collaborative spaces, where students can dialogue with one another and discuss their past experiences, fostering learning.

Eriksson and Mäkitalo (2014) observed environmental engineering master's students who were writing course papers. After analyzing video and written data, they explain that student dialogue with others, other objects, and even others' practices is what leads to learning. Course literature and lectures, scientific articles, previous discussions about terminology, and other texts provided conversations (both internal and external) that led to the creation of students' final papers. They tie notions of dialogism to principles such as appropriation (Bakhtin, 1981; Wertsch, 1998) and CoPs (Lave & Wenger, 1991; Wenger, 1999) to show how students recognize, recontextualize, and then repurpose new language and concepts they have experienced previously as their own. Larson and Maier (2000) conducted a research project where students in an elementary school had to write short stories on various topics. The instructor ensured that the classroom was a dialogical environment where students could work with each other and with the teacher while writing. Additionally, the teacher provided sample texts on an easel that the students could refer to as they wrote. While every student wrote his or her own text, in the end, they all acknowledged how others in the environment had helped in their authorship process.

Huang (2015) observed similar patterns as he interviewed language learners that participated in conversations via active listening. His research questions focused on how students could learn language in a setting where they only listened. Explaining that the co-authorship of

and the dialogue with the speakers impacted the meanings that each student constructed, Huang writes the following:

The listener not only takes on an active role in understanding and interpreting the message, he or she also offers ‘competing frameworks’ to the speaker during listening process. This view recognises the notion that the listener, rather than merely recreating the speaker’s understanding, actively constructs meaning. (p. 208)

This example demonstrates how even apparent one-sided listening can be an active dialogical activity and how previous experiences can serve to co-author understanding and future actions taken.

The preceding examples highlight previous research on co-authorship. However, to date, there is still a lack of studies that provide evidence or support for the concept of co-authorship in terms of language learning in online affinity spaces. While the ecolinguistic model has served as a reference for several works, it is also rarely the foundation of language learning research.

### **The Context of the Current Work**

This work aims to fill in some of the theoretical claims made by previous ecolinguistics scholars and to provide examples of L2 learners going through the process of first-order languaging leading to the use of new second-order language patterns. van Lier (2004) writes that, in the field of ecological linguistics, language learning is the process of discovering “ways of relating more effectively to people and the world” (p. 4). This project seeks to observe and describe this process in action, adding empirical evidence to the theoretical literature already published in the field of ecolinguistics. First, a summary of the published research on L2 learning from the perspective of ecolinguistics will be presented. Then, the ecology from which the data for this work were gathered (i.e., Reddit) will be described. The section will conclude with a

summary of key research focusing on explaining how Reddit can foster learning and, by extension, language learning.

### **Ecological Perspectives on Online Learning**

In the field of ecolinguistics, scholars (e.g., Cowley & Nash, 2013; Steffensen, 2013, 2015; Thibault, 2011; Zheng et al., 2015) have conducted studies analyzing how second-order language (i.e., grammar, vocabulary, phonology, sociocultural norms) constrains the first-order action of sense-making with others. However, much of the published research tends to be framed as fine-grained, exploratory case studies, whose data analyses often center on short, small-scale examples of conversation. Of those, very few centrally address language learning in online spaces.

The dialogue that takes place in any context, combined with the affordances that the ecology offers, serve to shape the language that appears within it. This is especially true for technology-extended ecologies. Technology-extended contexts are not bound in the same ways that physical classrooms are (Black, 2005). The audiences are different. There is a potential for immediate discussion. Bakhtin (1981, p. 280) writes that *responsivity* and *anticipation* (concepts that are both related to dialogue) are necessary for deep understanding (cf. Linell, 2009, p. 13). Language in technology-extended spaces is social in nature—not individualized, like it often is in a timed class assignment—and therefore a response (observable or not) can be anticipated by authors, enabling a deeper learning. Because of these characteristics, online spaces afford actions that simply cannot be reproduced in the classroom. Thorne et al. (2009) write that “what occurs online, and often outside of instructed educational settings, involves extended periods of language socialization, adaptation, and creative semiotic work that illustrate vibrant communicative practice” (p. 815). Studies from an ecolinguistic perspective can help to shed

light on some of the dialogues and relationships that occur in online places which can foster or encourage language learning.

Some of the earliest ecological research into language learning in online spaces began by analyzing student interaction in online virtual world spaces, such as Quest Atlantis, Second Life, or World of Warcraft (WoW). Young et al. (2006) describe how virtual spaces provide rich environments where people, embodied through their avatars, are afforded actions that can lead to learning, growth, and cooperative problem solving. They provide nine principles demonstrating how online spaces—and, more specifically, virtual worlds—offer instructors and students the potential to further both institutional learning standards and personal learning goals. Since then, other researchers have continued to explore how virtual world ecologies can impact language use and learning (e.g., Reinders, 2012; Sykes et al., 2010; Thorne et al., 2012), although their contributions are largely theoretical, providing overarching hypothetical patterns, rather than specific concrete examples of language learning.

Several studies have tried to shed light on the process of language learning in online collaborative spaces. Zheng et al. (2012) provide several examples of foreign language students playing WoW as part of an English course they were taking. Using a grounded coding method, they coded each communicative project (CP) in a 47-minute recording of the participants playing WoW together according to its communicative activity type and values demonstrated in the CP. Then, employing several visual inspections of the data charted over time, they identified connections between different values and their connections to learner engagement and learning. They conclude that WoW and other similar environments that bring a historical narrative and interactional constraints provide increased opportunities for learners to realize values in situations that would be difficult or impossible to recreate in classroom environments. The

realizing of values combined with second-order language use results in opportunities for skilled linguistic action to occur.

In a separate article, Zheng (2012) posits that language learners in WoW “[realize] values demanded by the ecosystem by drawing on second-order, sociocultural, and linguistic norms” (p. 557). She also concludes that learning the language is not the central purpose of the learner participating in WoW, but that it is interwoven with opportunities for values realizing. As learners are given opportunities to explore and realize their values, they are given opportunities to improve their language skills. Zheng et al. (2015) exemplify this claim by sharing examples of students learning to correctly use individual words while, more importantly, “learning to be” through languaging (p. 776). They postulate that the ability for students to act as agents in open-ended environments allow higher-level skilled linguistic action to occur. Zheng et al. (2015) provide specific examples of how a language learner incorporated the use of different vocabulary words after experiencing them and dialoguing with others through a humanoid avatar in a virtual world. In their study, one novice (a learner of English and also a newbie to the online space) met with an expert (a native English speaker and avid online gamer) to play a role-playing game. As they played together, the novice began utilizing words and phrases that he did not know before playing, but that he heard his partner using—he began using the internal grammar of the space. Some of the dialogue that led to these changes was observable (i.e., through text-chat interactions in the game). However, there was also an instance where the learner adjusted to the internal grammar without explicit dialogue. Only after making the change did the learner bring up the fact that the shift had occurred. The benefit to language use in online spaces is that the spaces afford second-order language patterns to be situated within another context-rich action. For example, when discussing forests in WoW, both the expert and the novice users were able to

run through a forest—something not afforded to them in a brick-and-mortar classroom. When learning about looting, the learner was afforded the action of looting fallen enemies and their encampments. The actions afforded in online spaces guided the language patterns used in those places, in turn guiding language learning within the space. These examples provide further evidence that language learning need not be the memorization of a prescribed inert coding system. Rather, true language learning should be part of a larger situated action where users practice interacting with other agents. As practice and reflection mutually occur (Hodges, 2009), learning takes place, and the learners discover how to relate more effectively to others in the surrounding ecology (van Lier, 2004). Zheng et al. (2015) conclude by calling for an increase in research that features thick, qualitative descriptions of language learning in online settings—an invitation that still stands largely unanswered.

In each of the preceding examples analyzing language learning in technology-extended spaces, one aspect meriting specific consideration is that people who interact in the online space require a projection of themselves in order to enter it (either via a humanized avatar, an account, or an address such as a phone number or IP address; cf. Gee, 2004). Many times, these projections enable users to be embodied in new ways and, therefore, to act in new ways (Zheng et al., 2009; Newgarden et al., 2015). For example, a language learner can create an account in an online forum without disclosing that he or she is not a native speaker. Doing so affords the taking of language actions that may not be possible in real-life settings. Similarly, an avatar's experiences can connect to and extend the experiences of the users, enabling the users to do things in a virtual environment that are not normally possible in the real world. In another example, when creating an account on a social website, a user can choose to add information that portrays certain characteristics and enables certain actions, regardless of its veracity. Similarly,

users must choose what information they do not wish to share. When joining a space centered on crocheting, a newcomer can choose to retain the fact that he or she is a novice. This affords a member the ability to share whatever he or she knows from the perspective of an expert. In contrast, users can choose to highlight their lower level of experience and thus better solicit help from others in the space (Black, 2006). Each piece of information divulged can impact actions afforded to the learner in a particular way.

Currently, there is a lack of studies which analyze language learning in online affinity spaces from an ecolinguistic perspective. None have focused on Reddit, the ecology in which this work is centered. Still, some of the conclusions from previous ecolinguistic research are applicable. It can be anticipated that language learners seeking to participate in an online affinity space, such as Reddit, will come in as novices to a new place laden with sociocultural values, roles, and established practices. They will have to access the place via a user account which, similarly to the ways explained by other scholars (e.g., Newgarden et al., 2015), affords actions unavailable in traditional learning environments. As in the study by Zheng (2012), it is likely that language learning will not be the primary reason for learners participating in the affinity spaces. However, as they learn to be a more effective member of the community, language patterns previously unused or unknown will begin to emerge. As Cowley (2014) writes, wordings play a part in the larger actions that the user will want to take. This will drive a learner-initiated reflection and cognition which, in turn, will result in new affordances and modified behavior. Some reflections may be driven by explicit feedback, while others will not (cf. Zheng et al., 2015). But as learners continue to participate, learning will occur.

Each study mentioned in this section concludes with a call for more in-depth examples of language learners acquiring language skills through self-initiated participation in social activity.

None of the cited works have analyzed language gains over the course of an extended period of time. Additionally, to date, there are no L2 learning studies focused on learning languages on Reddit from an ecolinguistic perspective. This work seeks to begin to fill this gap in the research.

### **Reddit as a Place for Learning**

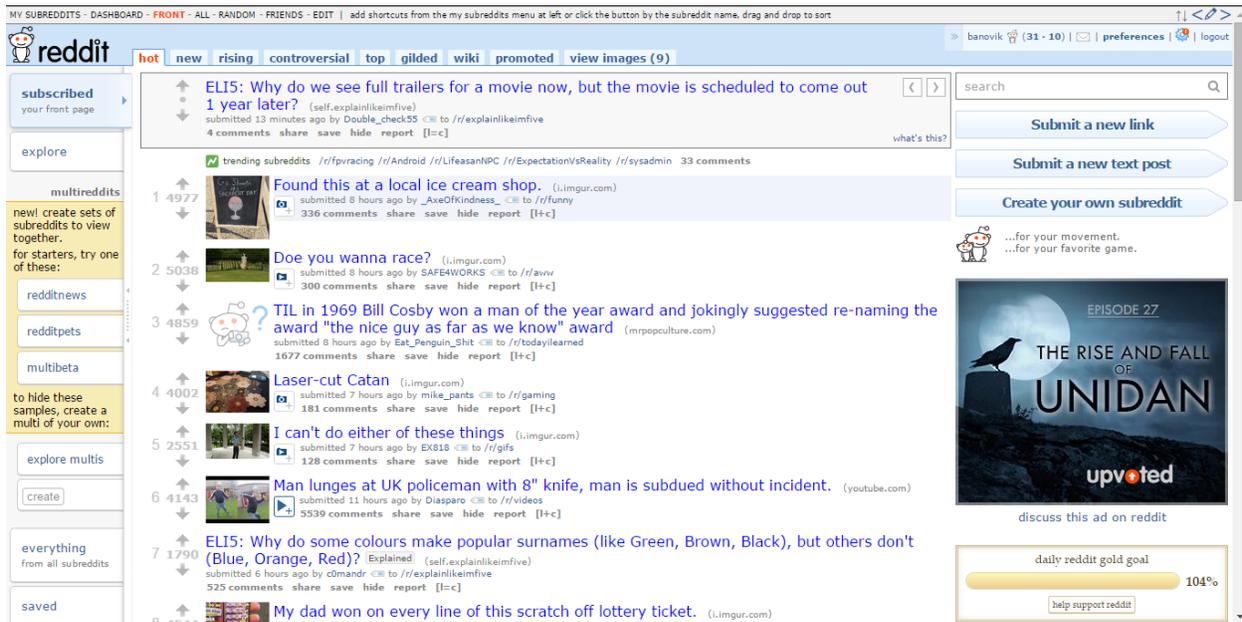
Reddit is one of the world's largest online communities. At the beginning of 2022, Alexa Internet, an internet traffic and data and statistics company, rated Reddit as the 19th most visited internet website in the world and the 7th most visited website in the United States (Alexa Internet, 2022). Reddit users come together in topic-centered sub-communities called *subreddits* where they ask and answer questions, post content that interests the users in that subreddit, discuss topics of interest, debate, and so forth. With an online culture based almost entirely on the participation and interaction of its users, Reddit creates many opportunities for learning. In fact, many of the most visited subreddits are tied to learning and teaching, such as the today I learned (TIL), science, ask science, explain like I'm five (ELI5), life pro tips (LPT), and do-it-yourself (DIY) subreddits—all in the list of top 30 most subscribed subreddits (RedditList, 2022). Still, extremely few articles have been published addressing learning on Reddit, and almost none have centrally addressed language learning within the Reddit community.

In its most basic form, Reddit is a social bookmarking website or bulletin board system. Users find content on the internet and then post it on Reddit so that others can see, vote, and comment on the post. Reddit does not store much content other than textual information (i.e., titles of posts, descriptions of posts, comments, link information, or metadata), separating it from other social websites such as Facebook, LinkedIn, or Twitter. The layout is relatively simple and unadorned. As can be seen in Figure 1, the content of the front page of Reddit consists of little more than small, linked images and a post title. Users can click on a post to view the content, or

they can click on “comments” to view and make comments, which are tied exclusively to each post.

**Figure 1**

*Screenshot of the Front Page of Reddit*



The remaining links are simply interactions users can make with the post itself, such as sharing it with others or saving it for future access. Comments made on the posts are organized in an equally simple format. Users may post comments about the post itself (parent comments) or in response to a parent comment (child comments). Figure 2 below shows an example of a comment thread with three parent comments and several child comments. Sometimes, users will reply to comments and start a thread which can be anywhere from a few comments long to hundreds of comments long, spanning the course of several years. Like posts, individual comments may be upvoted or downvoted. The top rated and most viewed comments appear first and on top, while lower rated comments appear at the bottom.

**Figure 2**

*Sample Reddit Comment Threads*



*Note.* The comment threads appearing in this figure are taken from the *comments* section of the first post appearing in Figure 1.

It is also important to know that the front page of Reddit (and any subreddit) can be organized in different ways. By default, the front page loads in the “hot” tab (as shown in Figure 1). This tab displays the most upvoted and popular posts at the time, as determined by a proprietary algorithm. However, a user can also click the “new” tab which displays the most recent posts. There is also a “rising” tab that displays recent posts that have received above average levels of upvotes. The “controversial” tab displays posts that have received a large amount of upvotes and downvotes, showing contributions that have a high propensity for debate. These distinct ways of organizing, viewing, and browsing content that has been posted on Reddit

enable users to act in differing roles easily. If they desire to propel new posts up the front page, they can do so by providing early, important upvotes to high-quality recent contributions in the “new” tab. If they desire to argue their points of view in debated topics (or see what others are saying regarding a current issue), they can visit the “controversial” tab.

As can be noted in Figure 1, each post on the front page of Reddit is associated with a subreddit, which can be seen after the “/r/” in the post description. For example, the first post comes from a subreddit titled “funny” (a subreddit dedicated to posting content that is funny), and the second post comes from the subreddit titled “aww” (a subreddit that is dedicated to posting pictures of adorable things). This is because posts appearing on the Reddit’s front page are gathered from posts made on subreddits. It is impossible to post something directly to the front page of Reddit. Users post in a subreddit, which is organized in the same manner with its own respective front page, post, and tabs that allow viewers to organize those posts as discussed above. The top posts in each subreddit are then added to the “hot” section of Reddit’s general front page, again being selected by a proprietary algorithm.

Subreddits are distinctive spaces in that they are based around one sole topic or premise, they have their own sets of explicit rules, and they have users which form a community with further unwritten rules of conduct. For example, in December 2021, the “today I learned” (TIL) subreddit had the following explicit rules:

- Submissions must be verifiable.
- No personal opinions, anecdotes, or subjective statements are allowed.
- No news or sources more recent than two months are allowed.
- Nothing related to recent politics is allowed.
- No misleading claims may be made.

- Titles must begin with “TIL ...”; be descriptive, concise, and specific; and be able to stand on their own without requiring readers to click on a link.

In other words, for users to submit content to this subreddit, or interest group, they must abide by the aforementioned rules. Otherwise, a moderator of the subreddit might remove their post and even possibly their posting privileges altogether. However, further unwritten rules exist in the TIL subreddit. Using sarcasm or hyperbole is generally a faux pas in the post title. Posts that cover topics which are either too specific or too obscure will often be downvoted or skipped. Generally, the highest rated posts tend to relate to topics, issues, or people that are popular in the media at the time. Users who do not follow these unwritten cultural norms when posting in the subreddit are unlikely to receive many upvotes, and they will likely be downvoted (cf. Isbell, 2018).

As a consequence of Reddit’s design, subreddits are examples of prototypical affinity spaces (Gee, 2005). They center around a specific topic or common endeavor. They have explicit internal grammars and standardized external grammars—with the adherence to the latter even being semi-quantifiable due to upvotes and downvotes. They have portals through which users participate. As users participate in these places, certain practices are systematized, resulting in the formation of CoPs. Wenger (2011) writes that CoPs are “groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (p. 1). Therefore, CoP theory can also help to explain the process of learning to language via Reddit. Still, language learning through Reddit remains a largely unexplored field of research.

## **Research on Reddit and Learning**

Although Reddit is a popular website, relatively few academic research articles have been published focused on the site, its content, or its users. Several studies have focused on the discussion threads and social structures that exist on Reddit. To define certain trends that exist in some of the most common subreddits, Steinbauer (2012) did a statistical analysis of Reddit and some of its comment threads. He concluded that the more popular subreddits tend to be older, to have more specific topics or subreddit names, and to be independent—not linking to or promoting other subreddits. In other words, the subreddits were relatively long-established, static, and complex affinity spaces, which new users needed to learn to navigate before being able to fully participate in them.

Massanari (2013) related Reddit to the theories of participatory culture and game studies. She compares receiving upvotes and replies to getting points in a game. The rules governing Reddit and subreddits are likened to game rules that need to be followed. As users play by making comments and posts, they receive points, exhibited by the garnering of upvotes. If users produce high-quality posts and have some luck (e.g., being upvoted early on), they can score big and receive a great deal of points. Users do this by reifying products and through active participation. Using the framework of CoP theory, this process of repeated active participation could be extended to deduce that reading, writing, and reflecting on active contributions in the affinity space creates opportunities for users to learn new information and skills (e.g., language skills).

Buntain and Golbeck (2014) attempted to identify and define types of social roles within the Reddit community. After filtering through a set of comments and threads, they concluded that users could fill answer-person roles and non-answer-person roles. In other words, users

tended either to ask questions within a subreddit or to answer them and participate in discussions. However, users who fill one role in one subreddit tended not to fill that same role in another subreddit. This means that while a user may function in the role of answer-person in one space, that user will most likely not be an answer-person in another space. This allows users to become involved in differing roles depending on the subreddits they frequent. Their conclusions are similar to the findings of L2 student roles in other online spaces (e.g., Chen, 2013; Liaw & English, 2013; Reinhardt & Chen, 2013), namely that as students participate in varying roles, they are afforded distinct actions, resulting in opportunities for learning through participation.

While Reddit has appeared more often in presentations at L2 conferences over the last decade (e.g., Albota, 2020; Banov, 2018, 2020; Kranzlein et al., 2020; Medina et al., 2018), very few published peer-reviewed studies to date have centrally addressed the topic language learning on Reddit. Isbell (2018) conducted a netnographic investigation of a subreddit dedicated to Korean language learning and a chatroom that was linked to in the subreddit. In his research, he provides several examples of explicit language question-and-answer discussion where interactions focus on specific second-order language patterns. He states, however, that English (the de facto language of Reddit) was often used as a “mediational tool” (p. 87). He also observed many interactions that were driven by an online participatory culture, meaning that all of the content in the online place was created, mediated, and shared by user action, and not some external source. Participating in the culture required users to adhere to norms of the subreddit, such as being accurate and concise, using Hangeul when writing Korean words, and demonstrating substantial effort when creating a post or comment. These were some of the internal and external grammars referenced by Gee (2005) that needed to be adhered to in order to fully participate in the affinity space. Using the framework of activity theory, Isbell (2018)

concluded that the two activity systems of the Korean subreddit and the associated chat space worked together to help L2 learners learn about and communicate in Korean. Each activity system had its own tools (e.g., the subreddit or the chatroom), its own objects (e.g., practicing Korean or gaining knowledge about Korean), and its own practices. Participating in the online places provided opportunities for language learning.

More recently, Yeh and Swinehart authored two articles exploring Reddit and its capacity for pragmatic instruction (2020a, 2020b). In one article (2020b), they describe training 64 English language learners living in the US to use Reddit and then asking them to spend time analyzing posts relevant to their current lives. The analyses were meant to help the students focus on the credibility, usefulness, and comprehensibility of the posts they encountered. After spending time on Reddit, the users reported becoming more familiar with the social norms of the subreddits they frequented through repeated exposure to the places and learning wordings and language patterns that helped them better adhere to the norms of each place through observation and reflection. Yeh and Swinehart conclude that Reddit is a platform that can successfully encourage language learning—specifically sociocultural pragmatics. In a follow-up study focusing specifically on 15 Chinese-speaking English language learners, Yeh and Swinehart (2020a) asked the participants to participate for six weeks in a Reddit affinity space of their choice. They analyzed each post and its metadata as well as the answers to provided prompts to assess the pragmatic development of the learners. They concluded that students became more aware of the pragmatic systems used in their respective subreddits through reflection on the content itself and the reactions provided by other users in the place. In both articles, Yeh and Swinehart end by calling for research to be conducted in more natural settings over longer periods of time. They also call for more in-depth research on language learning within online

networks like Reddit to identify the processes that language learners undergo to acquire language skills, such as pragmatics.

In response to the call for more in-depth and long-term research on language learning in online affinity spaces, this work looks at identifying some of the processes that lead to the development of a L2. Commenting on the article by Yeh and Swinehart (2020a), Sykes and González-Lloret (2020) write that as learners participate autonomously in settings such as Reddit, they “can begin to build these skills [of digital discourse] on their own, fundamental for their lifelong L2 development” (p. vii). It is hoped that this exploratory work can help shed light on how Reddit and other similar sites help learners in this lifelong path of learning.

### **Considerations for Ecological Research in Online Places**

Comparing studies that look at language use in online spaces, a few recurring ideas emerge. When new users join a space that has a strong or relatively static internal grammar (e.g., a long-established forum about car maintenance), their first uses of language usually struggle to align with the internal grammar of the space. Common jargon is often not used (or it is used incorrectly), the user’s voice might not match what is expected, the formatting of the text may not be correct, and so forth (Gee, 2005). However, as users in a particular space continue to participate in that space, their employment of second-order language patterns changes (Zheng et al., 2015). As they are afforded the ability to participate in skilled linguistic action, language learning occurs. This phenomenon can occur regardless of whether or not the spaces use the first, second, or subsequent language of the participants in them.

The catalysts for these changes are, in large part, observations of and interactions with others (e.g., Banov, 2021; Huang, 2015; Larson & Maier, 2000; Zheng et al., 2015). When choosing how to use second-order language, participants may consider past experiences, other

communications they have made, public responses (e.g., likes or upvotes) to those communications, concurrent events in the place, and numerous other ecological factors. The perceived views and opinions of others in the space (i.e., the external grammar) may also be contemplated. This process of dialogue with various others in the ecology causes small modifications in behavior in order to better relate to the people in that space—the process van Lier (2004) refers to as learning.

Regarding language research involving online spaces, it is important to effectively consider, use, and promote the dialogue afforded in online places. Noting the importance of dialogue in recent years, there has been a large shift toward collaborative learning, or intentional group activities where all learners must actively participate in achieving set outcomes with the purpose of deepening their understanding of a set topic (Barkley et al., 2014). However, scholars also need to ensure that learning spaces provide ample opportunities for all kinds of dialogue: dialogue with peers, experts, outside sources, past experiences, other viewpoints, and so forth. Researchers should be cautious of doing an activity online just because it can be done online. If the affordances of the space do not add to the activity at hand, then perhaps the activity would be better done in a physical, rather than virtual, setting.

Another important caveat is that established practices in any space may limit or impede certain actions. For example, participants of a study probably should not be expected to write an essay for a class and then post it on their personal Facebook page. While such an action is physically possible, the practice of Facebook would not easily afford such an action. Each social network has its own set of historically standardized practices, and posting homework assignments to a personal wall is not one of those practices. In addition, what agents choose to post on Facebook is likely not exactly what they would post on LinkedIn. Each space affords

different actions, and academics should be aware not to forcibly set students at odds with those practices.

Finally, when drawing conclusions about the impacts of a certain treatment on the language production or capacity of an individual, it is always important to consider the environment and its impact on the individual. Black (2005) observed how language learners participated in an online space dedicated to fanfiction writing. She noted how some of the learners that participated in the space found the ability to practice their English writing in a community where they felt safe. They were afforded dialogue with thousands of other users, the ability to translanguage, opportunities to incorporate other modes in their writing, and learning moments while collaborating with others (Black, 2006). However, if a learner were to perceive the site as boring or uninteresting, he or she would not be afforded the same actions. Therefore, a conclusion such as *online spaces can provide meaningful language learning opportunities*, while completely correct, only tells part of the picture. Black (2005, 2006) is careful to clearly explain what characteristics of the ecology serve to provide learning opportunities (e.g., a common endeavor that matches the interests of the learner, the ability and socially acceptable practice of identifying as a language learner, the affordance to include cultural history in the learner's writing, etc.), and other researchers should follow a similar standard.

### **Summary**

To review by incorporating all the heretofore mentioned principles, experience is based upon a human's relationships with other people, other objects, and other systems that surround the agent (i.e., the ecology). Those relationships afford sets of actions that a person can choose to undertake. Knowledge and understanding are gained through the experiences of undertaking those actions and through reflection on said experiences. Both the relations within the ecology

which yield experiences and the reflection on said experiences are fundamentally dialogical, and dialogue is related to the notions of cognition and learning. Language is a meaning-making activity and a principal way in which humans dialogue and think (viz., do cognition). As they participate in an environment, the way they think and act is modified due to situated reflection, resulting in (language) learning and development of the agent. Online environments afford more and different actions to language learners with lower barriers to entry, less serious consequences for violating established norms, increased prospects for dialogue, more abundant connections with a greater number of ecologies, and added opportunities for reflection.

Still, ecolinguistic research on language learning in online spaces is severely limited. Reddit, while being a place of learning, has rarely been studied as a place where language learning occurs. Long-term studies of language learners in the wild are few. This work endeavors (a) to fill these gaps by systematically observing language learners' participation on Reddit and (b) to reinforce claims made by ecolinguists by presenting evidence showing the connection between second-order language use and other systems in the online ecology.

### **Research Questions**

There are two main purposes to this exploratory work. The first is to attempt to validate some of the ontological claims made by ecolinguists (e.g., the primacy of first-order action over second-order language, the distributed nature of language, the dialogical nature of speaking and writing, etc.), assessing their ability to be observed or measured and providing evidence in favor of or contrary to those claims. The second is to find examples (both self-reported and observed in the digital wilds) of language learning and language development in users of Reddit and to shed light on how and why language learning occurs in online affinity spaces. Three principal research questions form the foundation of this work. They are as follows:

1. What features of Reddit and what personal goals or values draw L2 learners to Reddit (or specific subreddits) and encourage them to continue participating in those spaces?
2. Do L2 learners exhibit linguistic changes in their English writing over time because of their participation and values-realizing activity in online spaces, and if so, why do they occur?
3. What relationships are observed between language learners' actions, the second-order language patterns they produce, and other non-linguistic ecologies as they participate on Reddit for an extended period?

Additionally, this work helps to fill calls for longitudinal studies involving language learners and online social places made by previous scholars (e.g., Yeh & Swinehart, 2020a). It also aims to add examples of language learning that occurs in the digital wild, unswayed by researcher interventions (cf. Sauro & Zourou, 2019). In a world where learners are provided with increased opportunities for interaction and individual development by means of the internet, this work is both timely and indispensable. Key takeaways for researchers and practitioners will also serve to guide future works in the disciplines of ecolinguistics and language learning.

## CHAPTER 3

### Methodology

Conducting research where online spaces or the digital wilds are the main sources of data gathering can work to complicate analyses, replicability, and reliability. Therefore, it is especially important that the processes of data collection and data analysis be clear, accurately conducted, replicable, and reliable. Addressing challenges relating to working in online research, Gerber et al. (2017) explain how researchers can maintain the validity and reliability of their conclusions:

Online research is dependable when the researchers have taken care to explicate the research design and implementation, to detail the process of recruiting participants and collecting data, and to check with participants and colleagues alike on the study's emergent findings. (p. 87)

In a similar push for methodological rigor, Creswell and Miller (2000) explain nine different procedures for data verification that can help to increase the reliability of the results, specifically when working with qualitative data: (a) triangulation, (b) the search for disconfirming evidence, (c) researcher reflexivity, (d) member checking, (e) prolonged engagement or persistent observation, (f) collaboration, (g) external audit, (h) thick and rich descriptions, and (i) peer debriefing. In a later work, Creswell and Creswell (2020) recommend that every qualitative study include several of these nine procedures to maintain its rigor and reliability.

Addressing ecological research specifically, van Lier (2014) writes that when coding schemes are employed, both etic and emic tools should be used. Etic instruments include those based on pre-established categories and systems which are then imposed on the setting studied. Conversely, emic instruments are those where analytical notions and constructs are often created

from the data and therefore compatible with the observations of the participants in the researched setting (p. 195). In an attempt to adhere to this guidance, this work attempts to be sensitive to both etic and emic constructs, employing both to help draw both accurate and reliable conclusions.

This chapter aims to explain the methodology followed in this investigation while addressing the aforementioned suggestions. The process of gathering participants and data is explained in great detail. The proposed method of data gathering was overseen by the Institutional Review Board at the University of Hawai‘i at Mānoa. Potential researcher bias and confounding variables were explored and are included in the discussion. External audits and reviews with external researchers in the field of ecolinguistics were conducted. Banov (2021) also presented preliminary results from this research at an interdisciplinary conference, where feedback was solicited from current researchers in the field. Thick descriptions of the methodology and the focal participant allow future researchers to be able to assess the validity and applicability of this work while also facilitating replicability.

This study employs a mixed methods research design. According to Johnson et al. (2007), mixed methods research is a synthesis of both qualitative and quantitative research with the purpose of providing more informative, balanced, and useful research results (p. 129). Specifically addressing language research, Brown (2014) writes that mixed methods research must strategically both combine qualitative and quantitative methods in a way that generates new research questions and provides conclusions that would be better, clearer, more reliable, and more informative than they would be using only one of the two methods. Given that this is a novel study on a field and social platform scarcely studied, the use of both quantitative and qualitative methods aims to provide a clearer picture of online language learning and the

environment that surrounds it. This research seeks to provide conclusions that are consistent, faithful, verifiable, and meaningful—following Brown’s (2004, 2014) guidance. To facilitate this goal, each step of the research process is explained in detail below.

### **Online Netnography**

To guide the online observation of second language (L2) learners in the digital wilds (Hutchins, 1995; Thorne et al., 2015), an online netnographic case study methodology was followed. *Online netnography* is a term coined by Kozinets (1997). Originally, it refers to any “written account of on-line cyberculture, informed by the methods of cultural anthropology” (p. 471). In a later work, Kozinets (2010) redefines the term as “a specialized form of ethnography adapted to the unique computer-mediated contingencies of today’s social worlds” (p. 1; cf. Steinkuehler, 2006). The purpose of netnographic investigation is to look at online cultures and the actions that humans take in online settings. Netnography “encompasses interviews, data scraping, archival work, online observation, and active engagement with new forms of data collection, visualization, thematic analysis, and field-level rhetorical analysis” (Kozinets, 2019, p. 9).

Netnography is important in the study of the digital wilds, as it allows for the observation, notation, and analysis of many of the complex systems that compose online spaces. It allows for a method of observation where the researchers can (if desired) act right alongside those they observe, while at the same time permitting for data collection to be conducted with “a much larger degree of unobtrusiveness and expedience” (Isbell, 2018, p. 84). Conducting research from a netnographic framework also gives researchers the ability to take a more data-grounded emic perspective when performing analyses.

The research in this work aimed to employ each of the relevant methods recommended by Kozinets (2010, 2019) to collect data as well as draw conclusions. First, the author drew upon five years of experience of being a member of Reddit to be able to effectively, voluntarily, and as unbiasedly as possible reach out to and select participants. Multiple methods of finding and reaching out to participants were used, as described in greater detail below. Additionally, the data selected from the work were taken from several distinct sources, including interviews, raw contribution data, observations, and even active communication with some of the participants directly via Reddit. Conclusions made in the work draw upon all of these data sources, combining them to paint a more holistic picture of learner development than simply the memorization of a word, morpheme, or conjugation. From an ecological point of view, language development occurs simultaneously and inseparably from human development, so this work aims to demonstrate that phenomenon using deep descriptions and multiple data sources and types.

### **Participants**

The participants in this study were found, or recruited, using two methods. The first method was via a post made on the AskReddit subreddit (a subreddit where anyone can ask questions to the entire Reddit community). In the post, users who spoke English as a L2 were asked to share stories of what English they felt they had learned through their participation in Reddit and how they believed they learned it. Those who responded were added to the initial participant pool.

The second method involved doing an internet search of Reddit querying the specific words *learning English*, *non-English*, or *studying English*. These words were specifically chosen to help identify English learners. Users who had identified as being non-native English speakers or who had made comments such as “I apologize for my grammar. I am still learning English.”

were also added to the participant pool. It is important to note that just because someone writes *I am learning English* on Reddit does not mean that he or she is necessarily an English learner. In fact, one of the participants originally added to the participant pool wrote that he was a learner of English. Upon review of the posting history of that participant, it was identified that he was actually a native English speaker living in Leeds, UK. Because of this, he was removed from the participant pool. The comments of each participant in the pool were examined to ensure that there was no evidence of anyone just pretending to be a native speaker of a non-English language (e.g., by commenting that he or she was a native English speaker in another thread).

The participant pool was composed of 36 Reddit users. Each of these was messaged via Reddit's messaging platform. In the first message, the users were informed that a study was being conducted and asked if they were interested in participating. Users were allowed to reply on their own if they desired. The recruiting statement employed was approved by the University of Hawai'i IRB, and can be found in Appendix A. Of the 36 people in the participant pool, 21 responded to the message. They made up the final participant group. After the users replied, an open interview was conducted via Reddit. Upon being informed of the data that would be examined for this study, one user asked that his posts and comments not be analyzed. He did, however, provide consent for his interview responses to be used in the study.

Some users included demographic data in their interview responses. As specific biographical data were not solicited, only demographic information which was either shared with the researcher or else publicly available in user comments and posts was gathered. Free, public Reddit analytics tools (i.e., RedditInvestigator, SnoopSnoo, and RedditCommentSearch) were used to gather and examine each user's online contributions, allowing for an easy way to view

these additional data and providing a better profile of each participant. A short summary of the known information of the participants can be found in Table 1 below.

**Table 1**

*Demographic Data of the Participants*

Category	Group	<i>N</i>
Gender	Male	15
	Female	5
	Unknown	1
Age Group	18–24	8
	25–34	7
	35–44	1
	45+	1
	Unknown	4
First Language	Chinese	1
	Croatian	2
	Czech	2
	Danish	1
	Dutch	3
	Dhivehi	1
	Estonian	1
	French	2
	German	2
	Greek	1
	Italian	1
	Russian	1
	Spanish	2
Turkish	1	
Country of Residence	Belgium	1
	China	1
	Croatia	2
	Czech Republic	2
	Denmark	2
	Estonia	1
	France	1
	Germany	2
	Greece	1
	Italy	1
	Maldives	1
	Netherlands	1
	Russia	1
	Spain	1
	Turkey	1
Unknown	2	

As an additional note, all of the users cited in this work were assigned pseudonyms in place of their usernames. This means that no real Reddit usernames appear in this work. Nevertheless, the pseudonyms selected for each participant were similar in style to preserve some sort of image for each user. For example, if a user's name originally used Spanish words, the pseudonym would also use Spanish words. Nonsense usernames were replaced by nonsense pseudonyms. If a user had one number in his or her username, only one was included in the pseudonym, and so forth. For example, if a user's Reddit username were HappyMercury4110, a possible pseudonym could be JovialJupiter3882.

### **Data Collection**

Data for this work included comments, posts, usage statistics (i.e., timestamps, number of hours spent on Reddit, most commonly visited pages, etc.), and the responses from open-ended interviews conducted via Reddit with each user in the final participant group ( $N = 21$ ). Except for the open-ended interview responses, the data were publicly available online by viewing the Reddit profiles of each user or by retrieving it directly through Reddit's public API using the online search tools mentioned above.

### **Online Contributions**

Once a participant was added to the final participant pool, his or her account was queried using RedditInvestigator and SnoopSnoo as previously explained. These tools reported general information about Reddit users, such as the time of day they tended to visit Reddit, what subreddits they visited and how often they visited them, what demographic groups matched the online behavior exhibited by the users, how many submissions they had, how many total votes they had, and so on. The tools also exported easy-to-analyze lists of each contribution made by each user. This information was then examined and used to provide a better picture of each

Reddit user. For example, the data gathered helped identify if users identified as male or female in their contributions, what their interests were, and how they interacted with others on Reddit.

Afterward, each user's name was queried in RedditCommentSearch. This tool gathers a list of all the publicly available submissions (i.e., posts and comments) made by the user. It also provides links to each contribution, so that it can be viewed in its original context. The information from RedditCommentSearch was then copied and pasted into a Microsoft Excel spreadsheet, allowing the addition of metadata, such as the date and time of each submission, the number of votes per submission, the number of words per submission, and so on. Data gathered thus were easily able to be imported for further statistical analyses using SPSS Statistics for Windows (IBM Corp.).

Because terms relating to online social spaces (e.g., post, comment, message, like, etc.) can carry different meanings depending on the design of the user interface, it is important to clarify what each term means. Throughout this work, a *post* refers to any content or link posted to the Reddit website. A *comment* is a reply to a post. Referring to the Reddit platform, a *message* is a text communication between two users through the Reddit messaging interface. As Reddit's user interface does not provide the opportunity to like a comment or post, that term will not be used. However, users can vote in favor of a post or comment and express their like or approval of it (i.e., upvote). Conversely, they can also vote against a post or comment, expressing their dislike or disapproval of it or its contents (i.e., downvote).

Following the naming conventions of Koh et al. (2007), *active participation* refers to contributions to the Reddit space that require the user to modify the content of the space. Examples of active participation in this work include upvotes, downvotes, posts, and comments made by the participants. When referring to individual instances of making posts or comments,

this work may also use the term *submission*. Finally, *passive participation* refers to cases where users were on Reddit without posting or commenting on anything (also known as lurking). It is important that comparisons made between this work and others be aware of and account for similarities or differences between similar methods of contributing to the online spaces researched.

### **Open Interviews**

The online discussion with each user in the final participant group followed an open interview style. This means that the interview did not follow a specific order of questions, nor did every interview employ all of the possible interview questions. Additionally, follow-up inquiries were allowed in the cases where a user either was unclear or did not answer the questions asked. Questions were asked as they arose, usually in response to something that the participant had said in his or her previous response. The interviews took place asynchronously, with the researcher asking no more than three questions at a time. They occurred over the course of one to five back-and-forth messages and spanned anywhere from one to six days in total length. The interview questions were selected from an IRB-approved list, found in Appendix B. Of the 36 users in the first participant pool, 21 replied and participated in the interview. As explained before, one user asked that his submissions not be analyzed, but he did provide consent to analyze and include the data from his interview responses.

### **Interview Responses**

After the open-ended interviews ( $N = 21$ ) were complete, each participant response was copied and pasted into a Microsoft Excel document. The interviews were divided into individual clauses ( $N = 192$ ), and then each clause was coded to identify recurring ideas found among the interviewees' responses. A system of grounded (Corbin & Strauss, 1990), qualitative coding

following the methods outlined by Saldaña (2013) was used for this study. On the first pass of coding, words or short phrases that summarized principal attributes of each clause were written down (Saldaña, 2013, p. 3). Some clauses included more than two distinct attributes. In such cases, each attribute was written down, and both were assigned to the same clause. Recurrent ideas were then identified, and all of the principal ideas were condensed into 35 different codes. A second pass of coding was then conducted, where several codes were combined with others and then renamed to better fit the new principal ideas. This same process was repeated a third time. After the third pass, 25 codes were identified and defined. A fourth pass of the data was then conducted to ensure that each sentence was coded correctly and consistently, in accord with the final coding criteria. A list of each code and its corresponding definition can be found in Table 2 below.

**Table 2***Final List of Open Interview Codes and Their Definitions*

Code	Definition
Answers to Specific Questions	Comments stating that the learner utilized Reddit to ask other users questions specifically about English
Arguments	Comments stating that the desire to make an argument or voice an opinion led the learner to Reddit
Community Belonging	Comments stating that the learner felt a part of a specific subcommunity or the larger Reddit community
Comparing Genres or Language Styles	Comments stating that Reddit provided a place where learners could compare the styles of different genres (e.g., comparing words choices, phrasing, pragmatics, etc.)
De Facto English Use	Comments suggesting that English being the de facto language of Reddit constrained the learner's actions or led to language learning
English-Speaking Culture	Comments stating that the learner gained a better understanding or management of English-speaking culture
Everyday or Informal English	Comments stating that Reddit aided in learning common, everyday, informal, or online English vernacular
Exclusion by Community	Comments stating that the learner felt excluded from or devalued by certain communities for any reason
Feeling Better About English	Comments stating that participating on Reddit helped the learner generally feel better about their English proficiency
Formal or Specialized English	Comments stating that Reddit aided in learning specialized or formal English words and phrases
Imitation	Comments stating that the learner tried to study or imitate what others said or did on Reddit
Influence of Votes	Comments stating that the votes of other Reddit users impacted the learner's participation or language use
Limited Peripheral Participation	Comments stating that the learner felt like he or she took time to participate on Reddit passively or peripherally (e.g., lurking, reading comments, voting, etc.) prior to actively participating (i.e., posting and commenting)
Maintenance of English	Comments stating that Reddit aided the learner in the maintenance of English already learned
Other English Sources	Comments stating that the learner employed resources other than social networks or formal education to learn English (e.g., movies, music, general internet surfing, books, etc.)
Other Social Networks	Comments stating that the learner employed social networks other than Reddit to learn English
Prior English Learning	Comments stating that the learner had a level of English proficiency prior to participating on Reddit
Real-Life Application	Comments stating that participation on Reddit had some impact on or connection to the learner's real life
Reddit Platform Features	Comments describing specific design features of Reddit that impacted the language learning or participation of the learner
Reddit's Shortfalls for English	Comments providing reasons for why Reddit is not a good place to learn English
School Deprecation	Comments stating that the learner's previous formal education did not provide him or her with real-world experiences
Seeking Entertainment	Comments stating that the desire to consume entertainment or to combat boredom led the learner to Reddit
Seeking Information	Comments stating that the desire to find information led the learner to Reddit
Specific Examples	Comments providing specific examples of what language was learned by the learner (e.g., words, phrases, or grammar)
Spelling	Comments stating that Reddit aided in learning spelling of English words

To ensure that the coding scheme was clear, reliable, and able to be used by other researchers, an independent second researcher familiar with language learning and L2 research was asked to code a subsection of the interview response clauses. One third of the clauses ( $n = 64$ ) were randomly selected and then shared with the second researcher, and she was asked to code each clause according to the code or codes she felt best applied to it. The independent rater's coding was then used to obtain a coefficient of agreement for nominal scales and verify that the instrument had a high level of interrater reliability. Cohen's (1960) kappa value was used to provide an estimation of how reliable the data provided by the instrument were. Of the 25 possible codes for each item, only two instances of coding showed any discrepancy. In one case, the independent rater coded a clause as relating to Everyday or Informal English, while the original code was Comparing Genres or Language Styles. In another instance, the independent rater coded a clause as Real-Life Application, while the original code was Everyday or Informal English. Given that the code Everyday or Informal English was involved in both of the missed codes, the definition was refined to make sure that it was clearer. After discussion between both the raters, it was decided that the former case should be double-coded, and the latter should remain solely as Everyday or Informal English. Even when including the two discrepancies, Cohen's kappa statistic resulted very high ( $\kappa = 0.965$ ). The observed proportionate agreement was nearly perfect ( $p_o = 0.967$ ), and the probability of random agreement was quite low, particularly considering that the number of possible codes per clause ( $p_e = 0.063$ ). The resulting kappa statistic suggests that the coding scheme created to quantify and interpret the data of the interviews was highly reliable (Landis & Koch, 1977). After finishing the reliability test, one final pass of the data was completed to ensure that the codes were employed correctly after the

discussion about reliability. One code was added to one of the communicative projects (CPs), as it should have been double coded. No other changes were made in the final pass.

When the coding scheme for the interview data was complete, each code was combined into categories in order to help subsequently identify themes—a process which helps identify the systematic relationships between lower-level constructs (Saldaña, 2013). Five higher-level categories were identified: Second-Order Language Learned, Methods of Informal Online Language Learning, Reasons for Participating on Reddit, Community Belonging and Communities of Practice (CoPs), and Features of Reddit Which Impacted Learning. The five categories and the codes relating to each are listed in Table 3. Three codes (i.e., English-Speaking Culture, Feeling Better About English, Prior English Learning) did not fall into any of these categories and were left as individual codes.

**Table 3***Categorization of Each Open Interview Code*

Category	Code
Second-Order Language Learned	Everyday or Informal English Formal or Specialized English Maintenance of English Specific Examples Spelling
Methods of Informal Online Language Learning	Answers to Specific Questions Comparing Genres or Language Styles Imitation Other English Sources Other Social Networks
Reasons for Participating on Reddit	Arguments Community Belonging Real-Life Application School Deprecation Seeking Entertainment Seeking Information
Community Belonging And CoPs	Exclusion by Community Influence of Votes Limited Peripheral Participation
Features of Reddit Which Impacted Learning	De Facto English Use Reddit Platform Features Reddit's Shortfalls for English

Once the coding process was complete, each code was tallied, and totals were analyzed to identify commonalities among the user responses and salient issues surrounding the central topic of language learning on Reddit. Themes were then identified at the manifest level, as described by Saldaña (2013, pp. 175–181), with the purpose of organizing repeating ideas in the data set. Saldaña’s basic categorization tactics were used to identify the themes from the qualitative coding and quantitative analysis of the data and then compare the relationships they had with one another and with the rest of the data.

## Case Study

In his book describing language learning research from an ecological perspective, van Lier (2004) lists case studies as one of the most common methods for conducting research. He writes that in a case study, “a bounded case (often an individual, or a small group—such as a classroom) is investigated over a longer period of time to characterize its workings and development” (p. 194). van Lier also points out that when conducting ecological research, the researcher should set a clear boundary of time and space, keeping in mind that the phenomena under observation may not be impacted by or limited to developing only within the time and space under observation.

In order to look for evidence that could serve to support some of the results of language learning generated from the thematic coding of the open-ended interview data, one participant (pseudonym RealAcorn) was selected as a case study after that open-ended interview responses were gathered. RealAcorn was chosen for several reasons. First, he was a male between the ages of 18 and 25 at the time of data gathering, matching the demographics of a prototypical Reddit user (cf. Sattelberg, 2021). He was a learner of English who had completed high school but was not attending college at the time of his participation on Reddit. Second, while RealAcorn had taken English classes previously, he was not enrolled in any English courses during the lifetime of his Reddit account. This meant that the confounding variables of instructor intervention or classroom instruction could be ruled out. Last, RealAcorn became interested in trading cryptocurrency during his time on Reddit. He began following the official and unofficial subreddits of several different kinds of cryptocurrency. Cryptocurrency subreddits stereotypically prefer written language interactions, meaning that most of RealAcorn’s

interactions and experiences with cryptocurrency relied exclusively on written English and not on other kinds of media or audiovisual resources.

After a period of participating in Reddit's cryptocurrency ecologies, RealAcorn decided to invest some of his own money in a cryptocurrency called Monero. For the next few months, he participated actively in two or three subreddits focused exclusively on Monero. Eventually, RealAcorn decided to sell his Monero and invest in other cryptocurrencies. He explored other denominations and spent several months investigating whether and how to invest in them, buying and selling smaller currencies. Toward the end of the lifetime of his account, RealAcorn ceased trading cryptocurrency altogether, and finally discontinued his participation on Reddit.

All of the submissions (i.e., posts and comments) made by RealAcorn were gathered and used for the case study analysis. After each of his submissions were scraped from the Reddit API using `RedditCommentSearch` and pasted into a Microsoft Excel spreadsheet (as outlined in the Data Collection section above), metadata for the contributions were added. These included the type of submission (i.e., post or comment), the date and time of each submission, the number of words per submission, and the number of votes (i.e., a total of upvotes and downvotes) received per submission.

RealAcorn participated almost exclusively in cryptocurrency subreddits. These subreddits are somewhat unique in that they explicitly prohibit the posting of images and videos unless they somehow directly relate to the trading of the cryptocurrency in question. While not originally intended, this external restriction helped to increase the reliability for some of the analyses performed in this work. Because of these restrictions within the spaces where RealAcorn participated, he was forced to rely exclusively on his written English to communicate with others, gather upvotes, fulfill roles, and realize values in the ecology. This helped to control for

the impact that other forms of media (e.g., memes, videos, images, etc.) might have had on language learning, feelings of belonging, fulfilling community roles, and so on.

While all of RealAcorn's submissions ( $N = 192$ ) were analyzed, only the ones posted in cryptocurrency subreddits ( $n = 152$ ) were used in the analyses regarding language use and language learning. This allowed for a more systematic approach to the assessment of language change over time. It also helped when drawing conclusions, as much of the language found in the cryptocurrency subreddits is unique to those ecologies, meaning that it could not be learned in other contexts. This idea is discussed in greater detail in the Discussion section below.

In this case study, the space is clearly defined. It is composed of the Reddit website and specifically the subset of cryptocurrency subreddits where the participant was active. The time under investigation is also fairly easy to define: the life of the user account. The active participation data gathered spanned a period of almost exactly one year, from March 21, 2017, to March 13, 2018. As van Lier (2014) writes, even though the time and space are clearly defined, researchers must remember that the observations made can be impacted by events and actions outside of this time and space—a central part of the discussion found at the end of this work.

To systematically assess RealAcorn's language learning and language change over time, several analyses of his submissions had to be made. First, each submission was read several times in context, looking at the interactions that took place leading up to and following each post or comment. Afterward, each submission was divided into CPs. Each CP was then coded for its dialogical purpose within the environment it occurred. Next, the CPs were coded for the ecologies they referenced, following Bronfenbrenner's (1977, 1979) classification of nested ecologies. After another readthrough of each contribution, significant changes in behavior patterns were marked and annotated. Finally, cognitive event analyses were conducted to identify

transition points and possible event pivots that served to explain when and why the changes in behavior took place. Each of these steps is described in detail below.

### **Communicative Projects**

One of the main units of analysis employed in this work is the CP. The term CP has been used in communication studies since the 1990s (e.g., Linell, 1998; Luckmann, 1992, 1995). Linell (2009) explains that every utterance or communicative act is part of a larger project, goal, or action. CPs are discrete “tasks carried out by participants in and through their interaction” (p. 190) and the purpose of CPs is to establish something as communicative fact (i.e., something that is either explicitly stated or at least expected to be mutually understood; see Linell, 2009, pp. 188–190).

An important attribute of CPs is that they are inherently dialogical by nature. Linell (2009) points out that individual projects deal with topics or actions that the participants are somehow concerned with, interested in, or committed to—at least at the moment of participation. They may or may not be pre-planned, projected, or perceived as important. However, all projects are “at least partially oriented to and concerned with an addressee’s possible response” (p. 189). The dialogical CP fundamentally requires some sort of interaction from more than one party (even though the dialogue can be unequally distributed between the speaking agent and the other). Additionally, CPs can (at least in synchronous communication) emerge as the dialogue happens. What starts as a comment may end up being a question, or vice versa. A large-scale CP can therefore begin as a criticism and end as an attempt to provide comfort. CPs are emergent and dynamic, and need not always come to a clear conclusion to still carry meaning. And because they are dialogical by definition, they can overlap, be nested within other CPs, and even influence or be influenced by the environment in which they occur.

Given that CPs can be nested, they can exhibit the characteristic of being fractal. In other words, CPs often are composed of smaller CPs and are often part of larger CPs. Linell (2009) describes CPs as being local or global. Examples of local CPs would be simple actions such as saying hi, asking a question, replying to question, drawing attention to something, and so forth. In contrast, global CPs are generally larger in scale and usually comprised of multiple local CPs. Some examples of global CPs might be telling a story, providing counsel, or giving directions on how to complete a task—each of which are comprised of smaller-in-scale, local CPs. In addition, global CPs often have a limited number of possible local CPs to choose from, as they are socially defined. For example, the global CP introducing oneself generally begins with the local CP of greeting the person. Furthermore, the local CP of greeting someone generally has only a limited number of options (e.g., *hello*, *good afternoon*, *hi*, etc.). As an agent or interlocutor gains experience, he or she can often anticipate or project what kind of response might come next. This affords speakers not only the ability to plan what to say, but also the foresight to predict what others might do after hearing it, what others might think in relation to the sociohistorical context of the space or environment they are in, and what impact each agent might have on the environment.

CPs and their sociohistorical systematization results in certain expected patterns of interaction (e.g., question → answer; statement of opinion → rebuttal or approval → evidence for or against the opinion; exchange of hellos → asking to speak with someone → expression of understanding → exchange of thanks; etc.). In dialogical linguistics, these patterns are known as communicative activity types (CATs). CATs share some characteristics with the constructs of text genre (Bakhtin, 1986; Swales, 1990) or communicative genre (Günthner & Knoblauch, 1995; Luckmann, 2002; Marková, 2003) in the idea that all utterances are part of larger, and

more comprehensive activities. Being couched in distributed language theory, CATs not only look backward on pre-existing data or experience, but also are related to and influenced by concurrent actions, situations, and social encounters. In other words, they consist of the entire context in which the discourse occurs.

An example of a CAT relative to this work in question could be the conversation one might expect to have when trying to resolve a technical issue in a PC (personal computer) support subreddit. Usually, this interaction involves roughly five CPs: provision of information on the problem, the provision of a possible solution, a response, and a termination of the thread. Each subreddit is slightly different, but the first step generally includes providing others with basic information including hardware and software specifications, what the user was doing when the problem occurred, what went counter to the expectations of the user, and possibly what steps were already taken to troubleshoot the issue. As can be seen, the larger CP of providing information may be made up of smaller CPs, such as sharing specifications. Providing the solution must always include directions for what the user must do to resolve the problem, but it may also include information about why the problem happened. If the response is that the problem was resolved, then the thread may be closed. If not, then another cycle of information, possible solution, and response can be initiated. The format of this CAT is impacted by the subreddit's implicit and explicit rules, as well as the hardware and software of the time. While similar to a conversation that can take place at a brick-and-mortar repair shop, the CAT of the solicitation for help is still unique.

In the previous example, it is worth noting that while discrete in purpose and task, CPs may overlap. For example, a discussion of the response can bleed into the provision of additional details if the first recommended solution does not work. CPs can also be nested, in that the

retelling of what went wrong falls within the larger CP of providing information about the problem. Therefore, CPs are scalar and enable analyses from both local and global perspectives. In fact, some CPs are culturally patterned to be largely local (e.g., a greeting CP at a place of employment, usually expected to consist of one of a few utterances and to take only two turns), while others can move above and beyond the individual communicative acts, lasting even multiple encounters (e.g., providing reassurance during pregnancy; cf. Bredmar & Linell, 1999).

The most important takeaways from the preceding examples are (a) that CPs are discrete tasks with the purpose of establishing something as communicative fact and (b) that they are impacted and influenced and constrained by the sociohistorical contexts in which they appear (including the CATs to which they belong). Considering these points, it is possible to break utterances (or in this case, submissions) into individual CPs and then code each CP for analysis. This method has been employed in previous ecological studies on language learning (e.g., Newgarden, 2015; Newgarden & Zheng, 2016; Zheng, 2012; Zheng et al., 2012, 2018). Despite being employed often, this methodology has not been clearly explained in detail. It is difficult to identify exactly how researchers using CP analysis decided the scale of CPs to be coded. To my understanding, there is currently no published work explaining the complete methodology of CP analysis, including what qualified as a CP and what did not. To date, the only clear construct definition for a CP is found in Linell's (2009) work, and in that work, he explains that CPs are scalar. Therefore, a detailed explanation of how CPs were coded for this work follows.

### ***Delimiting Communicative Projects***

While CPs can often span several utterances, contributions, or actions, a macro-scale analysis of CPs is usually not beneficial for research on small-scale language learning (Linell, 2009). Therefore, each submission by RealAcorn was analyzed individually. Doing so did not

violate any of the definitions of CPs, as each submission is a discrete task carried out by a user in and through interaction (Linell, 2009, p. 190). Additionally, each contribution served to establish something as communicative fact (e.g., to share an emotion or opinion, to provide evidence supporting a claim, etc.). Therefore, the 152 submissions in cryptocurrency subreddits resulted in 152 analyzable CPs. Some of these submissions ( $n = 32$ ) were single CPs (e.g., “An interesting read” or “Is that good or bad?”), while the rest were comprised of multiple, even overlapping, CPs. Linell writes that multiple CPs often “end up as part of an overall project” (p. 189). Hence, the next hurdle was deciding if, where, and how to split the submissions comprised of multiple CPs.

To decide where to divide the remaining submissions ( $n = 120$ ), it was important to read through each one in context. The setting was important, as it helped identify the purposes of each phrase or sentence as well as the CATs surrounding each CP. CPs were only be delimited if they had some sort of dialogical purpose. Thus, submissions were subdivided into the smallest CPs that were still dialogical in nature (i.e., involving some level of interaction, anticipation, or responsivity with an “other” in the same space; Linell, 2009, p. 12). To help explain this process, several examples are shown below.

### **Excerpt 1**

I thought the same. Seems like very simple.

In Excerpt 1, the subdivision into subordinate CPs was fairly straightforward. RealAcorn first states his agreement with the preceding submission: “I thought the same.” Afterward, he shares his opinion that the action of keeping records of and reporting his cryptocurrency gains to a government tax agency should be very simple. There are two CPs in the above example, and

they align nicely with where one sentence begins and another ends. However, such is not always the case.

## **Excerpt 2**

So any idea of the motives behind yesterdays pump? Be aware that we havent even reached our max price yet. I think we still have good place to grow. In my opinion yesterday a whale with inside information bought to be prepared for the future that is coming. My guess? 30USD 20-30 May

In Excerpt 2, RealAcorn is involved in several distinct CPs. First, he asks a question: “So any idea of the motives behind yesterdays pump?” That is its own CP. It is arguable that the word *So* may be another CP, functioning as a sort of transition or setting some sort of a mood or rapport with the readers in the group. However, it is not eliciting or involving interaction, it is not anticipating any sort of responsivity, and it cannot carry a purpose without the rest of the sentence. Therefore, it remains part of the neighboring CP. The second CP in the sentence, is “Be aware that we havent even reached our max price yet.” Here, RealAcorn is establishing something as communicative fact. He is stating a pre-established fact: at this time, Monero’s price has still not reached its all-time high price. In fact, this statement is made to provide evidence for, create a context for, and substantiate the subsequent opinions he will share. This sentence has its own communicative purpose, and it is leading the reader to hear or take in RealAcorn’s opinions. The next CP is “I think we still have good place to grow.” Here RealAcorn states his belief that Monero will continue to grow. He is stating an opinion. Similarly, in the following sentence, he states another opinion as to what had happened on the previous day “In my opinion yesterday a whale with inside information bought to be prepared for the future that is coming.” The last part of the contribution is “My guess? 30USD 20-30 May.”

This last part is comprised of a sentence fragment in the form of a question, a projected price, and a date range. While each of these are CPs by themselves, they lose their dialogical purpose and responsivity when separated from each other. Together, they establish that RealAcorn guesses that the price of Monero will reach 30 USD between May 20 and May 30. Therefore, the remaining piece of the contribution was coded as one CP. In total, Excerpt 2 was split into five individual CPs.

Each submission that was composed of multiple CPs (e.g., Excerpt 2) was broken down into its individual CPs following the process outlined above. When the process of delimiting CPs was complete, there were 698 total individual CPs in all of RealAcorn's contributions to cryptocurrency subreddits. Each CP was then able to be analyzed and coded. These 698 elements served as the unit of analysis for the quantitative analyses explained below. The relatively large number of CPs also allowed for reliable and statistically significant parametric analyses.

As is clear from the above discussion, CPs are distinct from other linguistic constructs, such as turns, T-units, or adjacency pairs. CPs lend themselves to different kinds of analysis, as they are focused on the dialogicality of interaction. Linell (2009) posits that human sense-making and learning takes place while agents are involved in dynamic processes, actions, and practices. Meaning is contextually constituted within the interactions with others and their environments (p. 30). The strength of CP analysis is in the fact that it allows for changes in behavior and understanding to be observed while still considering the complexities of language and the ecologies and systems in which they are found.

Using a clearly-defined method of delimiting CPs also allows for more reliable statistical analyses. Previous works that employed CP analyses (e.g., Newgarden, 2015; Newgarden & Zheng, 2016; Zheng, 2012; Zheng et al., 2012, 2018) often used real-time audio or video

recordings as their data sources. The researchers in these studies employ software to mark and code CPs along a time continuum using qualitative analysis software such as Transana. Subsequently, a graphic display of the codes and their timestamps allowed for a visual analysis of the data. However, when using these types of analyses, running statistical procedures beyond frequency analyses is not reliable.

In works dealing with large quantities of longitudinal text data, graphically displaying CPs is not possible. However, using the approach explained above of clearly and consistently delimiting and breaking down CPs into their smallest dialogical components allows for more dependable results involving statistical analyses. It also allows for easier replication in the future, increasing methodological rigor and trustworthiness. This is especially needed in the comparatively new field of ecolinguistics, where standardized analyses and methods are still to be established and where generalizability is often very low (Kramsch & Steffensen, 2008).

### ***Coding Communicative Projects***

The CPs were coded using a similar grounded thematic coding process as described in the preceding section. The purpose of the coding was to identify the main dialogical purpose of each CP. Once again, the qualitative coding followed closely the methods described by Saldaña (2013). During the first pass of the CPs, words or short phrases that summarized the purpose of the CP were written down. Afterward, recurring ideas were identified and highlighted, and the most salient purposes were used to constitute a rough-draft for the coding scheme. A second pass of the CPs was then conducted. Again, some codes were combined with others and several new codes were created. Most of the codes had to be renamed, and definitions of each code were refined to better fit their new limitations. This same process was repeated a third time. After the third pass, 18 codes for dialogical purpose remained. A fourth pass of the data was then

conducted to ensure that each CP was coded correctly and consistently according to the final list of codes and their respective definitions. A list of each code and its corresponding definition can be found in Table 4.

**Table 4**

*Definition of CP Coding Scheme*

Code	Definition
Apologizing	CPs where RealAcorn apologizes for something he did
Asking a Question	CPs where RealAcorn asks a question encouraging another user to respond
Clarifying Another CP	CPs where RealAcorn restates or adds information to a previous CP to help clarify his original meaning
Defining Current Situation	CPs where RealAcorn describes or outlines his current situation or environment by presenting information as fact
Eliciting Responses From Others	CPs where RealAcorn simply tries to evoke some response by another user (e.g., “Sooo...”)
Expressing Agreement	CPs where RealAcorn expresses agreement with something another user has written
Expressing an Opinion	CPs where RealAcorn states his belief, view, or judgment of something
Expressing Disagreement	CPs where RealAcorn expresses disagreement with something another user has written
Giving a Command	CPs where RealAcorn instructs another user or other users to do something, employing the command form of a verb
Giving Thanks	CPs where RealAcorn expresses thanks to another user for something he or she has done
Greeting	CPs where RealAcorn greets or welcomes another user
Making an Exclamation	CPs where RealAcorn adds an interjection to the dialogical interaction (e.g., “Oh man”)
Providing a Citation	CPs where RealAcorn cites an external source for other users to consider
Providing Answers to Questions	CPs where RealAcorn answers another user’s question
Providing Encouragement	CPs where RealAcorn shows the value of caring by supporting or reassuring another user or other users
Providing Reasons or Evidence for Another CP	CPs where RealAcorn provides additional information meant to support, contextualize, or verify a claim or opinion made in another one of his CPs
Recounting Past Experience	CPs where RealAcorn tells of past experiences
Stating a Future Action	CPs where RealAcorn states he will do something in the future

## **Bronfenbrenner's Nested Ecologies**

In addition to being coded for its dialogical purpose, each CP was marked for the dialogical ecologies it referenced. The coding scheme for this step was taken from Bronfenbrenner's (1977, 1979) classification of nested ecologies. Bronfenbrenner (1977) argues that to be able to understand human development and learning, researchers must move beyond observing the behavior of a subject in one place at one time. Instead, researchers should examine multiperson systems of interaction and consider the relationships between the subject and other environments beyond the immediate situation of the observed (p. 514). He posits that learners are affected by (and in turn affect) not only the immediate environments in which they live, but also larger social contexts in which those environments are situated. Bronfenbrenner (1977, 1979) then provides a taxonomy for referring to four distinct systems that impact learner growth and development: They are the microsystem, the mesosystem, the exosystem, and the macrosystem.

The term *microsystem* refers to relations between the learner and those objects and agents in the immediate setting containing that person. Bronfenbrenner (1979) defines a *setting* as “a place with particular physical features in which the participants engage in particular activities in particular roles ... for particular periods of time” (p. 514). This is a similar definition to Tuan's (1979) definition of *space* as a territory that has boundaries and affords certain actions. Thus, in this work, a microsystem would include the complex set of relations that occur within a specific subreddit directly involving or interacting with a learner.

Moving outward from a microsystem, a *mesosystem* is comprised of the relations between the developing person and others who are closely connected to the learner at that particular point in his or her development. A main difference between microsystems and mesosystems is that those pertaining to mesosystems are not necessarily present in the place

during a certain micro experience. Bronfenbrenner (1977) provides some examples of possible mesosystems, such as families, peers, religious groups, workplace colleagues, and so on. To put it simply, a mesosystem is a system of microsystems (p. 515). On Reddit, a mesosystem could include a large group of people, such as all those who participate in a specific subreddit. These groups should include the learner but may not directly interact with him or her.

An *exosystem* is an expanded version of the mesosystem, comprised of other formal and informal social structures. However, a key distinction of an exosystem is that it does not include the learner. Instead, it is an external system that overtly or covertly impacts the learner by modifying, affording, or constraining certain actions the learner may take. Such systems may include governing bodies, rival groups with differing interests, those who control access to spaces, external social networks, and so on.

Lastly, a *macrosystem* is an ideological system that does not necessarily have clear boundaries, but which influences and endows meaning to the exosystems, mesosystems, and microsystems within it. It is a larger system that gives a context to the interactions which take place within it. An example of a macrosystem might be a national identity, such as being a member of the United States of America. Being part of the American system entails certain rules, ideals, and expectations. One example of a shared ideal might be the notion of the American dream where anyone who works hard has a chance to become wealthy. Macrosystems have no expressed rules, no one governing body, and no personified ideal, yet they (often strongly) influence the subsystems contained within them. To a slightly smaller degree, the macrosystem of the Internet, in general, carries certain expected behaviors, affords only certain kinds of action, or is available via a certain number and kind of portals. Each of these unwritten rules shape action taken on the Internet. And an even smaller macrosystem might be Reddit. Reddit has

certain unexpressed norms for action. In each subreddit, certain things are valued, upvoted, and commented on. Moderators are expected to perform certain duties and users are expected to contribute in certain ways.

Bronfenbrenner's (1977, 1979) system of nested ecologies suggests that each level of system is nested within larger systems. Recently, the nested systems ecology has been supplanted by research based on complex systems theory (CST; e.g., Cameron & Larsen-Freeman, 2007), suggesting that each system is not necessarily nested within another. Instead, change and development is argued to occur throughout all levels and scales of systems resulting in less stable ecologies than previously argued. Still, CST does not reject or counter the theoretical underpinnings of Bronfenbrenner's (1977, 1979) nested ecologies. Rather, it reinforces the argument that multiple levels of systems impact the development and actions of a learner. Additionally, Bronfenbrenner's taxonomy provides an easy and clear way to classify sociocultural systems external to learners that may impact their actions and learning.

### ***Microsystems***

Based on the explanations above, each CP made by RealAcorn was coded for the systems which influenced or were referenced by the content of the CP. CPs coded as Microsystem were those that generally involved the learner, a specific setting (i.e., the post itself), and other active participants (whether present on the page or not). In other words, they did not include any mention of belonging to or being affected by other passive outside social systems. Example CPs coded as microsystems are underlined in the excerpts below.

### **Excerpt 3**

Need place to buy bitcoins with USD and no age limit, and then convert ofc. Any recommendations? (hacksandstacks, April 24)

I use kraken (RealAcorn, April 24)

#### **Excerpt 4**

That's a very elitist and isolationist attitude that's only going to push away willing traders and new enthusiasts...

(Deletionist42, April 25)

I absolutely agree... (RealAcorn, April 25)

#### **Excerpt 5**

What are your thoughts on the current "top" coins such as BTC, ETH, LTC, XMR, XEM etc. ?

What do you believe is the optimal way to distribute your hard earned fiat into these coins? (DrCheeseFace, May 4)

XMR 80% XRP 10% S\*\*\*coins 10%

...And right now everything just seems so pumped to me.

(RealAcorn, May 4)

In the above examples, each of RealAcorn's CPs were coded as being Microsystem CPs. In each case, RealAcorn's contributions are projects that focus on the immediate interaction with another user and that do not reference belonging to or being influenced by any outside systems. In Excerpt 3, RealAcorn responds to a question, answering by providing his personal preference for a cryptocurrency exchange he uses. While citing the exchange, he does not provide any information about previous experiences with the exchange or how it impacts any social ecology or relationship. In Excerpt 4, RealAcorn simply expresses his agreement with a statement made by another user. And in Excerpt 5, he answers the question posed by DrCheeseFace and then shares his opinion. Stating an opinion that "everything...seems...pumped" is a Microsystem CP, as no information on any other systems is provided. It can be inferred that RealAcorn must have used an exchange to purchase his XMR and XRP, and it is likely that his opinion of everything

being pumped comes from personal experience with unnamed mesosystems or exosystems systems. However, the communicative purposes of each of the preceding excerpts does not involve language that denotes a personal connection with or exclusion from any other group of people or social system. In each case, RealAcorn does not clearly reference systems or ecologies to which he feels he belongs or from which he feels he is excluded yet impacted by. He is simply writing to other individual users who are active in the conversation.

### ***Mesosystems***

Mesosystem CPs included those that referenced groups to which RealAcorn felt he belonged. The most common case of this occurring was in situations where he referred to the other members of the Monero subreddit using the plural first-person pronoun *we*. These CPs implied that RealAcorn was not only stating an opinion, answering a question, contributing something he found interesting, or something similar. In some cases, he answered a question on behalf of the larger system or community to which he felt he belonged. In other cases, he was asking the larger community for comments on how a certain event might impact all of them. Other possible examples of Mesosystem CPs included those where RealAcorn's words suggested he was sharing advice to a group of which he was a part, making statements like "dont worry guys" (June 26) or "May the hold be strong in us" (April 26). In the context of this work, mesosystems referenced by RealAcorn included family, different subreddit member groups, school, and so forth. Some examples of Mesosystem CPs can be found below.

### **Excerpt 6**

If we go down, we go down together (RealAcorn, April 25)

### **Excerpt 7**

Just edit the "unfinished" where you want to translate a word and then submit your changes to the file. (KelseyMan, April 25)

since we are waiting for a gui update, should I wait?

(RealAcorn, March 28)

### **Excerpt 8**

There are some selling walls

lets see what happens. (RealAcorn, May 6)

In each of the examples above, RealAcorn references groups that he associated with. Sometimes, he simply expresses that he shares the emotions that others in the cryptocurrency ecology were feeling. At other times, he counsels the group as a whole, giving commands in the first-person plural form. All CPs containing similar phrases or statements were coded as being Mesosystem CPs.

### ***Exosystems***

CPs coded as referencing an Exosystem included those where RealAcorn wrote about an outside group of people, specific keyholders, or other systems that had a direct impact on him or his mesosystem. Importantly, these were groups to which RealAcorn did not feel like he belonged. CPs containing third-person pronouns (e.g., *they*, *them*, etc.) were often coded to include exosystems. Simply referencing an outside group did not suffice to classify a CP as Exosystem; RealAcorn also had to describe how that external system connected to his microsystem or one of his mesosystems. Some examples of Exosystem CPs can be found below.

### **Excerpt 9**

What happens when (if) bitcoins go down? (MikoN209, May 11)

probably the bear season will start

(perfect time to buy). (RealAcorn, May 11)

### **Excerpt 10**

The latest trend is simply a "bubble" provoked by bitcoins uncertainty , and it has affected all the altcoins.

Still I think it has been very useful for monero (RealAcorn, April 30)

### **Excerpt 11**

they were saying that moneros security has been compromised,

so it will be going down for a long time. (RealAcorn, April 25)

In this work, possible exosystems included systems such as political parties, the media, financial advisors, specific businesses with connections to cryptocurrency, governments, and others. In each instance, the external system impacted the lives, choices, futures, or afforded actions of RealAcorn or the group of cryptocurrency enthusiasts he was interacting with. And in all of these cases, RealAcorn did not see himself as pertaining to those groups.

### ***Macrosystems***

In the context of this study, macrosystems were rarely referenced. In all cases, the macrosystem referred to abstract ideals, concepts, or norms. Usually, these referred to systems such as entire countries (e.g., the US or Spain), although systems of government (e.g., socialism or communism) were also referenced. Three examples of CPs coded as referencing a Macrosystem can be found below:

### **Excerpt 12**

We enjoy the benefits and disadvantages of socialism.

(RealAcorn, May 7)

### **Excerpt 13**

Meanwhile in the USA all those things are way more cheap than in Spain. (RealAcorn, May 6)

### **Excerpt 14**

russia is cryptofriendly usa isnt. (RealAcorn, July 31)

As Bronfenbrenner (1977) writes, macrosystems are the “overarching institutional patterns of the culture or subculture” and they are “carriers of information and ideology that, both explicitly and implicitly, endow meaning and motivation to particular agencies, social networks, roles, activities, and their interrelations” (p. 515). In the preceding examples, RealAcorn references the macrosystems of socialism, U.S. healthcare, and Russia. In each case, there is a connection to the nested subsystems impacting RealAcorn’s ecology, although it is more ideological than direct.

### **Quantitative Analyses**

After the data were gathered, separated into analyzable units (e.g., CPs), and coded, a group of quantitative analyses were conducted to identify significant differences or relationships between variables and over time. Data points were graphed and visualized, allowing for a visual inspection of change over time. Analyses of variance (ANOVAs) were also performed to discover statistically significant changes in behavior over time. Where basic assumptions of the ANOVA were not met (e.g., equal variance), additional parametric analyses (Games–Howell Tests) were conducted to ensure statistical significance.

Statistical analyses require at least two comparable data sets in order to analyze differences between them. One of the ways researchers can do this in case studies is by dividing longitudinal data into individual periods (Brown, 2014). Periods can be defined from an etic perspective (e.g., prescribed lengths of time) or from an emic perspective (e.g., significant

observed events that mark the beginning of a new time period). For this work, an emic perspective was used. RealAcorn's participation has three clearly demarcated phases of action. Phase 1 included all of the submissions made before RealAcorn actually purchased his first cryptocurrency (i.e., Monero). Phase 1 lasted from account creation, on August 12, 2016, until March 21, 2017. Phase 2 included all of the submissions RealAcorn made while he was trading Monero. It ended on the day he sold his Monero and began his foray into trading other kinds of more speculative cryptocurrency. Phase 2 lasted from March 22, 2017, to May 6, 2017. Phase 3 included all of the submissions made from May 7, 2017, until the termination of his Reddit account, on April 20, 2018.

Dividing RealAcorn's contributions into these three phases allowed for easy computation of ANOVAs and Games–Howell Tests. It also allowed for simple and intuitive visualization of the analyses and their results. Tokens of observed phenomena could also be analyzed per CP, per submission, or per phase, allowing for fine-grained or more large-scale observations to be made. Each of the quantitative analyses performed is explained below in greater detail. As a note, when the ANOVAs were conducted, Bonferroni adjustments (Brown, 2008) were used to reduce the probability that significant results were found due to random chance.

### ***Words per Submission***

The first quantitative analysis performed to assess language change over time was a simple calculation of number of words per submission. Each submission was annotated for the number of words it contained. Emoticons, abbreviations, acronyms, and internet expressions (e.g., *lol*) each counted as one word. The total number of words per submission was used in an ANOVA, looking for statistically significant differences in the mean number of words per submission per phase and in the variance of total words per submission.

### ***Votes per Submission***

The next analysis involved the total number of votes (i.e., the number of upvotes minus the number of downvotes) per submission. Each submission was annotated for the total number of votes it received, as gathered directly from Reddit's API. These statistics were then used for an ANOVA to seek any statistically significant differences in the mean number of votes per submission per phase and in the variance of total words per submission. Votes are important in the measurement of learning, as they are a quantitative metric that correlates with how well a submission adheres to the norms of the space (Isbell, 2018; Massanari, 2013). Thus, a higher average votes statistic implies increased adherence to the established sociocultural practices of a subreddit—a result that CoP theory posits cannot occur without learning.

### ***Jargon***

After reading through the data set for first time, it was noticed that RealAcorn employed many examples of cryptocurrency jargon in his submissions. To assess his use of jargon over time, each token of a technical lexical item or phrase relating to cryptocurrency was tallied. The category of *jargon* included items that could not be learned or used outside of the context of cryptocurrency. There were three main categories of jargon: unofficial ISO 4217 codes used to identify denominations of cryptocurrency (e.g., BTC, XMR, XRP, etc.), abbreviations used by the larger cryptocurrency trading community (e.g., ATH, ICO, FUD, etc.), and words and phrases that have a unique meaning to cryptocurrency traders or that are not used in any other context (e.g., *megamoon*, *HODL*, *vaporware*, *dead cat*, etc.). Each CP containing one or more tokens of jargon was marked, and the number of instances of jargon was tallied. Afterward, total number of tokens of jargon, average number of tokens per submission, and average number of

tokens per phase were calculated. An ANOVA was conducted to determine whether there was a significant difference in the use of jargon per phase.

### ***Communicative Project Variation***

Another quantitative analysis examined the variation of the CPs employed by RealAcorn over the lifetime of his account. This was meant to provide an assessment of the complexity of RealAcorn's writing. After the dialogical purpose of each CP was coded, every instance where the dialogical purpose of the subsequent CP changed was tallied. This variable was called a Change Score. For example, the 1-CP post "you just hodl" made by RealAcorn (May 24) had only one kind of CP (i.e., Giving a Command) and thus received a Change Score of 1. Another submission (January 30) was comprised of four separate CPs. The first CP was coded as Evidence for Another CP. The last three CPs were coded as Expressing an Opinion. In other words, RealAcorn first explained his reason for having an opinion, and then used three CPs to express his thoughts. In this case, there was the first CP and one instance of the dialogical purpose shifting (i.e., from providing evidence for an upcoming statement to actually expressing his opinion). This post received a Change Score of 2: 1 for the first CP and 1 for the change in dialogical purpose. In another example (June 26), RealAcorn wrote a contribution with nine CPs. He began his post by expressing an opinion, and then he defined the status of the current cryptocurrency market. He then continued to express his opinion for the three following CPs, after which he wrote two more CPs where he continued to define the current situation of crypto traders. He finished his submission by giving two commands to the user to whom he was replying. This contribution went from Expressing an Opinion to Defining Current Situation, back to Expressing an Opinion, then back to Defining Current Situation, and finishing with Giving a

Command. The post in this example received a Change Score of 5: 1 for the first CP and 4 for the four changes in dialogical purpose.

As can be expected, coding CP changes in this manner would result in a data set that is neither normal in distribution nor necessarily representative of how complex or simple a submission is, as the Change score does not account for its length. Therefore, the Change Score had to be adjusted to account for the number of CPs per submission. This was done by taking the Change Score and then multiplying it by the Change Score divided by the total number of CPs in the submission. This new variable was called the Adjusted CP Variation. To provide some examples, a 1-CP submission with a Change Score of 1 would still result in an Adjusted CP Variation score of 1. A 2-CP submission with only one kind of CP (e.g., two Expressing an Opinion CPs) would result in an Adjusted CP Variation of 0.5 (i.e.,  $1 \times 1/2$ ). This means that the second example is less varied than the first. Similarly, a 6-CP submission with three different kinds of CPs would result in an Adjusted CP Variation of 1.5 (i.e.,  $3 \times 3/6$ ). Transforming the data in this manner created a more fine-grained scalar variable, allowing for a more reliable quantitative analysis of how varied each submission was regarding the dialogical purposes of its CPs.

While several previous studies have visually analyzed the variation of CPs in distinct interactions (e.g., Newgarden, 2015; Newgarden & Zheng, 2016; Zheng, 2012; Zheng et al., 2012, 2018) or numerically analyzed the total number of the dialogical purposes of CPs (e.g., Newgarden, 2015; Newgarden & Zheng, 2016), none has attempted to control for the number of CPs per interaction. The Adjusted CP Variation is a simple solution to quantify a construct that has been used before. After each score was calculated, an ANOVA was conducted to observe if

there was a significant change in the Adjusted CP Variation over each Phase of RealAcorn's participation.

### ***Nested Ecologies***

The last quantitative analysis performed was an ANOVA to compare each type of nested ecology (Microsystem, Mesosystem, Exosystem, and Macrosystem) over each Phase of RealAcorn's participation in cryptocurrency subreddits. The total number of CPs referencing each nested ecology was taken per submission. The means of each variable were then compared across phases to determine whether there was a statistically significant difference in the referencing of any ecology over time.

### **Cognitive Event Analysis**

After RealAcorn's CPs were identified and coded, a series of cognitive event analyses were conducted. Cognitive events analysis is a method for analyzing interactivity. Originating in the fields of ecological psychology and distributed language, it has been both recommended for (Hodges & Fowler, 2016; Lassiter, 2016) and employed in (e.g., Newgarden & Zheng, 2016; Zheng et al., 2018) ecological studies of language learning. Cognitive event analysis takes as a given the principles of distributed cognition and ecological psychology and follows the cognitive trajectory of an agent or learner. *Cognitive trajectory* is defined as "a dynamical and nonlinear path that [a] system creates as it achieves a given cognitive result" (Steffensen et al., 2015). In this case, the system under investigation is RealAcorn. In ecological psychology, it is important to not only look at the individual under investigation, but also the environment surrounding the agent. It is argued that the environment affords opportunities for action, and as the agent acts, he or she manipulates the environment, which in turn affords new actions (Hutchins, 1995, 2003, 2014).

When conducting a cognitive event analysis, researchers must first identify a cognitive event. According to Steffensen et al. (2015), a cognitive event can be any instance of problem-solving, decision-making, change of attention, or something similar (p. 83). Cognitive events can be identified externally (e.g., when researchers notice a significant observable change in behavior) or internally (e.g., when participants report having experienced some sort of a change, such as identifying a problem). Regardless of the cognitive event, there must be a clear before and after period, whether the change itself is empirically observable (e.g., when a learner attempts to overcome an obstacle by modifying her way of holding a tool) or not (e.g., when a learner makes an internal decision to pursue a new path).

After identifying cognitive events, researchers must identify where the event pivots are. This is usually completed by zooming in on the time period between the before and after phases of behavior and identifying critical transition points that mark the change between the before and after phases. Some cognitive events have only one event pivot, but most are comprised of several pivots. For example, arriving at how to write a question in a grammatically correct manner may have several distinct event pivots (e.g., typing it out, noticing that something is not correct, saying the words out loud, discovering the error, and then fixing the text on the screen).

Finally, researchers can use coding, annotation, and other kinds of analyses to conclude how the cognitive trajectory was enabled by its environment and by others acting in the environment. Steffensen et al. (2015) write that researchers should conduct analyses which “identify the constituents of the particular ‘distributed cognitive system ... that [produce] cognitive outputs’” (Giere, 2007, p. 318, quoted in Steffensen et al., 2015, pp. 82–83).

In the context of this study, cognitive event analyses were conducted around significant changes in RealAcorn’s behavior, such as the beginning of repeated and recurrent use of novel

words or phrases, the use of very low-frequency words (i.e., words a prototypical language learner would not normally encounter, let alone know or use), sudden changes in types of interactions or roles taken in the online cryptocurrency space, and the repeated employment of single kinds of interactions over a short period of time. To use an example, it was noted that RealAcorn significantly increased his use of cryptocurrency jargon, adding new words to his vocabulary at a higher rate and using them more often than before. Cognitive event analysis was used to pinpoint where that change began to happen and to identify the characteristics of the ecology around RealAcorn at that period of time. Another example was when RealAcorn began using a jargon term. In a short period of time, RealAcorn abandoned the use of one vocabulary item, replacing it with a jargon word. Cognitive event analysis was used to identify what caused that shift, and to discover if there were characteristics which were similar in other instances of language learning.

### **Summary**

While several previous ecolinguistic studies on language learning have incorporated one or more of the methodologies explained above, none has aimed to analyze written data over an extended period of time using a method as clearly defined as does this project. Some studies (e.g., Newgarden, 2015; Newgarden & Zheng, 2016; Zheng et al., 2015) have investigated language gains on smaller scales—for example, the acquisition of language items over the course of several hours of online gameplay. Others (e.g., Newgarden, 2015; Zheng et al., 2012) have examined the longer-term development of learners as agents and embodied actors in an environment. However, as far as I can tell, no ecolinguistic study to date has attempted to combine the principles of language learning and the development of the learner as an agent into

one work. In addition, no ecological linguistics work has employed a longitudinal data set of written text gathered from online social network spaces.

Because this work is novel in design and aims, it employs methodologies that are commonplace in other ecolinguistics studies: open-ended ethnographic interviews, the use of CPs as a unit of analysis, the coding of ecologies, cognitive event analysis, and both bottom-up and top-down coding. To ensure reliability and dependability, the methods used for this project have been explained with a focus on detail—something that is often lacking in ecolinguistics research—to increase its validity and credibility. It is hoped that the methods found in this section can aid replication in future works and set a standard for how research in the field of ecological linguistics can be conducted.

## CHAPTER 4

### Results

This chapter contains the results generated from analysis of both the open-ended interviews and the case study of RealAcorn's online contributions. The first section summarizes the findings from the open-ended interviews alongside a short exposition highlighting the statistically significant statistics and recurring ideas. Subsequently, the results generated from the quantitative analyses of RealAcorn's contributions are elaborated. Finally, the chapter concludes with findings of the cognitive event analyses and a commentary on the context that surrounded each cognitive event.

#### Qualitative Coding of Interview Data

As was previously discussed, 21 Reddit users comprised the final participant pool that took part in the open-ended interviews via the Reddit platform. The 21 responses were then subdivided into individual clauses ( $N = 192$ ). Each of these clauses was coded to identify recurring ideas, larger categories, and overarching themes. The final pass of coding resulted in 25 different codes organized into five categories, with three codes that were not able to be categorized. The number of tallies for each code can be found in Table 5 below. In addition, the percentage of respondents that included a comment about each code is included. For some codes (e.g., Imitation), the number of tallies ( $N = 3$ ) equals the number of respondents that included those comments ( $n = 3$ ). For other codes (e.g., Limited Peripheral Participation), the number of tallies ( $N = 15$ ) were contributed by a smaller number of participants ( $n = 7$ ). This simply occurred in any case where the participants referred to a central idea using more than one clause in their interview responses.

**Table 5***Tallies and Percentage of Respondents for Each Open Interview Code*

Code	<i>N</i>	Percentage of Respondents
Everyday or Informal English	22	66.67
Prior English Learning	18	66.67
Real-Life Application	18	52.38
Other English Sources	15	47.62
Community Belonging	13	47.62
Specific Examples	12	47.62
School Deprecation	10	38.10
Limited Peripheral Participation	15	33.33
Seeking Entertainment	10	28.57
De Facto English Use	6	28.57
Other Social Networks	6	28.57
Exclusion by Community	6	23.81
Formal or Specialized English	6	23.81
Maintenance of English	4	19.05
Feeling Better About English	3	14.29
Imitation	3	14.29
Seeking Information	3	14.29
Reddit's Shortfalls for English	3	14.29
Answers to Specific Questions	4	9.52
English-Speaking Culture	3	9.52
Reddit Platform Features	3	9.52
Spelling	2	9.52
Comparing Genres or Language Styles	4	4.76
Influence of Votes	2	4.76
Arguments	1	4.76

In both metrics, the most common codes were Everyday or Informal English, Prior English Learning, and Real-Life Application. However, the order of the rest of the list changes depending on which metric is used for sorting. While 47.62% of the respondents included the next three most common codes (i.e., Other English Sources, Community Belonging, and Specific Examples), the number of tallies of each varied slightly (i.e., 15, 13, and 12 respectively). School Deprecation was the next most common code with 38.10% of respondents including it in their interviews, even though there were only 10 tallies of that code. Limited Peripheral Participation

was the next most common code (33.33% of respondents), even though there was a significantly higher number of tallies ( $N = 15$ ).

The users also shared specific examples of language that they recalled learning while using Reddit. The word choice variation of the kinds of reported language learned was substantial. Many participants wrote that they learned common, or informal English. Examples they gave included genres or categories of English, such as Reddit English, “silly puns,” “Doge-speak,” “meme-English,” or “Internet slang.” They often cited low-frequency words that related to the subreddits they were interested in (e.g., *chuck and lathe*, *caulk*, *emaciated*, *hipster*, *omnipotent*, *sic*, etc.). Also important to their understanding of online language was their exposure to and experiences with Internet and computer-text abbreviations (e.g., *DIY*, *IDK*, *M8*, *SJW*, *WDYM*, etc.). Several users responded with specific examples of grammar they had learned. Some of those comments included “the -s after a verb in the third person singular,” word order and “sentence structure,” “usage of commas,” “the *a/the* articles,” and auxiliary verbs. At times, specific examples of spelling mistakes were shared. The final recurring kind of examples included expressions or phrases. Learners reported being exposed to and learning common English phrases that they had never seen before (e.g., *icing on the cake*, *to keep your composure*, *to kill two rabbits with one stone*, *to be a couch potato*, etc.).

In almost all of the preceding cases, the users reported that they encountered these words, phrases, and grammar constructions in the wild and learned them through exposure and practice. Sometimes, users reported having made a mistake (e.g., writing *I was able to keep my continence* instead of *I was able to keep my composure*). The experience then served to correct the errant behavior. Other times, they described seeing words in different contexts and then deriving their meaning. The common thread among the specific examples shared was that they were not

actively pursuing language learning, but rather the active participation in their subreddits of preference.

The raw tallies and percentages help the items that were most important to the participants come to the fore. The users responded that they learned everyday English. They felt that the language patterns they encountered on Reddit had ties and uses in their real lives outside of the online space. Most users also emphasized the fact that they had experience with English prior to using Reddit. Other results that proved interesting were those where there were significant differences between the number of respondents who commented on one issue and the number of tallies of that issue.

As explained previously, the codes employed were combined into several larger categories. The five categories resulting from the codes were the following: (a) Second-Order Language Learned, (b) Methods of Informal Online Language Learning, (c) Reasons for Participating on Reddit, (d) Community Belonging and Communities of Practice (CoPs), and (e) Features of Reddit Which Impacted Learning. Three codes (i.e., English-Speaking Culture, Feeling Better About English, and Prior English Learning) were not able to be combined with any others and were thus left as individual codes. The number of tallies for each category can be found in Table 6 below. In addition, the percentage of respondents that included a comment about each category is included.

**Table 6***Tallies and Percentage of Respondents for Each Open Interview Category*

Category	<i>N</i>	Percentage of Respondents
Second-Order Language Learned	46	76.19
Reasons for Participating on Reddit	55	71.43
Methods of Informal Online Language Learning	32	61.90
Community Belonging and CoPs	23	38.10
Features of Reddit Which Impacted Learning	12	38.10
Uncategorized	24	80.95

The results show that most of the comments found in the interview responses focused on the reasons for participating on Reddit. That corresponds with one of the most-tallied codes of Real-Life Application. Many participants addressed how Reddit allowed them to learn second-order language patterns, but more common was the focus on how they actually applied that in their lives. Of note is also the fact that the highest percentage of respondents fell in the Uncategorized division. This was mainly due to the large percentage of users that talked about their prior experiences with learning English.

Still, it is important to recognize that not every category was composed of the same number of codes. For example, Reasons for Participating on Reddit had six codes, while Uncategorized had only three. Therefore, averages of the columns in Table 6 can also help to cast further light on the results. They are shown below, in Table 7.

**Table 7***Averages for Each Open Interview Category*

Category (Number of Codes)	$\bar{N}$	Average Percentage per Code
Second-Order Language Learned (5)	9.20	15.24
Community Belonging and CoPs (3)	7.67	12.70
Features of Reddit Which Impacted Learning (3)	4.00	12.70
Methods of Informal Online Language Learning (5)	6.40	12.38
Reasons for Participating on Reddit (6)	9.17	11.90
Uncategorized (3)	8.00	26.98

Table 7 shows that even though the category of Second-Order Language Learned had fewer tallies than Reasons for Participating on Reddit, when adjusted for the number of codes, it made up a higher percentage of the tallies. In the previous two tables, it is clear that participants included answers relating to what specific English patterns they learned. However, the rest of the categories appeared fairly equally among the interview responses, showing no real difference in average percentage per code. In other words, even though the categories of Features of Reddit Which Impacted Learning and Community Belonging and CoPs had fewer overall tallies, on average, each individual code was about as common as those not belonging the Second-Order Language Learned or Uncategorized.

The last step in reviewing the interview data was to identify themes, or the systematic relationships between the interview responses, the codes, and the categories. After completing the coding process, three separate themes were identified. First, prior English learning is necessary to be able to participate in Reddit. Despite never being asked to report on prior English learning, 66.67% of the respondents included the fact that they already knew some English before joining Reddit. In most cases, the participants discussed what they had learned only after saying they already knew many of the basics. Responses repeatedly included comments such as “I only joined reddit a year or so ago. I was already at a high level through school, work etc.”

Second, the previous English learned was maintained, improved, and then used in novel settings because of the participation in Reddit. A majority of users (52.38%) reported applying what they had learned online in their real life outside of Reddit. Many provided specific examples of words, phrases, and grammar concepts they learned as they participated. They reported feeling like the English used on Reddit was “real English,” as opposed to what they felt

they had learned in school. In fact, 38.10% of the respondents explicitly deprecated the learning they had in school, stating that it was not as useful as what they gained by using Reddit.

Third, participation in the online community was of higher importance to the language learners than language learning itself. When asked why they came to Reddit instead of another platform, only one user mentioned language learning—and his comment placed having a community that discussed more than just sports on the same level as English learning. The users reported coming to Reddit in order to be entertained or to share with a larger group of people with similar interests. They participated to find information on topics that concerned them. They came to ask questions and get answers from other people. Even though language learning was not an explicit priority, it happened. This theme alone is a reason why more detailed case studies are necessary to identify different ways in which language learning occurs in online social spaces.

### **Results of the Case Study**

The principal unit of analysis for the case study involving RealAcorn was the communicative project (CP). After each contribution was divided into the smallest CPs that were still dialogical in nature, there remained 698 total analyzable CPs. Each was coded for its dialogical purpose and the nested ecologies it referenced. Subsequently, the CPs were divided into three groups and analyses of variance (ANOVAs) were conducted to identify significant changes in RealAcorn's participation over time. Then, cognitive event analyses were conducted to identify why shifts in behavior occurred. The results of each of these analyses are reported below.

## The Dialogical Purposes of Communicative Projects

Once each of RealAcorn's CPs was delimited, it was coded for its dialogical purpose.

The bottom-up coding scheme resulted in the creation of 18 codes. The number of tallies for each code can be found in Table 8.

**Table 8**

*Tallies and Percentages of Each Dialogical Purpose Code*

Code	<i>N</i>	Percentage of Total
Expressing an Opinion	229	32.81
Providing Reasons or Evidence for Another CP	97	13.90
Asking a Question	93	13.32
Recounting Past Experience	81	11.60
Defining Current Situation	69	9.89
Giving a Command	26	3.72
Providing a Citation	22	3.15
Expressing Agreement	16	2.29
Providing Answers to Questions	15	2.15
Stating a Future Action	15	2.15
Clarifying Another CP	10	1.43
Eliciting Responses From Others	9	1.29
Apologizing	4	0.57
Giving Thanks	4	0.57
Providing Encouragement	3	0.43
Greeting	2	0.29
Making an Exclamation	2	0.29
Expressing Disagreement	1	0.14

Notable from the results above is the fact that the Expressing an Opinion was the most common code by a significant margin ( $N = 229$ ). Providing Reasons or Evidence for Another CP was the next most common code ( $N = 97$ ). It seems like RealAcorn devoted most of his contributions to expressing his opinions and then providing evidence for them in one way or another. These two codes often appeared in tandem—where RealAcorn would first state what he believed would happen and then explained why. This formed a unique and common

communicative activity type (CAT) of making a logical argument. An example of a 2-CP contribution that follows this pattern can be seen in Excerpt 15.

### **Excerpt 15**

Still I think it has been very useful for monero,  
because it has achieved more popularity due of this. (April 24)

Another common CAT that was salient in RealAcorn's contributions was that of recounting an experience he had—specifically one involving a problem he faced—and then asking for help to resolve his difficulty (for an example of this kind of CAT, see Excerpt 16). That resulted in the third and fourth most-common codes being Asking a Question ( $N = 93$ ) and Recounting Past Experience ( $N = 81$ ), respectively.

### **Excerpt 16**

Ive downloaded the latest monero gui, and moved there a bit of  
monero (from kraken, just for testing), Then i started to sync  
the blockchain

Do I have to update the blockchain everytime I want to check my  
money or transfer ir? [sic] (March 25)

The last code that made up more than 5% of the CPs was Defining Current Situation ( $N = 69$ ). This code was assigned when RealAcorn was either trying to establish some sort of common ground with the other participants in the online space or to provide additional information that was important to the situation at the time. These CPs often occurred when RealAcorn was preparing to ask a question or give a command. Therefore, additional steps were optionally added to some of the CATs. For example, RealAcorn would often employ the CAT of Expressing an Opinion → Providing Reasons or Evidence for Another. However, he at times also incorporated the optional additional step of defining some common ground resulting in a

more complex CAT: [Defining Current Situation] → Expressing an Opinion → Providing Reasons or Evidence for Another CP. While not the focus of this work, there were several examples of simple CATs that were made more complex by the incorporation of other CP types.

**Communicative Projects and Nested Ecologies Factored by Phase**

After the dialogical purpose of each CP was identified, the nested ecologies referenced by each CP were also coded. Then, the number of references per contribution served as data points which were used to conduct ANOVAs and Games–Howell post-hoc tests. It is also important to note that whenever multiple analyses were conducted, Bonferroni adjustments (Brown, 2008) were used to minimize the chance that any significant results were found due to random chance. Therefore, any of the significant results included below were significant in all of the tests undergone (e.g., ANOVAs, Games–Howell tests) with a Bonferroni adjustment.

The first test compared the means of the number of Microsystem, Mesosystem, Exosystem, and Macrosystem CPs per contribution. The descriptive statistics for each of the three groups is found in below. As a note, in each table listed below, *N* represents the number of contributions included in the calculation of the means and standard deviations.

**Table 9**

*Descriptive Statistics for Nested Ecology CPs per Contribution*

	<i>N</i>	<i>M</i>	<i>SD</i>
Micro	152	3.51	3.21
Meso	152	0.26	0.69
Exo	152	0.80	1.91
Macro	152	0.03	0.16

Next, the 152 contributions were split into three groups: Phase 1, Phase 2, and Phase 3. (For a description of these phases, please see the section titled Quantitative Analyses.) The means of each of the three phases were then compared to see if there was a statistically

significant difference in the referencing of each nested ecology over time. The descriptive statistics for each group are shown first in Table 10. An ANOVA was conducted. Because the variances in each group were not equal, an additional Games–Howell test was conducted. The results of these analyses can be found in Table 11 and Table 12 below.

**Table 10**

*Descriptive Statistics for Nested Ecology CPs per Phase*

Group	Phase	N	M	SD	SE	95% CI	
						LL	UL
Micro	Phase 1	4	3.50	2.08	1.04	0.19	6.81
	Phase 2	88	3.42	3.27	0.35	2.73	4.11
	Phase 3	60	3.63	3.21	0.41	2.80	4.46
	Total	152	3.51	3.21	0.26	2.99	4.02
Meso	Phase 1	4	0.25	0.50	0.25	-0.55	1.05
	Phase 2	88	0.41	0.83	0.09	0.23	.58
	Phase 3	60	0.05	0.22	0.03	-0.01	.11
	Total	152	0.26	0.67	0.05	0.16	.37
Exo	Phase 1	4	0.25	0.50	0.25	-0.55	1.05
	Phase 2	88	0.70	1.59	0.17	0.37	1.04
	Phase 3	60	0.97	2.34	0.30	0.36	1.57
	Total	152	0.80	1.91	0.16	0.49	1.10
Macro	Phase 1	4	0.00	0.00	0.00	0.00	.00
	Phase 2	88	0.02	0.15	0.02	-0.01	.05
	Phase 3	60	0.03	0.18	0.02	-0.01	.08
	Total	152	0.03	0.16	0.01	0.00	.05

**Table 11***One-way ANOVA of Nested Ecology CPs by Phase*

		<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Micro	Between Groups	1.62	2	0.81	0.08	.925
	Within Groups	1552.38	149	10.41		
	Total	1553.99	151			
Meso	Between Groups	4.60	2	2.30	5.45	.005
	Within Groups	62.87	149	0.42		
	Total	67.47	151			
Exo	Between Groups	3.68	2	1.84	0.50	.606
	Within Groups	545.00	149	3.66		
	Total	548.68	151			
Macro	Between Groups	.01	2	0.00	0.13	.877
	Within Groups	3.89	149	0.03		
	Total	3.90	151			

**Table 12***Games–Howell Test of Nested Ecology CPs by Phase*

Variable	Group 1	Group 2	MD	SD	p	95% CI	
						LL	UL
Micro	Phase 1	Phase 2	0.08	1.10	.997	-3.98	4.14
		Phase 3	-0.13	1.12	.992	-4.12	3.85
	Phase 2	Phase 1	-0.08	1.10	.997	-4.14	3.98
		Phase 3	-0.21	0.54	.918	-1.50	1.07
	Phase 3	Phase 1	0.13	1.12	.992	-3.85	4.12
		Phase 2	0.21	0.54	.918	-1.07	1.50
Meso	Phase 1	Phase 2	-0.16	0.27	.828	-1.13	0.81
		Phase 3	0.20	0.25	.731	-0.83	1.23
	Phase 2	Phase 1	0.16	0.27	.828	-0.81	1.13
		Phase 3	0.36	0.09	.001	0.14	0.58
	Phase 3	Phase 1	-0.20	0.25	.731	-1.23	0.83
		Phase 2	-0.36	0.09	.001	-0.58	-0.14
Exo	Phase 1	Phase 2	-0.46	0.30	.350	-1.37	0.46
		Phase 3	-0.72	0.39	.192	-1.73	0.29
	Phase 2	Phase 1	0.46	0.30	.350	-0.46	1.37
		Phase 3	-0.26	0.35	.731	-1.09	0.56
	Phase 3	Phase 1	0.72	0.39	.192	-0.29	1.73
		Phase 2	0.26	0.35	.731	-0.56	1.09
Macro	Phase 1	Phase 2	-0.02	0.02	.334	-0.06	0.02
		Phase 3	-0.03	0.02	.334	-0.09	0.02
	Phase 2	Phase 1	0.02	0.02	.334	-0.02	0.06
		Phase 3	-0.01	0.03	.926	-0.08	0.06
	Phase 3	Phase 1	0.03	0.02	.334	-0.02	0.09
		Phase 2	0.01	0.03	.926	-0.06	0.08

The first analysis of the data is a simple means comparison (Table 10). Means comparisons can show trends in the number of references to each nested ecology over time. In Table 10, it can be observed that the number of references to microsystems per contribution does not change significantly across the three phases of RealAcorn’s participation. However, the average number of references to mesosystems per contribution decreases sharply, being almost non-existent during Phase 3. The average number of exosystem references per contribution appears to increase over time, albeit not significantly. The number of references to macrosystems

in RealAcorn’s contributions appears to be too small to enable any significant conclusions to be drawn.

An ANOVA of the data reveals only one statistically significant change over time. This is partially due to the fact that the standard deviations of each group were relatively large. Additionally, the distributions of the data often showed positive skewness. However, ANOVAs are very robust against the assumption of normality. Nevertheless, the ANOVA returns a statistically significant result for the number of references to mesosystems per contribution ( $p < .001$ ). The non-parametric post-hoc Games–Howell test also shows that there is a significant decrease between Phase 2 and Phase 3 in the number of references to mesosystems. Phase 1 is not found to be statistically significant simply due to the small number of contributions in that group.

**Words per Submission Factored by Phase**

In order to help interpret whether the significant decrease in mesosystem references is due to a possible confounding variable of the length of each contribution, a one-way ANOVA was conducted to assess the variance in words per contribution. The descriptive statistics for the number of words per contribution for the entire data set ( $N = 191$ ) and the cryptocurrency contributions ( $N = 152$ ) are found below, in Table 13 and Table 14.

**Table 13**

*Descriptive Statistics for Number of Words per Contribution of the Data Set*

Phase	N	M	SD	SE	95% CI	
					LL	UL
Phase 1	17	37.41	59.38	14.40	6.88	67.94
Phase 2	105	38.36	54.13	5.28	27.89	48.84
Phase 3	69	36.20	50.83	6.12	23.99	48.41
Total	191	37.50	53.17	3.85	29.91	45.09

**Table 14***Descriptive Statistics for Number of Words per Cryptocurrency Contribution*

Phase	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SE</i>	95% CI	
					<i>LL</i>	<i>UL</i>
Phase 1	4	25.00	22.76	11.38	-11.22	61.22
Phase 2	88	32.93	43.16	4.60	23.79	42.08
Phase 3	60	30.47	41.39	5.34	19.77	41.16
Total	152	31.75	41.90	3.34	25.04	38.46

In Table 14, it is clear that the average number of words does not appear to change significantly over time. In addition, the standard deviation of the number of words per contribution is larger than the mean of each total set, suggesting that there is no significant difference between groups. An ANOVA of the data sets, found in Table 15 and Table 16 below, reveals the same conclusion.

**Table 15***One-way ANOVA of Number of Words per Contribution by Phase*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between Groups	194.22	2	97.11	0.03	.967
Within Groups	536853.53	188	2855.60		
Total	537047.75	190			

**Table 16***One-way ANOVA of Number of Words per Cryptocurrency Contributions by Phase*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between Groups	403.98	2	201.99	0.11	.893
Within Groups	264706.52	149	1776.554		
Total	265110.50	151			

In both of these analyses, it is clear that the number of words per contribution does not vary significantly by group. As RealAcorn progresses in his Reddit participation, the length of his contributions does not change significantly. Follow-up Games–Howell tests showed the same conclusions, with no group varying significantly from any other.

## Votes per Submission Factored by Phase

Another pertinent subset of RealAcorn's metadata was the number of votes he received per submission. While Reddit does not share how many upvotes and downvotes each submission to their site receives, it does keep track of the net total votes (i.e., the total number of upvotes minus the total number of downvotes). This means that a submission can net a score of zero if nobody votes on it or if an equal number of people upvote it and downvote it. While each of these cases is quite different, Massanari (2013) argues that the net total votes correlates to how well the contribution adheres to the norms and established practices of the space. Thus, an increase in votes suggests an increase in the ability to produce content which is valued by others in the subreddit. Each of RealAcorn's contributions was entered into SPSS along with its total number of votes and an ANOVA was conducted to identify whether there were any statistically significant differences between the three phases of his participation. The descriptive statistics are located in Table 17. The one-way ANOVA follows in Table 18 below.

**Table 17**

*Descriptive Statistics for Number of Votes per Contribution*

Phase	N	M	SD	SE	95% CI	
					LL	UL
Phase 1	17	2.41	3.43	0.83	0.65	4.17
Phase 2	103	6.94	14.38	1.42	4.13	9.75
Phase 3	71	10.55	37.43	4.44	1.69	19.41
Total	191	7.88	25.18	1.82	4.29	11.47

**Table 18**

*One-way ANOVA of Number of Votes by Phase*

	SS	df	MS	F	p
Between Groups	1104.89	2	552.44	.870	.421
Within Groups	119347.35	188	634.826		
Total	120452.23	190			

As can be seen, there is no statistically significant parametric difference when the number of votes is factored by Phase. The means do, however, appear to increase substantially from one group to the next. The results from the Games–Howell test shed further light on the subject. In Table 19 below, it can be observed that there is a statistically significant difference between Phase 1 of RealAcorn’s participation and Phase 2. While there is no statistically significant difference between Phase 2 and Phase 3, it is clear that the data points in Phase 1 have a smaller standard deviation than those in the later phases as well as a much lower mean. These changes are internally significant.

**Table 19**

*Games–Howell Test of Number of Votes by Phase*

Group 1	Group 2	MD	SD	p	95% CI	
					LL	UL
Phase 1	Phase 2	-4.53	1.64	.019	-8.44	-0.62
	Phase 3	-8.14	4.52	.176	-18.94	2.67
Phase 2	Phase 1	4.53	1.64	.019	0.62	8.44
	Phase 3	-3.61	4.66	.720	-14.73	7.52
Phase 3	Phase 1	8.14	4.52	.176	-2.67	18.94
	Phase 2	3.61	4.66	.720	-7.52	14.73

**Tokens of Jargon Factored by Phase**

Each contribution made by RealAcorn was analyzed and tallies were made for each instance of cryptocurrency jargon used in the text. In RealAcorn’s contributions, 48 different jargon terms and phrases were identified. They are listed alongside their definitions in Table 20 and Table 21 below.

**Table 20***List of Jargon Words and Phrases Included in Analyses*

Term	Definition
ATH	Abbreviation for <i>all time high</i>
BTC	Non-standard ISO 4217 code for the Bitcoin cryptocurrency
burn	The action of permanently removing a number of crypto tokens from circulation
CLI	Abbreviation for <i>command line interface</i> ; often in reference to an application used to track the portfolio holdings of a crypto trader.
CPC	Non-standard ISO 4217 code for the CPChain cryptocurrency
CPChain	Either the name of the CPChain cryptocurrency or for the distributed internet-of-things infrastructure upon which the currency's blockchain is distributed
dead cat	A temporary, short-lived recovery of the price of a cryptocurrency token from a prolonged decline market; it is then followed by the continuation of the downtrend
DEX	Abbreviation for <i>decentralized exchange</i>
EQT	Non-standard ISO 4217 code for the EquiTrader cryptocurrency
ETH	Non-standard ISO 4217 code for the Ethereum cryptocurrency
FUD	Abbreviation for <i>fear, uncertainty, and doubt</i>
hard fork	A radical change to the protocol of a blockchain network that effectively results in two protocols being followed for a period of time
hodl	The action of investing in a cryptocurrency and shunning any trades based on short-term price moves
ICO	Abbreviation for <i>initial coin offering</i>
IOTA	A distributed ledger designed to record and execute transactions between machines and devices in the internet-of-things ecosystem
MCAP	Abbreviation for <i>market capitalization</i>
MegaMoon	An individual denomination of cryptocurrency
moon	The action of a cryptocurrency valuation experiencing a significant spike in price and volume
Neo	An individual denomination of cryptocurrency
NG	Abbreviation for <i>next generation</i> ; in reference to a new blockchain protocol
node	A computer that is able to download and store a blockchain and also to verify and to record new transactions
normie	Someone who does not believe in or trade cryptocurrency
POLO	Non-standard ISO 4217 code for the NftyPlay cryptocurrency
pump	The action of purchasing of large quantities of cryptocurrency tokens to increase the demand and price of that token
rekt	The action of a cryptocurrency trader becoming ruined and due to losses from a recent price crash
SIA	A decentralized cloud storage platform that uses blockchain technology
TG	Abbreviation for <i>telegram</i> ; usually in reference to a crypto support account using the Telegram app
vaporware	A cryptocurrency project that is never actually developed
WCT	Non-standard ISO 4217 code for the Waves Community Token cryptocurrency
whale	Any person or company that has enough capital to directly influence the price of a certain crypto coin
When [N.S. ISO 4217]	A phrase used in cryptocurrency communities to ask when a certain denomination of cryptocurrency (expressed by the non-standard ISO 4217 code) will moon
XMR	Non-standard ISO 4217 code for the Monero cryptocurrency
XRP	Non-standard ISO 4217 code for the Ripple cryptocurrency; may also refer to the gross settlement system, currency exchange, and remittance network on which Ripple is traded

**Table 21**

## List of Jargon Words and Phrases Excluded From Analyses

Term	Definition
2FA	Abbreviation for <i>2-factor authentication</i>
B	Abbreviation for <i>billion</i>
bear	A crypto market in a long period of consistent price declines
beta	A second phase of software testing in which a sampling of the intended audience tries out a new product
block	A data structure within a blockchain database, where transaction data in the blockchain are permanently recorded
BTW	Abbreviation for <i>by the way</i>
bubble	The state of an asset being valued higher than its real value resulting in the possibility of a quick and dramatic decline in price
bull	An extended period during which an abnormally high number of investors purchase cryptocurrencies, characterized by rising prices, demand outweighing supply, and high market confidence
correction	A rapid price decrease in a tradable asset which traders can use to their advantage with the assistance of trading bots
dump	The action of selling an asset to gain money from the sale
DYOR	Abbreviation for <i>do your own research</i>
GUI	Abbreviation for <i>graphical user interface</i>
hash	A function that meets the encrypted demands needed to solve for a specific blockchain computation
LEL	A mutation of <i>LOL</i> , the abbreviation for <i>laughing out loud</i>
M	Abbreviation for <i>million</i>

While all of the words and phrases found in these two tables had direct connections to the field of cryptocurrency and the action of trading it, several of them (i.e., those listed in Table 21) were also used in other contexts outside of cryptocurrency, such as web security, traditional stock markets, gaming affinity spaces, and so on. Therefore, the learning and subsequent employment of these terms and phrases could not be reasonably traced to RealAcorn's participation in online cryptocurrency affinity spaces or linked to his development as a cryptocurrency trader. For that reason, only the items described in the Table 20 ( $n = 31$ ) were tallied and counted in RealAcorn's cryptocurrency contributions.

The tallies for each of the items listed in Table 20 were then entered into SPSS. An ANOVA was conducted for the total number of jargon words per contribution factored by Phase.

The descriptive statistics, ANOVA, and Games–Howell test can be found below in Table 22, Table 23, and Table 24, respectively.

**Table 22**

*Descriptive Statistics for Instances of Jargon per Contribution*

Phase	N	M	SD	SE	95% CI	
					LL	UL
Phase 1	4	.50	0.58	0.29	-0.42	1.42
Phase 2	88	.19	0.45	0.05	0.10	0.29
Phase 3	60	.85	1.39	0.18	0.49	1.21
Total	152	.46	0.99	0.08	0.30	0.62

**Table 23**

*One-way ANOVA of Instances of Jargon by Phase*

	SS	df	MS	F	p
Between Groups	15.40	2	7.70	8.67	.001
Within Groups	132.37	149	.89		
Total	147.76	151			

**Table 24**

*Games–Howell Test of Instances of Jargon by Phase*

Group 1	Group 2	MD	SD	p	95% CI	
					LL	UL
Phase 1	Phase 2	0.31	0.29	.599	-0.87	1.49
	Phase 3	-0.35	0.34	.588	-1.41	0.71
Phase 2	Phase 1	-0.31	0.29	.599	-1.49	0.87
	Phase 3	-0.66	0.19	.002	-1.10	-0.21
Phase 3	Phase 1	0.35	0.34	.588	-0.71	1.41
	Phase 2	0.66	0.19	.002	0.21	1.10

As can be observed in the results, it appears that the average number of jargon items used per contribution varies significantly by Phase. Specifically, Phase 3 has the largest mean, although the standard deviation increases as well. The Games–Howell test shows that the significant shift occurs between Phase 2 and Phase 3 of RealAcorn’s participation. The mean increases significantly, and the mean difference is much larger. Also of note is the fact that only

8 of the cryptocurrency jargon terms were used in Phases 1 and 2 of RealAcorn's participation (i.e., *ATH*, *BTC*, *burn*, *CLI*, *ETH*, *FUD*, *XMR*, and *XRP*). However, Phase 3 included 26 of those terms—all except *ATH*, *burn*, *CLI*, and *ETH*. An example of a jargon-rich contribution can be seen in Excerpt 17 below. This contribution came from Phase 3 of RealAcorn's participation.

### **Excerpt 17**

```
oh man..... u have so much to learn Waves is going to be huge
take a look at deloitte and their connections with rus gov +
waves take a look at tokenomica at the dex etc.... russia is
cryptofriendly usa isnt
..... dyor but xrp is a manipulated crap with fake supply , no
bank will use xrp ever. They may use ripple but not xrp (August
1)
```

This excerpt shows that RealAcorn not only uses more jargon, but also uses it in ways that make sense to the community he is addressing. He also demonstrates understanding between the ripple transfer network and the Ripple cryptocurrency, XRP. He is able to combine jargon native to the field of crypto trading with other internet-common jargon, such as DYOR. The comment in Excerpt 17 exemplifies the skilled combination of second-order language with the act of defending a personal opinion in front of others who disagree.

### **Adjusted Communicative Project Variation Factored by Phase**

The next quantitative analysis involved an ANOVA of the Adjusted CP Variation factored by Phase. The descriptive statistics for the Adjusted CP Variation per contribution for RealAcorn's cryptocurrency contributions are found in Table 25. The results of the ANOVA are displayed below, in Table 26.

**Table 25***Descriptive Statistics for Adjusted CP Variation per Contribution*

Phase	<i>N</i>	<i>M</i>	<i>SD</i>	<i>SE</i>	95% CI	
					<i>LL</i>	<i>UL</i>
Phase 1	4	3.53	2.13	1.07	0.14	6.92
Phase 2	88	3.09	2.74	0.29	2.50	3.67
Phase 3	60	1.68	1.22	0.16	1.37	1.99
Total	152	2.54	2.34	0.19	2.17	2.92

**Table 26***One-way ANOVA of Adjusted CP Variation by Phase*

	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between Groups	74.50	2	37.25	7.37	.001
Within Groups	753.21	149	5.06		
Total	827.71	151			

The ANOVA of the Adjusted CP Variation factored by Phase shows that there is a statistically significant difference in the amount of CP variation. Because of claims that expert users are able to easily shift between roles in affinity spaces (e.g., Gee, 2005) and that language learners who participate in social network spaces produce more complex sentences over time (Lin et al., 2016), it was anticipated that contributions would become more varied as RealAcorn gained more experience in cryptocurrency subreddits. However, the opposite happened, with mean Adjusted CP Variation scores decreasing significantly over time. The Games–Howell test, found in Table 27 below, provides more details as to where the change occurred.

**Table 27***Games–Howell Test of Adjusted CP Variation by Phase*

Group 1	Group 2	MD	SD	p	95% CI	
					LL	UL
Phase 1	Phase 2	0.45	1.11	.916	-3.79	4.68
	Phase 3	1.85	1.08	.329	-2.53	6.23
Phase 2	Phase 1	-0.45	1.11	.916	-4.68	3.79
	Phase 3	1.41	0.33	.001	0.62	2.19
Phase 3	Phase 1	-1.85	1.08	.329	-6.23	2.53
	Phase 2	-1.41	0.33	.001	-2.19	-0.62

As is visible in Table 27, the statistically significant difference happens between Phase 2 and Phase 3 of RealAcorn’s participation. While the mean did decrease Phase 1 and Phase 2, the difference in the last two periods was significant.

### **Cognitive Event Analyses**

Steffensen et al. (2015) write that the identification of cognitive events can be based on both internal and external criteria. While reviewing the data gathered from RealAcorn’s Reddit account, several prominent shifts in behavior were identified. These were marked and annotated. Cognitive event analyses were then conducted to discover the ecological affordances surrounding the alterations of behavior patterns. In several cases, it was difficult to identify clear before and after patterns of action. In other words, the change in behavior either happened too slowly to identify key event pivots or the border between old and new behaviors was not clear-cut. However, wherever changes in behavior were unambiguously present, a cognitive event analysis was conducted to learn more about why the change occurred.

### ***HODL***

First, there were many cases of RealAcorn adopting words or phrases (e.g., jargon) because of his interaction in the online spaces. One salient example of this occurred with the jargon term *HODL*. The verb *to hodl* means to invest in a commodity (specifically

cryptocurrency) and to shun any trades based on short-term price moves (Frankenfield, 2020). Additionally, hodling can refer to more than just a strategy for making money. *Hodlers* (i.e., people who adopt a hodling lifestyle) are people who believe that cryptocurrency will eventually replace real-world currencies and form the basis of all future economic structures. Therefore, *to hodl* carries a very distinct meaning from *to hold*, albeit only in the field of cryptocurrency trading. Cognitive event analysis helped to pinpoint the moment in which RealAcorn shifted his behavior and then to analyze the environmental characteristics that enabled the modification.

In a comment made in a daily discussion of the *xmrtrader* subreddit, RealAcorn writes “May the hold be strong in us” (April 26). In the most upvoted reply to his comment, another user, *areyouforserious*, corrects RealAcorn by typing “H O D L”—in effect, correcting the word *hold* to *HODL*, as the latter was more applicable in the context. This is a critical point and an event pivot in RealAcorn’s cognitive trajectory. After the comment by *areyouforserious*, RealAcorn began writing the term *HODL*; he had never written it prior to April 26. More importantly, he did not stop using the word *hold*. Instead, RealAcorn began using each word distinctly in its respective context, showing his development of skilled linguistic action with the two different terms.

On the day after receiving the critical feedback from *areyouforserious*, Monero prices begin to drop. People in the *xmrtrader* subreddit begin to speculate about the causes of the price drop and what to do. RealAcorn makes a comment telling the other users to “JUST HODL” (April 27). It is worth noting that in the first application of the newly learned lexical term (as well as in the next few instances), RealAcorn ensures to write the word in all capital letters, as modeled in the feedback he received. Less than a week later, RealAcorn again writes “KEEP calm and HODL” (May 1). In a second comment on the same day, RealAcorn contributes “Well

im clearly lost now. Will HODL for life, but no idea whats going on.” Later in the month and after selling his Monero, RealAcorn counsels another user to instead retain his investment in Monero, writing “you just hodl” (May 24). In the same contribution, he once more comments “I hodl other cryptos now.” In each of the preceding cases, RealAcorn demonstrates that he understood not only the meaning of *HODL*, but also the sociocultural settings in which *HODL* was an appropriate word choice to communicate with his target audience.

Similarly, RealAcorn also made several comments after April 26 in which he wrote the word *hold*. For example, on May 3, RealAcorn writes “Seems like we are holding our price pretty well.” He also refers to “WCT holders” (August 7), instead of *hodlers*—both nouns which carry the same connotations as their respective verbs. This distinctive employment of the two words shows that RealAcorn understood the connotations of both words and skillfully chose which to utilize in distinct situations. Each evokes a certain action or response in a prospective reader, and the participant demonstrates that he purposefully chooses the one that will produce the desired effect. These results highlight a clear after period appearing following a cognitive event.

A few characteristics of the ecology surrounding the cognitive event highlight its uniqueness. First, the response made by areyouforserious was made clearly and concisely. He showed RealAcorn that there was a better word choice in place of *to hold*. Second, several other users upvoted the comment by areyouforserious, showing that the community found his comment to be valuable. Third, the timing of the comment and its upvotes caused it to rise to the top of the comment list—something that is not guaranteed to happen to all upvoted comments. The combination of these characteristics was unique and coupled with a quick shift in RealAcorn’s behavior.

## *Moneroj*

A different example of vocabulary learning was observed in RealAcorn's adoption of the word *moneroj*. The Monero denomination of cryptocurrency has two generally acceptable plural forms: *moneros* and *moneroj*. The word *moneroj* originates from the Esperanto rules for pluralization, and thus differs from the common English forms of adding *-s* or *-es* to the end of the word. Novices in the field of cryptocurrency tend to use the plural form *moneros*, while experts and those who are well-known within the community tend to prefer *moneroj*.

During the initial stages of his participation in cryptocurrency subreddits, RealAcorn exclusively employed the plural form *moneros*. Some examples include him writing "ive sold my 51 moneros. Im gonna be buying again in some days" (April 4) or "Lets say for example ... I have 1M moneros" (April 25). However, beginning in the early part of May, RealAcorn adopts the plural form *moneroj*. In his first use of the term, he writes "moneroj will keep growing" (May 7). On May 27, he writes "Here I am now. Watching moneroj from the outside." In another comment, RealAcorn contributes "I sold moneroj at 20\$" (August 26). In fact, he never returns to using the plural form *moneros*.

A cognitive event analysis of this phenomenon results in a less defined transition. Somewhere between the end of April and the beginning of May, RealAcorn decides to begin using *moneroj*. There is no explicit correction made by others in any of his online contributions. There is no significant vote on any of his contributions using *moneros*. The word *moneroj* was surely encountered by RealAcorn prior to the shift in behavior. The earliest confirmable instance of *moneroj* appearing in the posts viewed and commented on by RealAcorn occurs on March 26, more than a month before the cognitive event occurred. Reading commentary about a recent shift in other alternative cryptocurrencies, one user commented that he or she had sold all the altcoins

he or she was holding and then used that money to purchase moneroj. In response to that, RealAcorn responded that he preferred to just hold onto his coins until the prices rose. The word *moneroj* verifiably continued to appear in contexts where RealAcorn was actively participating, and surely appeared in all the Monero-related environments where he was passively observing.

Looking for the first case where RealAcorn may have encountered *moneroj* proved to be less fruitful than looking at the first case where he decided to use that word. The day on which RealAcorn decided to ultimately sell all of his Monero and announce it to the xmtrader subreddit was May 7—the same day he began using the term *moneroj*. This is also the same day that marked the beginning of Phase 3 of RealAcorn’s participation. The contribution that first employs the word *moneroj* received a large number of upvotes, placing it in the top 10% of RealAcorn’s contributions when sorted by votes. Thus, it appears that *moneroj* began appearing in RealAcorn’s writing on the day that he decided to sell his Monero. In addition, RealAcorn never went back to trading Monero. His contributions using the work *moneroj* were consistently voted higher than those that used *moneros*. Each of these characteristics makes this cognitive event salient and relatively important in RealAcorn’s participation on Reddit.

### ***Money and Fundamentals***

Another cognitive event analysis was conducted around the repeated use of a specific phrase by RealAcorn. In several contributions, RealAcorn addressed a debate between investing in Monero to make money or to support the fundamental tenets of the cryptocurrency. At the beginning of May, he states that there are many cryptocurrencies with great fundamentals that ought to be invested in. However, by the end of May, RealAcorn writes, “I invested in monero at around 18 usd, and kept waiting, and watching all this awesome community. ... I started with fundamentals, and now im trading for the money and investing in promising projects” (May 24).

Throughout the rest of the life of his account, RealAcorn continues the same position, although whenever he references the issue of fundamentals versus money, he uses a similar peculiar wording. In one instance, he writes “Im not there for fundamentals , im fore [sic] the money man” (July 17). And later, he writes “Im in for the money, not fundamentals” (August 8). Two things merited further investigation into this behavior shift: First, it was important to identify what caused RealAcorn to begin making comments about how he no longer cared about Monero’s fundamentals. Second, because the wording was quite unique, it was worth looking into why RealAcorn chose the low-frequency phrasing of *I am (in it) for [noun]*.

Upon examining RealAcorn’s attitudes toward the fundamentals of Monero, clear before and after periods emerge. In the beginning of his participation in cryptocurrency trading, RealAcorn views monero as a cryptocurrency with potential and a bright future. He writes “im still very confident about [investing 1000 USD in monero]” (March 21). In a similar contribution, he states “Im really running in the long range (3-4 years)” (March 23). He lauds Monero as being “one of the best altcoins” (March 26), “great” (April 13), “a good place to grow” (April 28), and “the future” (April 30). However, around the middle of May, the attitude of his contributions makes a notable shift. He writes that Monero will “probably lose lots of value” (May 11), citing its “enormous lack of marketing” (May 24) and his getting “tired of [Monero’s developer]” (June 4).

While looking for event pivots relating to RealAcorn’s attitude change, the period of time between May 1 and May 11 was foregrounded. On May 7, it is possible to identify RealAcorn’s reasoning for changing his attitude. In a comment made on that day, he stated that he expected Monero to “keep growing till it [reached] 100usd.” However, he felt that he was “not sure how monero [would] perform” and that he was “not taking the risk” because he was “a student and

the profits [he] made [were] huge to [him]” (May 7). In other words, he felt like Monero was too risky, and that the return on investment was not enough. Explaining that he was thereafter “trading for the money” (May 24), he shared that he moved on to “[hodling] other cryptos now” (May 24).

Analyzing how RealAcorn settled on the wording used to express his purpose in trading cryptocurrency revealed one interesting event pivot. On August 7, RealAcorn made a comment in the xmrtrader subreddit about a recent unsettling development in the world of Monero. Another user, TurboJuno, replied to RealAcorn’s comment saying “im there for the money, not for the fundamentals,” implying that he did not care so much about the recent events, as they did not impact his goal of making money. The very next day, in the same subreddit, RealAcorn wrote “I totally agree with you. Since I dumped monero ive made 10 more times money than hodling monero. Im in for the money, not fundamentals, so...” Upon further research, the statement that a cryptocurrency trader is *in it for the money and not for the fundamentals* appears relatively often in online crypto ecologies. Seeing instances of RealAcorn copying what others have recently said is important when addressing the topic of language learning. In the case of RealAcorn, there is clear evidence that exposure to one statement can influence the authoring of another online contribution in the future—the principle of co-authorship.

### ***The Case of Barolo***

Dissecting RealAcorn’s online contributions led to the identification of very low-frequency words or phrases that seemed out of place in the vernacular of an English speaker. One such example was discovered in a comment made on May 7. After selling his Monero, RealAcorn writes to the xmrtrader subreddit and says, “im gonna buy some barolos and enjoy them those months to come.” The choice to spend his money on Barolo wine was

uncharacteristic of RealAcorn, as he had previously shared (in another comment) that his dream was to go to London and pursue an education in acting. In an effort to narrow down why RealAcorn chose to share that his profits would be spent on alcohol, several comments made in separate posts over the course of the two preceding weeks became salient.

On April 18, Monero reached a milestone, as it was the anniversary from the first time a block of monero was mined—essentially Monero’s birthday. On that day, a user named Phlegm218 wrote “I’m getting ... a bottle of 2004 Barolo in your and all the devs honor.” What followed was a long discussion about the relationship between the Monero community and Barolo wine. The discussion included the origin of the inside joke and how everyone in the community should know about Barolo. It ends with a user asking for recommendations on what vintage to buy and others sharing their opinions. RealAcorn commented on the parent thread to this conversation and undoubtedly saw the discussion.

About one week later, on April 27, another discussion about Monero and its unit price deviated toward the topic of Barolo. A user named Mootown contributed his opinion that the recent surge in Monero would cause people to start purchasing Barolo wine, thus elevating the price of one bottle. RealAcorn also commented in this post, showing that he participated after the discussion of Barolo had occurred. While there is no evidence that RealAcorn wanted to purchase Barolo or wanted to participate in the discussion about Barolo in the preceding two cases, it is clear that he was at least exposed to the concept of purchasing a specific type of wine with the funds gained from trading Monero. This exposure can help to explain (at least in part) why RealAcorn decided to share that he was using the capital gained from cashing out on May 7 to purchase Barolo instead of anything else.

### *Prevarication*

One last salient element—and its resulting investigation—came from the content and text analysis of RealAcorn’s contributions. This dealt with his choice in wording regarding the facts of his experience trading cryptocurrencies, specifically Monero. According to his comment history, RealAcorn bought into Monero by purchasing about €1,000 worth of Monero around March 22. The average price for one unit of currency on that date was around \$21.15 USD. In a separate comment, he wrote that he had purchased 51 XMR, validating the assumption that he spent approximately €1,000. On April 4, he sold his Monero holdings because of a fear of what the market would bring. He stated that he had gained about \$50 from his sale (April 4). As predicted, the price over the next couple of days dropped to almost exactly \$19. RealAcorn wrote that he would re-buy and then wait to sell until the price per unit increased significantly. In his own words, he was “running in the long range (3–4 years).”

As it turned out, RealAcorn ended up not being as devoted as he said he would be. On May 7, he cashed out all of his Monero at a rate of roughly \$29 per XMR, verifiable by the trading history of XMR on May 7. The gain was significant and substantial. Calculating the increase per unit, he probably gained slightly more than \$500 USD in less than two months. However, in response to some comments by other users, RealAcorn misstated some of his investment moves. On the day he sold, another user commented writing, “you should have waited to sell. You selling is causing a pump.” This comment implies that RealAcorn missed out on possible gains. In response, RealAcorn wrote “I can see it XD. But however im not regreting it. I did profit since 18usd so...” (May 7).

The interesting phrasing in the preceding example is the inclusion of “I did profit since 18usd.” Monero never dipped as low as \$18 during the entire time RealAcorn was trading the

currency, so it was not possible for him to purchase that low. As a trader who had been watching and commenting on micro shifts in token prices, it would be highly unlikely that he would have made such a mistake while typing, either in his mind or on the keyboard. In fact, traders in some cryptocurrencies can be impacted by shifts in price down to the thousandth of a cent, so misstating a sell price by a whole dollar is rather suspect. To understand why RealAcorn might have chosen to write “18usd” instead of \$19, it is important to know that later in the day, the price of Monero jumped to over \$32.40 per unit, meaning that had RealAcorn waited, he could have made another \$150 in a couple of hours. Therefore, RealAcorn’s misstatement seems to be connected to others making money that he might have missed out on.

On May 22, while the price of Monero was still high (indicating that RealAcorn could still have made more money), he again falsified some information writing that he “cashed out at 30usd.” However, when the price of Monero stabilized back around \$21.50 on May 24, he wrote on the xmtrader subreddit what appears to be the correct numbers of his trading experience: “Bought [XMR] at about 19 usd, saw the price go down for a month, then it pumped to 29 and I sold.” His statement shows that the previous comment stating he bought at \$18 USD and sold at \$30 were incorrect. These cited interactions further support the inference that his prevarications appear connected to events and happenings that were occurring outside of the online spaces of cryptocurrency subreddits (e.g., shifts in trading price, comments by other users, other’s comparatively larger gains, etc.). He stated numbers that suggested he made more money than he actually did, but only when others were making profits that RealAcorn could have shared.

Two other instances of fiscal falsification stuck out from among all of RealAcorn’s contributions. The first occurred shortly after his true statement on May 24. In a post in another subreddit (i.e., Monero), a user named DauntingDeluge asked the subreddit how they felt about

recent news that Monero’s founder had been lying to the community. The majority of the comments made in response to the post were contributed by users who were frustrated with the situation. In this context, RealAcorn—who at this time had also been expressing his discontent with Monero—wrote the following: “I wont lie, i got introduced to cryptos by monero 5 months ago. I invested in monero at around 18 usd, and kept waiting, and watching all this awesome community. Sold at 32 usd after noticing the enormous lack of marketing.” In this comment, he goes back to his statement that he first purchased XMR at \$18 USD and he further aggrandizes his selling price to \$32 (the max price that was hit two weeks earlier). This instance suggests that RealAcorn may have wanted to show that his way of opposing the Monero developers’ lack of marketing strategy was by making out with their money by cashing out big. And to do so, he inflated his margins to the maximum historical price possible to make it seem like he gained a larger sum of money. When questioned about the validity of his statement, RealAcorn replies by writing “its a crypto-bubble no one can deny it I invest in coin with fundamentals, and **MARKETING.**” In essence, he is saying that his investment strategy is sound—evidenced by his gain and fundamentals—and that he no longer agrees with Monero’s founder or its future.

The last instance of financial prevarication occurred several months later, on August 26. A few weeks after RealAcorn cashed out, Monero’s prices began to skyrocket, and on August 26, it reached a new all-time high price of over \$134 USD. Returning to the xmrtrader subreddit, RealAcorn posted his regrets of having sold when he did. However, in this statement, he wrote “I sold moneroj at \$20.” In this post, he reinforced some of his shared feelings. He writes “I cashed out ... now I regret doing it. ... Here I am now. Watching moneroj from the outside. ... you just hodl.” While one cannot exactly know what was on RealAcorn’s mind, it appears that he wanted to encourage other traders to hodl their XMR and to learn from his mistakes. This context begs

the question of what the difference is between saying that he cashed out at \$29 versus \$20. When considering the fact that RealAcorn purchased 51 XMR, that increases his lost earnings by over \$450. Therefore, it seems that he was trying to gather other users' support and pity. This appears to have worked, as RealAcorn's post gathered over 75 comments plus 5 net upvotes within the 19 hours it was up in the subreddit. Eventually, the post was removed by the subreddit moderators for being posted in an incorrect area of the subreddit. Still, this is another case of the Monero cryptocurrency trading system impacting RealAcorn's word choices.

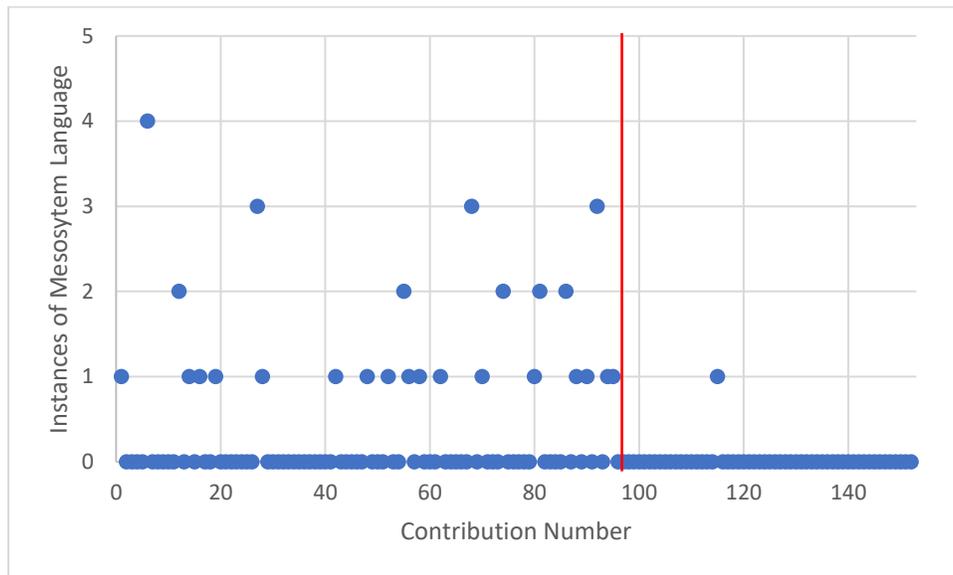
One concluding example of dishonesty in RealAcorn's contributions was prominent in his online contributions. As has already been discussed, RealAcorn traded Monero actively for about two months. On May 24, he made a post stating that he had sold his XMR "after holding for 2 months." However, a few weeks later (on June 4), he commented on a post in a subreddit devoted to a different cryptocurrency that included negative information about Monero. RealAcorn writes "i got tired of this guy and sold all my xmr after hodling for more than 3 months." Analyzing why RealAcorn may have decided to alter the facts yielded an interesting event pivot. When making his first post on May 24, a user named ShimmySoldier commented and wrote "I don't know if 2 months is quiiiiite a hold..." This comment was upvoted by more users than actually commented on the post. In effect, ShimmySoldier was saying that 2 months is far too short of a time to state that you are holding a cryptocurrency; many investors hold, or hodl, their currencies for years. Because this comment was the top-rated comment in RealAcorn's post and because he commented in the thread after it was made, it is certain that RealAcorn not only read it, but also noticed the community's response to it. A few weeks later, it seems that RealAcorn attempted to stretch the truth a little bit, also employing the term *hodl* instead of *hold*.

### *The End of the Mesosystem*

After the quantitative analyses explained in this chapter were conducted, the data points were plotted on graphs. Doing so resulted in two additional cognitive event analyses that followed. The first centers around RealAcorn's use of language focusing on the mesosystem. When each contribution is numbered chronologically and the instances of mesosystem language are plotted on the y-axis, there is a very clear change of behavior, with a clear before period and a clear after period. The change happens around cryptocurrency contribution number 96 (marked by a red line in Figure 3). From that contribution on, RealAcorn uses mesosystem language only once, whereas he had used it 40 times previous to that comment.

**Figure 3**

*The Instances of Mesosystem Language per Cryptocurrency Contribution*



Following the identification of the cognitive event, event pivots were sought.

Contribution number 96 was made on May 7. Immediately, it became evident that RealAcorn's use of mesosystem language was closely tied to his interest in Monero. While trading XMR, he referred to his connection with the cryptocurrency mesosystem an average of 1 time per 2.37

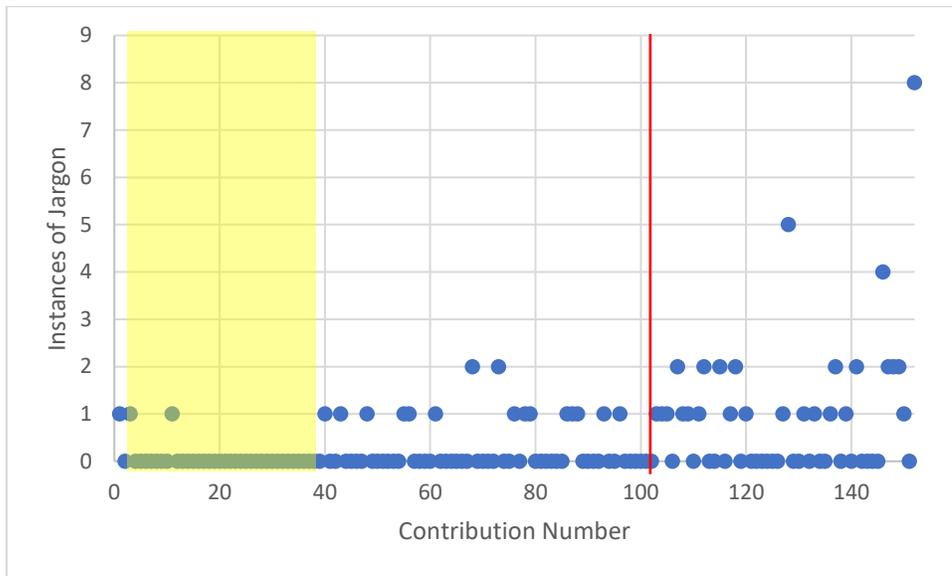
contributions. After May 7, it dropped to 1 time in 57 contributions. After May 7, RealAcorn continued participating in subreddits relating to Monero, but he also began visiting subreddits devoted to other cryptocurrencies, such as Ethereum, Siacoin, Waves, and so on. The only instance where RealAcorn employed language relating to the cryptocurrency mesosystem after May 7 occurred, once again, in a Monero subreddit. Therefore, it appears that his use of language patterns signifying connections with a mesosystem was tied directly to the contexts or ecologies to which he felt he belonged—that is, to the Monero subreddits. Furthermore, once he sold his XMR, he abruptly ceased referring to the Monero mesosystem.

### ***The Jargon Rollercoaster***

The final cognitive event analysis centered around different periods in RealAcorn's use of jargon terminology. This analysis also resulted from a visual inspection of the data relating to jargon use. When each contribution is numbered chronologically and the instances of jargon are plotted on the y-axis, there are two main regions that stick out. The first is a time period of relatively low use of jargon (highlighted in yellow in Figure 4 below). This time period corresponds directly to the first three weeks of RealAcorn trading Monero and actively participating in Monero subreddits (March 23–April 14). During this time, RealAcorn uses only one jargon term (i.e., *CLI*) once, despite making 36 contributions to the subreddits. This results in an average of 0.03 jargon words per contribution—a significantly lower value than the average of 0.59 jargon terms per contribution after April 14.

**Figure 4**

*The Instances of Jargon per Cryptocurrency Contribution*



increase that was large enough to cause a significant difference in the ANOVA for jargon factored by Phase. Looking at where the change begins results in the easy identification of an event pivot. The red line corresponds to the middle of May, right after RealAcorn sells all of his Monero. Isolating cases where RealAcorn employed novel terminology resulted in repeated contexts where RealAcorn was interested in new kinds of currency. While asking for information about a given denomination, he would use terms that related to cryptocurrency. He often inquired about a token's ICO or about recent instances of FUD. He would also refer to tokens by their non-standard ISO 4217 codes. Whether the jargon was used to portray a certain image online or whether RealAcorn simply viewed these terms as a normal part of his vocabulary is unknown. However, the desire to trade other cryptocurrencies with the sole intent of making money seems closely tied to his increased use of crypto jargon.

### **Summary**

This chapter shared the results generated from both parts of the overall study: the open-ended interviews and the focal case study. Results from the open-ended interviews revealed an overarching theme that English was not a primary reason for language learners to come to Reddit. Instead, the common endeavors which they valued were what drove them to join and participate alongside others who shared similar values. As a consequence of their movement from LPP to active central participation, users reported learning everything from individual English words to phrases and genres. Again, participation in the affinity space was the central motivator that resulted in the self-reported language gains.

In an attempt to validate the self-reported claims made by the participants in their open-ended interviews, RealAcorn's Reddit submissions were analyzed both quantitatively and qualitatively. The results generated through those examinations revealed instances of RealAcorn

learning and using new words and phrases in a manner consistent with what was reported in the first half of the study. Additionally, there was evidence that his overall global writing style changed slightly, as his average Adjusted CP Variation scores decreased significantly. When looking at what caused the changes in RealAcorn's writing, several drivers were identified. In some cases, explicit correction from other users preceded a change in behavior. In other cases, prolonged exposure to an idea impacted word choices over time. However, the most intriguing connection is that RealAcorn's shift in roles (i.e., moving from a novice Monero trader to a more expert hypecoin trader) aligned with many shifts in his writing of second-order language patterns. Additionally, one of the phrases that went on to co-author many of RealAcorn's contributions also appears to have co-authored his actions, as he begins being "in it for the money," and not trading just for the fundamentals. The connection between the adoption of a phrase and the enactment of that phrase is something that has not been clearly connected in previous ecological linguistics, despite being posited in many theoretical writings (e.g., Cowley, 2017; Linell, 2009; van Lier, 2004). A discussion of these results and implications for future research follows.

## CHAPTER 5

### Discussion

In order to explore the connection between language learners, the ecologies that surround them, and the connection between first-order languaging and second-order language learned, researchers must observe phenomena from both macro and micro viewpoints. Therefore, this section will first aim to take a more holistic view, discussing why it is that language learners join online affinity spaces and then why they feel they learn language as they participate in them. A discussion about the case study and the results of RealAcorn's behavior changes follows. This chapter concludes with a revisiting of the research questions and a summary of the conclusions drawn.

#### **Reddit as a Place for Learners to Do What They Value**

The first step to analyzing language learners' participation on Reddit was to gain a general idea of why they decided to use Reddit in the first place. Subsequently, it was important to identify why the users decided to actively continue participating in certain subreddits. The open-ended interview of the 21 language learners in the final participant pool revealed some of these reasons. It also addressed the first research question in this work, namely identifying what features of Reddit and what personal goals or values drew second language (L2) learners into the online space.

Cowley (2017) posits that theoretically, languaging and interactivity have de facto priority over language and language systems. In other words, the cognitive and emotional connections with other agents and the environment—all of which have the purpose of coordinating action together—are more important to second-order language use and language learning than the language patterns themselves. Along a similar train of thought, Thibault (2011,

2012) writes that second-order language does not exist without first-order languaging, as it is driven, in part, by the values and desires of individual and connected agents (Hodges, 2007, 2009). Again, Thibault's emphasis is on the emotional or social connections and the interactivity that speakers or learners have with others. Second-order language patterns, such as words, phrases, or syntax, are only possible when part of first-order languaging. Similarly, Gee (2005) states that common endeavor is the primary driver for the creation of affinity spaces. In all of these positions, the focus is the agent and his or her connection with others in the space. Thus, when analyzing language learning, there must be an accounting of the change of the learner as a person. A secondary purpose of the open-ended interviews was to gather evidence either in favor of or against these claims commonly made in the field of ecolinguistics, but heretofore scarcely investigated.

The open-ended interviews were also tailored to help identify (a) second-order language patterns that learners recalled learning directly because of their participation on Reddit and (b) the experiences that they associated with their language learning. Patterns among the responses were defined, and theories that supported those development patterns were used to explain the observed data. This was done in an effort to begin exploring the second and third research questions guiding this work.

### **Language Development Fostered by Online Interaction**

The first and most salient result from the interview data was that participants reported that their participation on Reddit directly impacted or led to language learning. From the descriptive statistical analysis of the grounded thematic codes, it was noted that 76.19% of the respondents mentioned specific examples of second-order language patterns they had learned specifically due to their participation on Reddit. Examples included specific wordings (many of

which were lower-frequency words, e.g., *chuck and lathe*, *caulk*, *emaciated*, *hipster*, *omnipotent*), grammatical conventions (e.g., “the -s after a verb in the third person singular,” word order and “sentence structure,” the “usage of commas,” and the use of articles or auxiliary verbs), internet slang and jargon, spelling conventions, colloquial phrases (e.g., *icing on the cake*, *to kill two rabbits with one stone*, *to be a couch potato*), and even larger-scale language patterns such as genres (e.g., making comedy posts, giving general suggestions, sharing complaints, making analyses and summaries).

Despite the overwhelming majority of participants contending that Reddit indeed had helped them learn English, the second-order patterns they stated they had learned varied greatly. Some participants reported learning everything from micro patterns in language (e.g., spelling conventions) to macro patterns (e.g., genres) due to their participation on Reddit. These data seem to support the ecolinguistic position that language is a distributed system of coordinating action.. van Lier (2004) argues that language plays a role in social activity and that the purpose of language learning is to help learners become more effective, efficient, and precise in their abilities to align social activity. Yet this process is neither linear nor constrained or prescribed by a language system. The data seem to reflect a similar idea, with users reporting gains in any and all aspects of language, be they first-order languaging skills or second-order language patterns, regardless of their reported experience with English prior to their Reddit participation.

### **The De Facto Priority of Languaging and Interactivity Over Language**

Cowley (2017) is among the foremost proponents of the position that first-order languaging and interactivity hold de facto priority over second-order language patterns, such as wordings, spelling conventions, and so forth. Similarly, in the open-ended interviews, when participants were asked why they chose to join and participate on Reddit, only one

(lovingenglish0) reported that he had started using Reddit with the express purpose of learning English. Other users reported joining and participating on Reddit for various reasons, including seeking new entertainment, looking for information on a certain subject, or even simply wanting to argue with others about certain topics. Following are some examples of prototypical responses to a question inquiring why the learner decided to spend time and participate on Reddit.

SwissKicks responded, “I started my first day on Reddit on a day where I was really bored and decided to give reddit, the most globally used (I think) online community a try and see how much entertainment I could get.” He later added “I tried to find something fun to do at work.” In another interview, frustratedfly wrote that she “[found] tons of entertainment and inspiration” on Reddit. She stated that she enjoyed visiting “the more specialized subreddits about art(isan) and scientific subjects.” Southern3 shared “I look to pass time or find a decent read,” and SmallShame3524 answered “I’m mostly here for the memes since I love Internet memes.” Again, it appears that interactivity (i.e., those things that are not said, but that create, hold, and change meaning; Thibault, 2011) is what keeps people coming to and participating on Reddit.

The recurring pattern observed is that language learners joined Reddit with the intent to do something other than explicit language learning (cf. Gee, 2005). Yet, language and wordings played a part in each of the activities they described. This seems to be a preliminary point in favor of the ecolinguistic position that values and first-order languaging are foundational to second-order language patterns, or wordings. Furthermore, the statement that second-order language is a part of (and not a constraint on) the larger action was verified in the comments made by the several of the respondents. One user, comomuchasfrutas, shared “I always look up facts and backstories to the movies I watch or the games I play ... I do believe engaging in online platforms, art and media have taught me the most.” His self-evaluative statements show

that his personal motivations to research his favorite games and media led, indirectly, to improved skills with language. Answering the question of why his English improved after using Reddit, garret35 replied “Because Reddit posts are usually in written form.” As before, the participants show that they were cognizant of the fact that language played a part in the larger activities they were pursuing. In fact, 28.57% of the respondents mentioned the fact that the de facto language of Reddit being English shaped their actions and the activities they pursued.

Therefore, it appears that language learners actively participating on Reddit often feel that the topics or content they are interested in are what drives them to the site. Additionally, those subreddits employ English as the de facto medium of communication. Consequently, it appears that the desires of the learners to co-act with others and their relationships with them are among the main drivers to improving or refining their English skills. SwissKicks wrote “I have learned ... the way native English speakers comment on different things such as comedy posts and general suggestions or complaints.” When asked what language he learned, he answered by saying that he had learned more about the actions or “the way” of making “comedy posts,” “general suggestions,” and “complaints.” In his comment, it appears that the language is inseparable from the larger action and purpose of the contribution. He concludes that his time on Reddit “improved [his] writing skills in terms of the ability to make analysis and summaries, as well as the ability to utilize the western style of humor to blend in with western communities better.” It is worth noting that he continues to report learning skills, and not just wordings (or syntax, or morphology) that can be used to encode the meaning he wants to convey. Thus, using only quantitative analytical methods of assessing the accuracy or correctness of his writing would likely not be enough to assess how much SwissKicks gained in his ability to make analyses or to write video game summaries. He reported increasing his skill in doing certain

actions in which wordings played a part. This is a sign of the development of the learner as an independent agent in conjunction with the learner as an English speaker. This applies equally to RealAcorn's co-development as a cryptocurrency trader and English learner. A framework and methodology that allows for both micro and macro analyses and the exploration of linguistic and non-linguistic cues is necessary to be able to identify and demonstrate this kind of change.

Other users made comparable statements to those by SwissKicks: ageekygamer wrote "[Reddit] also helped with casual and informal talking." Southern3 stated that as he used "subreddits to ask questions [he] had trouble finding answers to on the internet," his English improved. SmallShame3524 responded "I have small gaming hobbies so I go to those communities" and later reflected "I do think that the English I've learnt is useful, as it helps in daily life." A final example comes from another user, goktug1, who replied that even though he was "not a active redditor" in any specific subreddit, "I would do much better on my english class" just because of the time he spent passively lurking and reading things for his own enjoyment.

All the participants in the study except one reported joining Reddit for purposes unrelated to language learning. Additionally, the one outlier, lovingenglish0, commented that he "wanted to have some kind of forum that [involved] every topic," and that is what kept him coming back—not his progress with learning English. While it seems difficult to validate in quantifiable and statistical methods the claim that second-order language is both inseparable from and secondary to first-order languaging, it appears that—in all cases—the doing something (e.g., reading about favorite video games, talking about DIY projects, musing with other enthusiasts about space exploration, etc.) is what prompts the initiation of dialogue between the learners and the online content. Rather than constraining both activity and communication, it appears that

structured language patterns are ancillary to the actions of the learners. As learners do what they love, they become better at refining what they do—be it finding memes or researching videogames. As they refine the actions (in which wordings play a part), their language improves.

Central to this concept of learning as refinement is the idea of values realizing. Discussing language learning in WoW, Zheng (2012) writes that learners “[realize] values demanded by the ecosystem by drawing on second-order, sociocultural, and linguistic norms” (p. 557). Again, the values-realizing action is what drives second-order language use, and it is tied to the physical, symbolic, sociocultural, and cognitive ecologies that surround it. As learners refine their actions within the ecosystem, their second-order language also improves. Keeping an ecological perspective can provide insights into how relationships with others and the environment can impact *informal language learning*. The informal language learning framework takes the position that experiences with the L2 outside of the classroom can result in “tacit knowledge of all levels of linguistic analysis from phonology through pragmatics via distributional analysis of the input” (Christianson & Deshaies, 2020, p. 30; see also Ellis, 2002, 2005). Taking a similar stance, Zheng (2012) discusses how avatar-extended affordances lead to unplanned, informal skilled linguistic action spurred by values-realizing activity: “learning the language is not the central purpose of the learner participating in WoW, but it is interwoven with opportunities for values realizing. ... When learning about looting, [learners are] afforded the action of looting fallen enemies” (p. 557). Thus, informal language learning can be fostered as learners are provided opportunities to realize values and coordinate with others’ values-realizing activity.

The perception–action cycle, or the process of repeatedly assessing a situation and then doing something and evaluating its effect on your environment (Hodges, 2007, 2009; Hodges et

al., 2012), affords new kind of actions previously unavailable. It refines learners' abilities to do what they value (e.g., share information about cryptocurrency with other potential investors, garner upvotes, obtain answers to questions about music, etc.). Those actions seem to be primary to second-order language, and not the other way around.

### **The Praise and Deprecation of Formal Education**

One unforeseen result of the online survey was that despite not being asked explicitly about their previous experience with English, 66.67% of the respondents stated in their interviews that they had already learned some English prior to joining Reddit. Participants shared having studied English in primary and secondary school ( $N = 14$ ), in post-secondary school ( $N = 2$ ), through private tutoring ( $N = 1$ ), and because of employment ( $N = 1$ ). Several users reported learning the basics of grammar and vocabulary in their schooling, with one participant writing "I think that the foundations of English grammar are probably [one] part you can't learn via online interaction." Yet despite the perceived need to share that they had already studied English prior to joining the Reddit ranks, a significant percentage of the participants (38.10%) almost immediately added deprecatory statements about their formal education.

The most common argument against formal schooling was that the content covered simply did not or could not include the many informal and unstandardized language practices which are found online. Estabanagain wrote "I have ... realized that the English I learned in school is too formal for casual conversations on the internet." Similarly, frustratedfly contributed that Reddit "enriches my vocabulary with all those words one will never encounter at school, community college and ... university." LuluBaby8 also said that "Reddit ... communities have added another layer that I don't think I could have learned at school." PonWayWay acknowledged that the ecologies of brick-and-mortar schools are different than those of the

digital wilds, simply writing that the expressions used online would never be encountered at school.

Others, however, took a more hostile approach, declaring that what they learned in their formal schooling was simply not useful in the real world. One user, goktug1, stated his frustration with his English schooling in these words: “i didnt really got an education about english expect [*sic*] for school (which is heavily grammar focused and not really useful for just communicating with someone on its own).” TheDiana wrote that her native language was quite different from English, leading her to have difficulties learning it in school. Then she added “even if I am a student I have one of the worst teacher of my school.” When asked why her experience learning English was poor, she answered “[I learn] reading something that I like, instead of read pages of school books not at all interesting, which words and topics I will forget the next day.” Ferrari\_Para\_Mi made a similarly disparaging comment, stating that even though he took English in primary and secondary school and had a tutor, he “didn’t write in English very much,” resulting in him never retaining the information he was given. RealAcorn wrote “I’ve been learning english in school since I was around 8 years. However it wasn’t a full time learning. Just some english classes we had during the week. ... I just couldn’t understand [anything].”

To language instructors, the argument of how formal language schooling—often built on the componential assumption of language—does not transfer to real-world languaging is not novel (van Lier, 2004). In fact, many language learners feel that what they learn in a classroom is very different from what they encounter after they leave the confines of the school, despite how well (or not) they do in their practice assignments or assessments. Some scholars (e.g., Ferrara et al., 1991; Herring, 2007; Murray, 1990) attribute this difficulty to online English having a

different method of encoding meaning found somewhere between spoken and written language. The new linguistic system must be learned, perhaps similarly to another L2. The encoding methods learned in class just do not work in online settings. In contrast, the field of ecolinguistics provides an additional possible explanation for the significant disconnect between classroom English and Reddit English.

In ecolinguistics, scholars propose that language is—and must be—situated (within natural, symbolic, sociocultural, and cognitive ecologies; see Steffensen & Fill, 2014). While the written and auditory symbolic structures (i.e., second-order language) learned in a classroom may remain largely unchanged, each of the other ecologies is quite different. The values of the learners change as well. This means that new coordination activities need to be learned. The reason learners often feel such a disconnect between the language learned at school and the way “people speak and interact in real life” (SmallShame3524) might be because they are engaged in two different actions: English schooling and, as an example, trying to resolve a software problem. Each action is surrounded by and influenced by different ecologies which students must navigate to find their way (Hodges, 2007).

A warranted follow-up question can then be asked: Can any experiences with languaging result in understanding that is transferrable to another situation? Bakhtin (1984) alluded to the fact that every experience with language is unique and dissimilar from previous experiences, writing that although each word is partly someone else’s, each time it is used, it takes on a slightly different meaning, or color. He writes that even though an utterance might be different or new, all words are said in response to, or in dialogue with, something that has already been said. In ecological terms, each experience with language is distinct, as it is built upon and co-authored by all previous experiences that the agents have had. However, humans are also very good at

analyzing and making patterns (Cowley, 2014). Thus, when learners have enough experiences in situations which share multiple ecologies (e.g., symbolic, sociocultural, and cognitive), they can identify patterns in communicative projects (CPs) and communicative activity types and begin to anticipate what is coming. These experiences can then help them make decisions—including which first-order languaging actions to take and which second-order patterns to apply—resulting in a more efficient coordination of action in the future.

Such a line of reasoning can then help explain why 52.38% of the respondents stated that the language they experienced and learned on Reddit had a connection with or was useful in their real-world, daily lives. SmallShame3524 replied “I do think that the English I've learnt is useful, as it helps in daily life and ... settings with my classmates.” LuluBaby8 wrote that in her formal schooling, she was only able to speak in formal presentation settings “on very specific topics, but [she] didn't feel fluent and comfortable when talking about everyday life.” However, after spending time on Reddit “just looking around” and browsing topics that were of interest to her, “some [of the] expressions and ways of speaking ... constantly used on Reddit ... are now part of the way I speak with my English-speaking friends or colleagues.” Spending time in ecologies centered around her personal interests made it easier for her to call upon second-order language patterns in similar situations outside of Reddit. Similar examples were shared by other participants. “The English that I learned on reddit is useful. Where I live is not a tourist place, but when I go on Holiday happen that I speak/make friend with foreigners, and the only way to communicate [*sic*] is speaking English” (TheDiana). After browsing content relating to her job, ageekygamer responded “[Reddit] helped me learn new words, especially in my line of work. ... In my day to day life I can communicate better with people who have English as a native language.”

The phenomenon of learners stating that school English is not as applicable to the real world as Reddit English ought to make sense, because the values and actions of the agent on Reddit (where they are not constrained to certain prescribed activity types) can more closely resemble the actions they choose to take in the non-virtual world as well. Because the things that one does in Reddit's ecology are closely connected to what one values in the non-virtual environment, the user is easily able to make connections between the two settings. Referring to the framework of language ecology provided by Steffensen and Fill (2014), the language found on Reddit more closely resemble those in the real world in the symbolic, the sociocultural and historical, and the cognitive ecologies, making the transfer of skills easier from Reddit to the real world. This is what Newgarden et al. (2015) refer to as *situation-transcending practices* (cf. Linell, 2009). In situations where the values of the learners are similar to those they have had in the past, they are able to draw upon past and predicted future experiences to effect new actions. The concept of co-authorship moves beyond just the symbolic ecology and connects with the other ecologies as well. Because they share many of the complex systems that appear on Reddit, the real-world actions and language production are facilitated. The patterned resources that learners can draw upon from their experiences on Reddit include "habituality, routinization, conventionalization, and institutionalization of human practices" (Linell 2009, p. 50). These allow the learner to then "produce and reproduce activity types and other routines" (p. 50) in contexts outside of online affinity spaces.

If the above conclusion is to be made, then it must also be expected that learners would have a harder time transferring what they have learned to situations that share fewer ecological similarities. The user garret35 wrote "Because Reddit posts are usually in written form, it didn't really teach me how to actually understand spoken English though (which sounds very different

from what we learn at school.)” As can be expected, when the symbolic ecology changes (from written to spoken), situation-transcending practices do not come to the fore easily. Describing how the courses she took at a university taught her “grammar and translation,” frustratedly explains that “the foundations of English grammar are probably the part you can't learn via online interaction.” In school, the values and actions of the learner are different than they are when browsing Reddit. Citing the fact that his only use for English in the real world at the time was in school, the user *estabanagain* wrote that he did not think that the English he learned on Reddit would be useful in school—simply stating “At the moment, no.”

With several participants claiming that the English they learned in school was not very useful in the real world while simultaneously concluding that the language they learned in the real world was not very useful in school, language practitioners should evaluate what factors might cause this divide. Additionally, they may consider the processes and ecologies that are involved in school-centered L2 classrooms compared to L2 learning in the digital wilds. When discussing languaging, dialogue, and relationships, the theories of affinity spaces and communities of practice (CoPs) can help to illuminate and hopefully overcome this issue.

### **The Relationship Between Affinity Spaces, LPP, and L2 Learning**

When asked to reflect on their language learning process on Reddit, very few respondents included statements that suggested language learning was the central focus of their participation. As an atypical example, *comomuchasfrutas* wrote “I have improved my English using Reddit [when] the other Redditor [clears] up [a] certain phrase.” This could be taken to mean that the learner had a component of language explained to him, enabling him to move higher on the hierarchy of linguistic complexity. However, that position would be unconvincing.

Conversely, a salient and recurring category of responses was one that resembled the process of learning described by Lave and Wenger (1991) and, later, Wenger (1999, 2011): learning through apprenticeship in a CoP. Lave and Wenger (1991) describe the process of situated learning, where what is being acquired is not information, but rather a skilled action. According to them, new members of a group begin their learning experiences by participating peripherally in very low-stakes, low-skilled ways. As they gain experience in these peripheral roles, they can reflect on their actions and their respective outcomes, affording new, more visible, and larger-impact actions. As they continue to refine their skills, some learners become viewed as leaders, enabling them to act in further roles and to take further actions. This results in them learning a practice, rather than discrete, static information. In his work discussing online spaces, Gee (2004, 2005) suggests that this process occurs much more easily in online spaces, as the barriers to entry and the stakes tend to be much lower.

The learning processes reported by the participants in this work resembled very closely the pattern of learning presented by CoP theorists. Several of the learners described going through a period of “lurking until something catches enough of my attention” (frustratedfly). LuluBaby8 wrote that, in the beginning, she was “mostly just looking around, very rarely giving my opinion or answering on posts.” This time period of lurking or *passive participation* (Koh et al., 2007) is similar to the principle of legitimate peripheral participation (LPP) coined by Lave and Wenger (1991). During this phase, learners tend to avoid active, or central, participation not because they do not have the words or phrases necessary to express an idea, but rather because they are not familiar with the practice (i.e., how things are done) in the space. By observing peripherally, the novices can see how other agents navigate the space, how they interact, what they value, and the results of each of these individual movements on others within community.

The importance of ecologies, or relationships, and reflections on the personal experiences had with those ecologies comes to the fore. It appears that participation in a written-language centric affinity space is influenced to a degree by how familiar the newcomers are with the established practices of the space.

“As we language, we anticipate, affect each other and, of course, modulate our own activity as we hear each other’s vocal gestures. Languageing can thus be seen as structural coupling under the control of biological parameters” (Cowley, 2012, p. 13; see also Cowley, 2010; Steffensen & Cowley, 2010). Similarly, through LPP, language learners in online settings begin to identify patterns of action and reaction that occur in the spaces they frequent. When a user identifies a setting that affords actions with a valued, anticipated outcome, he or she can then choose to take a step toward active participation. Assuming that the learners’ values align with those of the users in an online affinity space, they move toward active participation naturally and instinctively, without needing explicit feedback, instruction, or assistance (Gee, 2004).

The process of moving from passive to active participation takes time, as Southern<sup>3</sup> mentioned in his interview: “I certainly got more active and started posting as time went.” Gee (2005) also posits that patterns in behavior exhibited in affinity spaces naturally change over time. He argues that the porousness of social structures in online affinity spaces enables more dynamic shifts in behavior (compared to traditional CoPs) and the taking on of various roles with relative ease. However, he also describes that the members of these spaces need to have *tacit knowledge* of other practices relating to the affinity space—things that may not be able to be explained fully in words (p. 228). Therefore, when a language learner finds a subreddit where users share a common endeavor aligning with his or her own values, he or she can participate

peripherally, slowly acquiring other skills necessary to then contribute meaningfully, and later actively, to the space. Another learner stated that he only “started using reddit when i already had a [*sic*] idea about [it]” (goktug1).

SwissKicks, one of the participants in this study, explained his process of moving from the periphery toward active participation in a couple of subreddits dedicated to two videogames he enjoyed playing. He also explained how that process of development was connected to his understanding of English. SwissKicks explained that he began participating in affinity spaces using the Chinese platform 贴吧 (Tieba). Tieba is similar to Reddit, in that it is composed of millions of special-interest *bars*, akin to subreddits. As a new user to the space, SwissKicks wrote “I started my first day on Reddit on a day where I was really bored and decided to [it] a try and see how much entertainment I could get.” Like the other participants stated, SwissKicks shared “I had been reading posts made by others for quite some time before feeling comfortable enough to make my own,” adding that he refrained “from posting very often at the beginning due to how unfamiliar I was with western online communities.”

When asked what it was that made him decide to begin contributing actively on Reddit, SwissKicks wrote, “[Browsing all of the best user-created content] intrigued me enough for me to start being part of the community myself.” He began making posts on various subreddits and then grew fond of one dedicated to his favorite game at the time, Dota 2. “Soon enough I grew much more comfortable posting on /r/dota2 which I had been following for quite some time as well.” As he continued to participate in the different subreddits, SwissKicks was able to develop some connections with other users in the space, and he even created some content that “went viral” in the Dota 2 subreddits. (As a note, the Dota 2 subreddit has over 1 million subscribers with millions more who visit the subreddit each day.)

When asked how and why his English improved while participating in the subreddits, SwissKicks replied, “I tried to study what kind of content is most welcome by reading a lot of reddit.” He then added that he “studied the word choices native speakers would use when making comments or composing threads.” In this statement, it is clear that his goal was not only to learn new words or phrases, but also to make comments and compose threads (Swales, 1990). Again, the actions and values took precedence over the language. Furthermore, SwissKicks wrote, “The time I spent on Reddit ... has improved my writing skills in terms of the ability to make analysis and summaries.” Here again, he adds that his experiences enabled him to analyze and summarize, and not to remember the meanings of words. SwissKicks attributes his ability to do things with English to his previous experiences in the space: “The first time I [created something that went viral in online communities] fully in English, I think that's all thanks to the time I spent on Reddit.”

One key characteristic of Reddit that aided SwissKicks’ learning was the display of votes next to each online contribution. The votes provide a sort of numerical index of how well the content aligns with the values of the online place. The “most well-received [comments and posts] thrive,” (SwissKicks), while others are “downvoted to oblivion.” This feature of Reddit has benefits to other users as it keeps the users’ common endeavor always at the fore and it allows new potential members to quickly and easily evaluate whether or not the common endeavor is something they value. After spending time in the subreddit, users become accustomed to the practices of the space and then align their actions (of which wordings are a part) to the norms of that space.

Reddit supports sorting posts by popularity and ‘likes’ (upvotes) which tieba never had, and that immediately allowed me to browse all of the best user-created content that ever

existed. ... With the number of 'karma' visually displayed it was hard for me to not want to choose my words carefully in order to not make an unimpressive or even embarrassing comment. (SwissKicks)

This process of aligning individual behavior with the values and norms of a larger group is part of what Zheng (2012) and Newgarden et al. (2015) refer to as the eco-dialogical model. In settings where conversing and caring about others' thoughts and opinions come together, learners can appropriate semiotic resources and embodied affordances to develop their identity:

The appropriation and embodiment [signify] the learners' careful conversing with action. The [eco-dialogical] model illustrates how perception and action are ongoing in cycles of meaning making and values realizing. This process *is* languaging, incorporating both the linguistic and action modes of semiosis, as well as the sociocultural engagement of values-realizing. Both what people say and do constitutes languaging. (Newgarden et al., 2015, p. 26)

Affinity spaces provide excellent places for languaging to happen. Each space (e.g., subreddit) is centered around unique sets of values. Learners can then experience and reflect on the actions which happen in the space. Then, with little fear of consequences, they can begin to engage in LPP. As they progress, their participation grows to become more active. The final step is refining the actions taken, so that they can contribute in the intended ways.

Reddit is unique in that wordings are a necessary and key part of almost every subreddit. Some subreddits even prohibit the use of other meaning-making modalities, such as images, videos, graphics, and so on. Therefore, in order to refine the actions made within the subreddit, second-order language must be refined as well. This argument brings scholars back full circle to the definition of language learning by van Lier (2004) shared at the beginning of this work: the

process of discovering “ways of relating more effectively to people and the world” (p. 4). It is evident that (a) the reasons for language learners joining Reddit have little to do with language learning and (b) the reasons they choose to participate actively in certain communities have little to do with language learning. And finally, it appears that the language they learn has everything to do with the answers to (a) and (b) above. Thus, it appears that languaging and interactivity do indeed have de facto priority over language and language systems (Cowley, 2017). It seems very difficult to isolate the actions and experiences of participating on Reddit from the second-order language patterns. Because of this, it is logical to accept that, as learners develop in their abilities to do what they value doing, they improve their language skills as well. Their development as an agent results in language learning.

### **Agentic Development**

Analyzing the results from the open-ended interviews, a recurring phenomenon is discerned. Language learning in online spaces co-occurs with the development of the person. The latter half of this statement is what is referred to in this work as *agentic development*. In an ecology, agents are entities that are able to exert power by initiating action. Agentic development would therefore refer to increasing the ability of an agent to act. In the context of online social spaces, this is done through in three main ways. First, agents need to have a place in which they mutually want to and are able to act. This draws on Hodges’s (2007, 2009) theories of values and Gibson’s (1975, 1979) writings on affordances. The value systems of the learners must align with the activities available to them in a space. If the activities do not align, there is little opportunity for learner-initiated action, especially in places with deeply established practices and patterns of activity.

Second, agents need to have opportunities for reflection and planning. Reflection on perceived phenomena within a space is what allows for learning to occur (Dewey, 1925, 1938). The idea of *planning* is not intended as an operationalized procedure of using a set amount of time to prepare for an utterance. Rather, it refers to the importance of being able to evaluate the predicted outcomes of taking any intentional action and then assess whether a modification can or should be made (cf. Dewey, 1925; Hodges, 2007, 2009). The concepts of previous experience and co-authorship are important pieces of this process. As learners reflect and plan, they can refine the actions they take by exerting less force in a more focused manner to achieve the same valued result (cf. the definition of *learning* given by van Lier, 2004). This cycle of reflection or perception can then result in new affordances, as agents discover new ways in which they mutually want to and are able to act.

Third, agents need the opportunity to be and to become (cf. Zheng et al., 2019, p. 583). This involves the combination and reification of the first two pieces described above through the taking of intentional action (Dewey, 1925) with some sort of valued predicted outcome (cf. Cowley, 2011b). It is an agent voluntarily acting on the affordances in the environment provided by the reflections and predicted outcomes because they align with his or her values. As agents refine their abilities to do certain tasks, they can fill roles needed in a larger group by aligning to others to achieve greater outcomes (Cowley, 2007). This kind of co-action with others is what leads to the development of self and identity. In his book on the ecology of language learning, van Lier (2004) writes that the “development of the self occurs as a consequence of interaction with and in the physical world” (p. 114). He then adds that “the self is not just a detached observer taking in the world through the windows of the mind, but it is an ongoing project of establishing one’s place in the world” (p. 115). Thus, through repeated intentional acts and co-

action with others, agents develop as individuals—as people. This is why Gibson (1979) took the position that as humans perceive the world, they perceive themselves. This development, in turn, affords new desires to act, bringing the cycle full circle, back to the beginning.

In the context of this work, the agents are the users of Reddit who make contributions to an otherwise desolate, empty place. (Reddit does not create or curate any content not provided by users.) Because each subreddit is centered around a certain interest, users can choose to participate in whatever group they want, either actively or passively. This also allows for each learner to progress into active participation without ever being coerced into doing so. Because active subreddits have users posting all the time, it is easy for newcomers to have personal experiences with the subject matter and to evaluate the outcomes of individual and group actions taken in the space. Once they feel so inclined, they can begin making active contributions to the subreddits they favor. Repeated interactions result in the users fulfilling additional roles necessary to the subreddit, and the ability to switch between roles fluidly and quickly enables the development of the learner as a person. On Reddit, wordings play a part throughout this entire process, making each of these steps languaging activities. Thus, as the learners develop as people, their ability to employ second-order language patterns increases as well.

### **A Need for Case Studies**

With all of the self-reported data from the open-ended interviews, it is important to take a deeper look at individual participants and to identify patterns and ecologies that lead to specific examples of language learning. Yeh and Swinehart (2020a) cite the lack of longitudinal research in the field of language learning and online social network spaces, including affinity spaces such as those found on Reddit. They write that more studies are needed to identify and perhaps begin to understand the systems at play in complex online spaces. The purpose of these studies should

be to identify the processes that language learners undergo as they develop and refine their abilities to act online while concurrently adopting second-order language patterns. One case study from the participants in this work is discussed in greater detail below.

### **RealAcorn's Agentic Development and Language Learning**

From the results presented in the Results chapter above, it is clear that there are significant changes in the linguistic behavioral patterns that RealAcorn displays. It also appears that many of the shifts in second-order language patterns happened in close chronological proximity with one another. This next section will look at specific examples of words and phrases that RealAcorn incorporated while making the transition from LPP toward active central participation in a group of subreddits relating to cryptocurrency. It will also discuss how those changes associated with the roles that RealAcorn took within the affinity spaces and his relationships with the diverse ecological systems that surrounded him. The section concludes with a discussion of RealAcorn's agentic development.

#### **The Beginning of Agentic Development Through LPP**

RealAcorn began visiting Reddit at least several months before interacting with the cryptocurrency communities centered in its subreddits. His account was created on August 12, 2016, or about six months before he began actively contributing to any subreddits. While it is difficult to track, observe, and motivate peripheral participation by users in online spaces (Koh et al., 2007), metadata during that period show that RealAcorn frequented many of the most popular subreddits, especially those that were featured on Reddit's front page. In the time leading up to his involvement in cryptocurrency trading, RealAcorn gravitated more toward tech-centered subreddits. He visited subreddits dedicated to at-home media servers. Shortly thereafter,

he started to visit subreddits focusing on cryptocurrency, and more specifically Monero. This was the point at which he made his first post.

In order to make a comment or post on Reddit, a person must have a user account. However, research has shown that many new Reddit users—especially English language learners—create accounts long before they ever make their first active contributions (Banov, 2018). This is often due to the fact that one of the less-active methods of LPP, that of casting upvotes and downvotes, requires a Reddit account. During RealAcorn's lurker period, he would encounter new content, some of which aligned with his personal goals and values and some of which did not. Once he had become familiar enough with the ecology of Reddit, he likely wanted to reward content he liked by upvoting it. This desire would then require him to create an account. For the first six months after creating an account, RealAcorn moved from LPP practices of finding and voting on content toward attempting to actively contribute. Despite having a low barrier to entry and requiring a minimal amount of effort to do, viewing and voting on posts and comments are central and very important actions, as they determine what shows up on the front pages of each subreddit and of Reddit itself. After discovering content that RealAcorn valued, he was able to move from the role of observer or lurker into that of rater. Thus, RealAcorn's decision to create an account occurred in tandem with his ability to act in a novel way. However, acting as a rater requires more skills than simply clicking on the up-arrow next to a comment. Some of the additional skills required could include reading the explicit rules of posting on individual subreddits, recognizing patterns to identify what content is enjoyed by others in the same place, and reflecting on previous experiences to assess the value of the newly discovered content. And to effectively participate in these practices, understanding of second-order language patterns and reflection on previous experiences with those language patterns are needed.

This first phase of participation is crucial for two reasons. First, the beginning of RealAcorn's agentic development in an English (his L2) dominated space is observed. He finds various roles that align with his values, and he begins to fill them (Buntain & Golbeck, 2014). This, in turn, fosters relationships with other users and the content of the subreddit, and those relationships co-author future actions taken by RealAcorn (cf. Reinhardt & Chen, 2013). LPP helps the agent to begin building an identity and to develop as a competent actor, while at the same time building and strengthening relationships between the novice and others in the space.

Second, LPP brings with it the learning and refinement of new skills. RealAcorn's purpose in joining Reddit was to find content that was interesting to him. Over time, he added another purpose or goal: that of voting on and curating content. As he developed interest in cryptocurrency and found a group that shared similar values, his desire to interact with them clearly increased. Knowing what cryptocurrency content is worthy of an upvote, knowing where to click to upvote, knowing how to find a previous post, knowing where to click to reply to a post, and knowing how and what to comment on a cryptocurrency post are all pieces of the larger goal of being a member of a cryptocurrency subreddit. In fact, it is arguable that without these skills, one cannot be a full member. Therefore, a theoretical question remains: Can the skill of knowing how and what to comment on another's cryptocurrency post be separated from the underlying, first-order action of being a member of that crypto community? Ecolinguistics scholars would posit that it cannot. A similar argument is thus made about second-order language patterns in ecolinguistics. Learning how to be an active and valued member of a certain subreddit cannot be separated from the second-order language patterns that are requisite to doing so, nor can the language patterns be separated from their situated and (virtually and physically) embodied contexts. Since language plays a part in becoming any kind of redditor (i.e., a

proficient user of Reddit), language learning is a required part of that becoming—what Zheng et al. (2019) refer to as *language-as-part-of-nonlinguistic-action*. Zheng et al. (2019) write that in online learning ecologies, “the work of the language learners is changed from *learning about language* to *learning to be* and *learning to become* in languaging” (p. 583; see also Zheng et al., 2018). Specific examples of different ways RealAcorn moves toward being an active member of his online group through modifications in linguistic behaviors follow below.

### **Co-Action in the Cryptocurrency Mesosystem**

According to a complex systems theory of language, there are numerous—perhaps even uncountable—systems that impact the language appearing in any given space. Each of these systems or ecologies and its accompanying values acts on and with agents, effectively constraining or evoking certain kinds of actions, depending on the endeavors of each individual (Cowley, 2007; Hodges, 2007). Thus, as a learner’s values align more closely with a sociohistorically established population of an affinity space, the practices of the novice begin to approximate the practices of a perceived archetype (Gee, 2005). CoP theory suggests that as novices gain the experience necessary through LPP, they can become part of a more central subdivision of the community (Lave & Wenger, 1991) and then become role models or examples for other, newer members.

The movement from outsider toward key central member impacts not only the first-order practices of agents, but also the second-order language patterns that they employ as part of the actions they take. That means that evidence of agentic development should be observable in the linguistic behaviors—and modifications thereof—of the novice-turned-skilled. In other words, as RealAcorn’s values change and his role in the online cryptocurrency community changes, it can

be expected that the language patterns observable in his utterances (or online writings) would change as well.

Nowhere in RealAcorn's contribution history is this more evident than in his reference to the mesosystem of cryptocurrency enthusiasts that surrounds him. After spending some time in LPP, RealAcorn decides to make his first active contribution to a Monero subreddit. In it, he directly refers to the larger ecology of crypto aficionados and asks them "what do you think" about Monero's future (March 21). A couple of days later, he asks them to explain some of Monero's possible drawbacks, stating "lets be serious, and lets talk about it [*sic*] weakness" (March 23). These are RealAcorn's first linguistic outreaches toward and forays into the Monero mesosystem, even subtly referring to himself as part of that group of people through the contracted pronoun *us*. Both of these posts are fairly well received, garnering a fair number of positive upvotes.

### **Excerpt 18**

Im a bit disappointed with monero. First I was like, wow, its the definitive cryptocurrency, etc... However after some day of thinking, I think i was wrong investing 1000USD. (March 27)

About a week later, RealAcorn makes another comment, trying to involve the larger mesosystem in a discussion about whether or not Monero was worth investing in (Excerpt 18). In the comment, made on the daily discussion post of the *xmrtrader* subreddit, RealAcorn states "Im a bit disappointed with monero." He then relates some information from exosystems (i.e., the cryptocurrency bubble, the irregular focus of others on altcoins, and the increasing value of Bitcoin) to validate his argument. In this post, he refers to the mesosystem using the first-person plural pronoun *we*. However, he quickly discovers that his views, values, actions, and wordings do not align with the internal and external grammars of the affinity space. Immediately, the

community comes in with responses to his comment such as “Disagree with this” (Alan\_Johnhanneson). TheGrayDoor7 sarcastically writes “Omg please dont sell those 1000 USD XMR, you will shake the market. :D” SupernovaDeemon adds “I am not disappointed at all with Monero.” Other responses included the following: “Lol. You think this is rough?” (Civ2iswaybetter); “Perhaps monero is not for you.” (WestIndiesMammal); and “Are you in the DENIAL stage of the Cycle of Market Emotions Graph?” (FossaJohn1968).

RealAcorn’s comment then gets downvoted harshly. In fact, this comment becomes his lowest-voted contribution. This is a key learning moment in the progression of a novice, as he is afforded the ability to explore the external grammar of the group he is interacting with. This post has the potential to serve as an archetype of what not to share in the xmrtrader subreddit. From the analysis, it is observed that RealAcorn never replies to any of the comments. It becomes fairly obvious to the community that he has not yet aligned with their values. Some of the wordings which RealAcorn chooses do not portray an image of being central to the group. The values he expresses in his post are not shared with the others in the space. Even the hesitant tone of this post exhibits traces of RealAcorn being a novice. (These facts are discussed in greater detail in the section titled A Comparative Analysis Highlighting Agentic Development below.)

Nevertheless, RealAcorn continues his interactions with the members of the subreddit, because, as he states, he has at this point, entered into the role of a cryptocurrency trader by purchasing his first crypto coin. Over the next two and a half months, RealAcorn makes more than 50 contributions to the xmrtrader subreddit alone, in addition to his contributions to other similar cryptocurrency subreddits, such as Monero, Cryptocurrency, MoneroMarketing, Bitcoin, and so forth. Cryptocurrency-related contributions end up composing 79.58% of RealAcorn’s contributions on the entire Reddit platform, showing that the English he writes on Reddit is

primarily impacted by the actions he is taking in the real world. RealAcorn buys and sells Monero several times. He explores alternative kinds of cryptocurrency. He feels uncertainty about claiming crypto investment gains on his taxes. All of these real-world activities are expressed in his writing, and they motivate the linguistic actions he takes. During this time, RealAcorn becomes intimately familiar with the details of the internal and external grammars of the subreddits Monero traders frequent. He learns the jargon unique to the ecology. He makes posts that do not align with the external grammars of the space, but then he modifies the content of his contributions. This results in the average number of votes he receives increasing steadily and significantly once he begins trading Monero. All of this evidence shows that RealAcorn begins to act like a part of the larger sociocultural group. He adopts and adds to the groups values while developing as one of comparatively few Monero traders in Spain. Again, this development is seen as inseparable from the skilled linguistic action combining first- and second-order language in meaningful ways.

The fact that RealAcorn feels like part of the larger mesosystem is reflected in his writing. During Phase 2 of his online participation (i.e., the period of time between making his first Monero purchase and selling Monero for the last time), he references the cryptocurrency mesosystem 36 times, accounting for 90% of the mesosystem references in the lifetime of his account. Of the remaining 4 mesosystem CPs, 2 occurred on the same day RealAcorn sold his cryptocurrency. Only one case appeared before buying Monero, and one appeared around a month and a half after selling it. Thus, it is clear that the second-order language patterns that appear on Reddit—and, arguably, in other affinity spaces as well—are impacted dramatically by what happens in the personal lives of the users outside of the system. If nothing else, language is impacted by the roles that agents fill in these online CoPs. In RealAcorn's case, acting as a

person who actively trades cryptocurrency on Reddit appears to encourage second-order language patterns that refer to others in the same system. Additionally, it is not out of line to state that the wordings that RealAcorn adopts reflect his feeling like a part of a larger group.

These conclusions are further reinforced by the fact that the day after RealAcorn sells his Monero, he effectively ceases referring to the agents in the Reddit Monero affinity space. Over the next nine months, RealAcorn never uses any first-person plural pronouns again. He only once refers to the larger group stating, “Don’t worry guys” (June 26). It appears that the fact that he no longer trades Monero directly impacts his feelings toward the larger group, and therefore his wordings as well. Knowing that RealAcorn felt like a part of the larger community while trading, it is still important to see how his experience languaging in the role of a cryptocurrency trader impacted specific language patterns used and learned in the online setting. The next section discusses the results uncovered on that topic.

### **Modifications of Second-order Language Patterns**

It is admittedly difficult to isolate language patterns that are learned specifically due to autonomous and uncontrolled interaction in online settings. Critics of research into informal language learning may cite the fact that it occurs in uncontrolled settings, thus making it impossible to show or prove that interacting in online settings helps learners at all. Therefore, ecolinguists and other researchers in online language learning choose to focus on the development of the learners as agents, gamers, explorers, redditors, and so forth (e.g., Banov, 2021; Newgarden, 2015; Newgarden & Zheng, 2016; Newgarden et al., 2015; Zheng et al., 2009, 2012, 2015, 2018, 2019). Taking this approach has resulted in the identification of many instances of second-order language learning as tied directly to learner becoming. As more case studies are conducted, patterns of language learning begin to emerge, and the same applies to the

current work. In all of the examples listed below, second-order language unique and central to the settings of online cryptocurrency affinity spaces is addressed to help limit the possibility of the language patterns being encountered and learned in other settings.

The first example of learning comes from RealAcorn's adoption of the verb *to hodl*. In this case, RealAcorn had been using the verb *to hold* for some time prior to April 26. However, when he received a sort of correction from another user, areyouforserious, RealAcorn immediately shifted to using the term HODL, even capitalizing it in the same way as it appeared in the post that went viral in the cryptocurrency world (GameKyuubi, 2013; for an explanation of HODL's history, see Montag, 2018). The discussion that follows therefore focuses on why RealAcorn made the shift. It appears that—in a manner similar to the experience of external grammar modification described above—RealAcorn had an experience that foregrounded an internal grammar standard that he was violating. In the cryptocurrency world, holding on to one's assets during difficult times (e.g., when the value of the coin depreciates), is not referred to as *holding*, but rather *hodling*. To the novice trader or group member, this may just seem like a recurring typo or some small, inconsequential movement. However, experienced crypto aficionados not only know the story behind the word and how it went viral, but also when and when not to use it (Frankenfield, 2020). They are able to pick up on micro sociocultural queues (first-order languaging) to predict when *hodl* may be more appropriate than *to hold*.

RealAcorn's experience with areyouforserious calls to mind the noticing hypothesis proposed by Schmidt (1990), in that it brought the learner's attention to something previously unnoticed. However, the conclusions drawn in this work differ slightly from the theoretical underpinnings of Schmidt's theory. From an ecological perspective, the focus is not on spurring the detection of linguistic input, but on fostering reflection on and dialogue with previous,

current, and possible future experiences. As RealAcorn develops into and portrays himself as the cryptocurrency trader he desires to be, he inevitably confronts more second-order language in the online space. This provides an increased number of past experiences that can serve to co-author his writings in the future. The more experiences RealAcorn has with the words *hold* and *hodl*, the better able he is to imitate and embody what he both observes and reflects on. This is evidenced by RealAcorn's demonstration of a deep understanding of the difference between *to hold* and *to HODL*. As he progressed in his development as a cryptocurrency trader, he used not only the verbs, but also derivative words (e.g., *holders* and *hodlers*) in distinct manners and in accordance with the sociocultural practices of the space in which those terms appear. This is what Cowley (2012) refers to as skilled linguistic action. RealAcorn successfully manages his activity within preexisting cultural constraints and links each of the two linguistic patterns with affect and social skills (p. 13). He was able to observe the number of upvotes received by areyouforserious and his subsequent discussion about how a rebound in Monero's price was sure to come soon. He had an opportunity for reflection on the previous times he had perceived the word *to hodl*. He was then able to use it in future skilled actions to effect reactions from others. He continued writing *hodl* and *hold* throughout the lifetime of his account.

Similar results are observed in RealAcorn's management and use of the plural noun *moneroj*. However, this change of behavior occurred without any explicit feedback or correction from other Reddit users. Instead, RealAcorn begins using the word on the day he decides to sell all his Monero holdings, effectively doing something very contrary to the external grammars of the affinity space in which he was participating. In this case, it appears that his decision to act in a new way (i.e., to move from trading Monero to speculating with other cryptocurrencies) prompted a change in behavior (i.e., moving from writing the word *moneros* to *moneroj*).

Both of the preceding cases show similarities to the research of Zheng et al. (2015). In their study, an English learner also showed examples of learning words both because of and without explicit feedback from others in the same virtual space. They write the following about their focal participant, Conan:

While two of the examples in our analysis show Conan learning words that are more specific to the game environment, this study is not solely about vocabulary learning in MMOGs [massively multiplayer online games]. More importantly, MMOGs allow transcending the immediate situation of gameplay, facilitating learners' *learning to be* through languaging in myriad contexts. (p. 786)

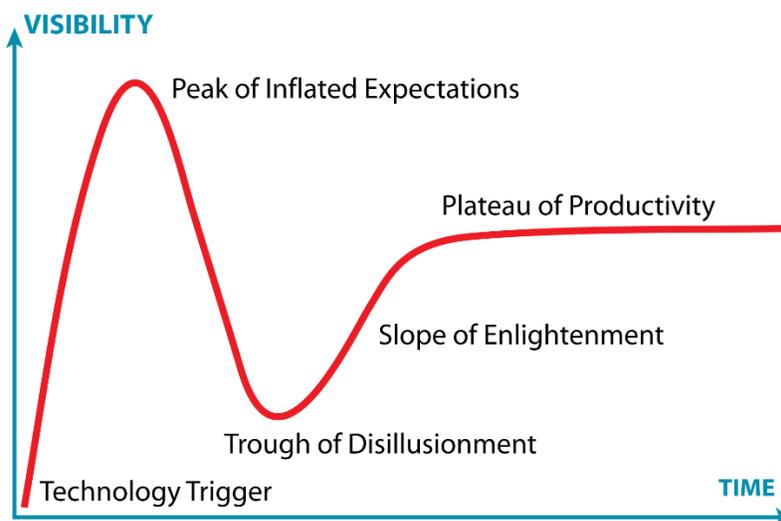
Ecological research on gaming and language learning shares many similarities with this work. In both cases, language learners join online places with rich and long-established sociocultural histories. Through their avatar or username, they are afforded certain actions that would not be normally available in the physical world. They act in ways that are fairly low-stakes to the real physical environment in which they live. Nevertheless, the values that learners have in both the online and real-world ecologies are similar, making it possible to use what they have learned in other situations. In both cases, it is the process of agentic development that drives the modified linguistic action. Modifications to behaviors involving second-order language patterns come as an ancillary or subordinate process.

This also seems to be the case when analyzing RealAcorn's adoption of jargon. While a novice, RealAcorn begins using some jargon unique to the space of cryptocurrency. Sometimes, he uses the terms in ways that are not accepted by the others in the space, meriting some corrections and possibly downvotes. At other times, he uses them correctly, evidenced in part through higher numbers of upvotes or replies to his contributions. After the first period of jargon

use, RealAcorn stepped back and did not use any jargon for a relatively long time. As he became more familiar with the space and the internal and external grammars of the users in it, he went back to using jargon. However, once he decided to pursue the role of speculator, his use of jargon increased dramatically and significantly. This pattern of behavior is what Scheibenreif (2018) and others refer to as the *hype cycle*. The hype cycle (shown below in Figure 5) refers to the adoption process of new or emerging technologies and practices. Akin to the concept of U-shaped learning (Gershkoff-Stowe & Thelen, 2004), the hype cycle begins with new users adopting a practice because of a trigger. After that, they have a phase of increased use, titled the *peak of inflated expectations*. Subsequently, the third phase is a lull where interest wanes, often due to unmet results or expectations. The hype cycle finishes with a period of widespread adoption and productivity during which development and growth occur.

**Figure 5**

*The Five Phases of the Hype Cycle*



Note. © Hype cycle by Jeremykemp is licensed under CC BY-SA 3.0.

The hype cycle is clearly visible in Figure 4 displaying RealAcorn's use of jargon. He begins by attempting to use jargon. However, he faced a bit of opposition from the mesosystem

as his internal and external grammars did not align correctly with theirs. During a period of jargon avoidance (highlighted in yellow), it looks like RealAcorn develops his understanding of when and how jargon is used within the ecology of which he is a part. Shortly thereafter, he jumps back into writing jargon terms and phrases. As time progresses, he uses more and more jargon, significantly increasing the average number of jargon words during Phase 3 of his participation. It is not by chance that this change in behavior occurs around the same time that he begins actively speculating with other cryptocurrencies. It is clear that RealAcorn's use of new internal grammar (i.e., second-order language structures) is directly connected to his goals, values, and role in the online space. Thus, it is also easily concluded that his learning of new jargon is also directly related to the roles he fills online, especially provided that most of the jargon terms he wrote appear first in Phase 3 of his participation. Again, RealAcorn's agentic development appears inextricably connected to his language learning. The greatest increase in his jargon adoption appears during the phases where he is pursuing new interests and redefining his own self.

The last example of second-order language modification is taken from RealAcorn's instances of prevarication. Regardless of the motivations behind lying in online spaces, it appears that it always occurs because of a perceived desirable (or valued) future outcome (Toma et al., 2019). Within hours after RealAcorn sold his XMR (at the price of \$29 per coin), the price of Monero rose to over \$32.40 per coin. It is interesting to observe RealAcorn claiming that he sold his coin at \$30 or \$32, even though he had not. A reason for doing so appears to be the dialogue that occurred within the online community and his self-portrayal toward others. Those who make the most money while trading gain notoriety within the cryptocurrency ecosystems that is not available to those who make relatively little. Those who lose money because of bad trades are

also especially sidelined. In deciding to share that he bought low (at an even lower price than what he really did) and sold high (at an even higher price), RealAcorn intentionally chose to develop his online self in a certain way. This type of agentic development is afforded to RealAcorn because of his virtual embodiment as an online user. While it might be harder to lie about income to someone in the real world, the limitations and freedoms of online spaces such as Reddit enable a different kind of identity development. This is perhaps reminiscent of afforded actions in avatar-embodied virtual worlds described by Zheng (2012) and Zheng et al. (2012).

Most curious is the fact that toward the end of his participation on Reddit, RealAcorn flipped his position and portrayed himself in the opposite light. About three months after selling, XMR reached an all-time high price of over \$134 USD. Having accepted the fact that he would now be viewed as someone who lost out on a huge opportunity, RealAcorn decided to double down on his losses. While advising others to just hodl their coin, RealAcorn stated that he had sold back when XMR cost \$20, not \$29. In this instance, his goal was to play the role on someone who had missed big on his possible earnings, and increasing the loss of \$105 per coin to \$115 per coin helped him fill that role just a little bit better. In each of the cases including the prevarication of money gained or lost, RealAcorn showed that he understood the way his contributions would be received by others in the space. The evidence suggests that he took skilled, premeditated actions to fulfil whatever role he wanted to at the time, and he did so successfully.

One more instance of his agentic development occurred right after RealAcorn sold his Monero. When he told the subreddit that he sold his coin after two months of hodling, he received a couple of responses questioning whether two months was really enough to be considered a *hodl*. Many of the users in the Monero subreddits had been holding their XMR for a

long time, up to two or three years in cases. Therefore, RealAcorn saying he hodled for two months seemed like a misuse of the term. RealAcorn reflected on the replies, and less than three weeks later, made another contribution (this time, to a different subreddit) stating that he had hodled Monero for three months. These examples bring to mind the pattern of taking a linguistic action, observing and reflecting on the effect it had, and modifying future linguistic actions in response to what is happening in the ecology. It is safe to conclude that RealAcorn's contributions were, at least in part, co-authored by the previous reactions of others in the online spaces he frequented. This also shows a kind of skilled linguistic action and agentic development that might not be fully available in real-world or classroom environments. Reddit affords quick shifts in roles and environments that then allow additional ways of acting. Consequently, this allows for a much quicker shaping of self and the portrayal of that self.

### **Agentic Enactment of New Language**

Some novel observations, heretofore unobserved in ecolinguistics, include the adoption of whole phrases in both the linguistic and the real-world, non-linguistic behavior patterns of the language learners. It appears that RealAcorn's comments such as "Im not there for fundamentals , im fore [*sic*] the money man" (July 17) and "Im in for the money, not fundamentals" (August 8) were co-authored by the posts and comments of others in the same space. This is a novel observation, as it shows a level of language learning that goes beyond the acquisition of an individual vocabulary item. RealAcorn likely first encountered this phrase as a reply to a comment he had made. That comment—and others like it—was then adopted as his own in its entirety, largely unmodified in any way. A similar case involved the phrase of buying Barolo wine (a sort of tradition for those who make money selling their Monero done in honor of one of the founders of Monero). On May 7, after selling his Monero, RealAcorn wrote, "im

gonna buy some barolos and enjoy them those months to come.” This phrase was also undeniably co-authored by his past experiences on Reddit. It had been used by many others in the xmrtrader and Monero subreddits, and, by using it, RealAcorn displayed that he was aware of both it and its sociocultural meaning.

However, even more important than simply learning the phrases, it is notable that RealAcorn took real-world actions based on the phrases that he learned. In other words, he enacted the second-order language patterns: first encountering the wordings, then perceiving them as having a unique meaning, giving them value, and finally modifying his behavior in accordance with his perceptions and understanding to realize a predicted outcome (Hodges, 2007; Thibault, 2011). Beyond simple repetition of a previously encountered phrase, or alignment “by a primitive and resource-free priming mechanism” (Pickering & Garrod, 2004, p. 172), RealAcorn uses these phrases in skilled linguistic action. In the statements about being “in for the money” and “[buying] some barolos,” RealAcorn states that he will act out something in the real world, and both of these actions are the result of language he had previously encountered online. In other words, he is not only learning the second-order language. As he perceives new phrases and vocabulary, new information about his environment and new courses of action are illuminated (cf. Hodges, 2007). These new perceptions afford a novel set of actions in his life as a cryptocurrency trader. Instead of being a hodler, RealAcorn realizes that he can better be “in for the money” by speculating with smaller hypecoin and staying away from larger, more stable cryptocurrencies. He adopts this phrase as a mindset, agentic stance, or way of viewing the world for the next few months.

Whether reading another’s post is what first sparked his interest in other cryptocurrencies or whether discovering other cryptocurrencies is what led him to begin paying attention to other

users with slightly different values is ultimately inconsequential, as these two events have less of a cause-and-effect relationship and more of a dynamic co-action relationship. RealAcorn repeatedly states that he is “in for the money” and “not for the fundamentals” while at the same time diving deeper into becoming an active cryptocurrency trader and moving away from being a Monero hodler. More interestingly, this enactment seems to then have an impact on RealAcorn feeling like he is part of the larger mesosystem of Monero fans. As he takes the position of looking for the money, he ceases writing CPs such as the following: “We all should spread the word.” (March 28); “What do you think about it guys?” (April 5); and “It hasn’t affected us much.” (April 24); once popular in his writing. He moves away from the surrounding mesosystem he has come to associate with and moves into his own role of being a cryptocurrency speculator. Again, the results suggest that first-order languaging is primary to second-order language and that internal and external grammars can impact one another. This example highlights the complexity of language in general and shows the impact it can have on the agentic development of those who learn it. If they have the ability and desire to enact or embody the language they encounter in the online space, they are free to adopt it as their own and to take a stance with it.

### **Language Learning as Communicative Project Refinement**

One rather surprising result of this research involves the RealAcorn’s CP Change Scores. Previous research on language acquisition in online social settings suggests that as learners participate in social networks and affinity spaces, their language becomes more syntactically complex, thus reflecting language learning (e.g., Lee, 2006; Lin et al., 2016). Therefore, it was hypothesized that as RealAcorn became more used to the online affinity space and more confident in his ability to language in it, his language would also become more complex and

varied. In other words, it was expected that the purpose of his CPs would vary more as his skills in achieving certain goals increased. It might make sense that when RealAcorn started posting, he might be more uncertain, thus limiting his contributions only to questions, only statements of opinion, or only sharing a past experience, for example. One could then expect that, after time and practice, he would be able to create more varied contributions, such as one that begins with a statement of opinion followed by a CP or two providing evidence and finishing with a statement of future action. However, the exact opposite appeared to be the case.

In the first two phases of RealAcorn's contributions, his contributions had an average Adjusted CP Variation score of 3.53 and 3.09, with standard deviations of nearly the same size. An example post can be seen in Excerpt 19. It contains four CPs: (1) a statement defining the current situation, (2) an exclamation, (3) a question, and (4) an expression of opinion (i.e., the emoticon). Because there are four CPs and each one is different, it received an Adjusted CP Variation score of 4.00.

### **Excerpt 19**

`we are going down. wtf. Cant we retain 24 usd :(?` (April 30)

However, as time goes on, RealAcorn deviates from these kinds of contributions and moves toward contributions with fewer changes in the CPs' purposes. For example, Excerpt 20 below shows a post made by RealAcorn later in his participation. It is composed of five individual CPs. Their purposes are as follows: (1) sharing a past experience, (2) sharing a past experience, (3) sharing a past experience, (4) sharing a past experience, and (5) defining his current situation. Note that even though this contribution is longer in number of CPs and number of words, it is much simpler in terms of the purpose of RealAcorn's individual CPs. He first shares a story that has happened in his past, and then he makes a statement of fact, hoping that

others will reply, commiserate, share similar experiences, or perhaps just learn from his incident. In either case, this post has less variation in CP purposes than the preceding example.

### **Excerpt 20**

So.... I sold monero at 29 usd, after holding for 2 months.  
Bought it at about 19 usd, saw the price go down for a month,  
then it pumped to 29 and I sold.  
Here I am now. Watching moneroj from the outside. (May 24)

The two excerpts shared in this section are prototypical of the kinds of contributions RealAcorn made as he went from being a novice crypto buyer to being an active hypecoin speculator. In most cases, RealAcorn's later posts are less complex, when looking at the CP Variation scores. While this might seem slightly counterintuitive at first, this behavior aligns with van Lier's (2004) definition of language learning as discovering ways of relating more effectively with others. In online interactions, where time, space, length of each contribution or turn, and fluency have relatively little impact compared to face-to-face interactions, simpler and more direct may be better. As RealAcorn develops in his role as a cryptocurrency trader, his contributions become more focused, with less deviation in the purpose of the CPs he writes. He shows an increased ability and practice of going straight to the point of what he wants to share. It is also notable that this happens without any statistically significant change in words or CPs per contribution. This aligns with the principle of agentic development stating that agents develop as they exert force in a more focused manner. RealAcorn shows that he has planned what he wants to say, and then he does so, without varying from the point.

It is worth noting that such linguistic changes might not be similar in all contexts. To date, many studies have shown that as learners develop their second-order language skills, they increase the complexity and variation of their writing (cf. Lin et al., 2016). Simpler may not

always be better. But in online affinity spaces where posts receive upvotes for adherence to a certain long-established norms, it can be best to keep contributions more focused. Many of RealAcorn's posts with lower Adjusted CP values received higher scores. This may not be the case in all subreddits, but it does suggest a refinement of skills, and it shows that RealAcorn was significantly developing his writing in ways beyond the incorporation of jargon terminology.

### **A Comparative Analysis Highlighting Agentic Development**

This final section looks at three contributions made over the course of RealAcorn's development as a cryptocurrency trader and discusses how they represent the principles of agentic development discussed above. They are all made in the Daily Discussion section of the xmrtrader subreddit. This means that they were made to the same—or at least similar—audiences with the same interests and values. The comments were selected because they are comparable in terms of length and content. They are also spaced fairly evenly across RealAcorn's three phases of participation: Excerpt 21 was written just over a week after the end of Phase 1, Excerpt 22 came just over a week before the end of Phase 2, and Excerpt 23 was authored well into Phase 3 of RealAcorn's participation. Each excerpt is found below, and a comparison of the three follows.

### **Excerpt 21**

Im a bit disappointed with monero. First I was like, wow, its the definitive cryptocoin, etc... However after some day of thinking, I think i was wrong investing 1000USD.

We are in an altcoin bubble (including monero), relative to that bitcoin "fork", i think nothing strange will happen with bitcoin, and after all the panic, everybody will return to bitcoin, leaving monero and all the other altcoins totally unworthy. (March 27)

### **Excerpt 22**

So any idea of the motives behind yesterdays pump? Be aware that we havent even reached our max price yet. I think we still have good place to grow. In my opinion yesterday a whale with inside information bought to be prepared for the future that is coming. My guess? 30USD 20-30 May (April 28)

### **Excerpt 23**

Mcap falling to 60-80B levels IMO.

That means 50% drops ore more.

After that a huge bull will come, 10 times bigger than the last one.

XMR will pump a lot, it has a lot of whales behind, the price is being manipulated (botnets) and doesnt let it pump properly.

Just look longterm.... dont worry guys (June 26)

The first comment above, Excerpt 21, contains 69 words, but no instances of jargon. In the comment, RealAcorn refers to Monero as “monero,” and not another term (e.g., *XMR*). The Adjusted CP Variation score for the Excerpt 21 is 5.14, showing a high number of changes in the purposes of each CP. In the post, RealAcorn mentions to the mesosystem once, stating “We are in an altcoin [*sic*] bubble,” referring to all the users who share an interest in Monero. He also references two exosystems (systems that do not include RealAcorn, but that still impact him in his role as a Monero trader): (a) Bitcoin and its prices and (b) “the other altcoins.” As mentioned once above, this post received a net voting score of -13, showing that the users of the subreddit believed that the post was not worth sharing or did not adhere to the rules of the subreddit. It appears that the main reason for the downvotes was because RealAcorn wrote something that painted a slightly negative picture of Monero while writing that Bitcoin would remain stable. The common practice in the *xmrtrader* subreddit is to post mainly things that are positive toward the cryptocurrency and that do not show it in a negative light. Users of the space also generally dislike Bitcoin and downvote any post that makes positive statements about its future. The downvotes and negative comments from other users likely afford RealAcorn an opportunity to reflect on what he may have done to violate the norms of the space. This is the beginning of the perception–action cycle, and it results in modified linguistic and non-linguistic behaviors in the future.

Excerpt 22 shows some examples of change in RealAcorn’s writing, evidenced in both the second-order language used and the topics discussed. While slightly shorter than the previous excerpt, with 53 words, the comment still uses one reference to the mesosystem, “we still have good place to go,” again referring to the same users in the space. This time, RealAcorn does not refer to any exosystems, and he stays much more focused on the purpose of his contribution. The

Adjusted CP Variation score of Excerpt 22 was 1.80, evidenced by the repeated use of CPs with the purpose of expressing an opinion. While the post does not contain any instances of crypto-exclusive jargon, RealAcorn does use some terms that refer to markets, such as *pump* and *whale*, without feeling the need to put those words in quotation marks. There is one instance of a second-order language pattern that might suggest to others that RealAcorn is not quite an expert yet. In his comment, he mentions Monero's "max price." However, when cryptocurrency experts refer to the maximum historical price of a coin, they usually use the term *ATH*, or all-time high. This is a term that RealAcorn would adopt a couple of weeks later and use repeatedly throughout the rest of his participation. This comment garners a total of 4 votes, showing that at least some users found it to be helpful or contributing to the ongoing discussion of the day. As a reference, comments in the Daily Discussion threads rarely receive more than 15 votes, simply due to their readership and voting practices.

The last example, Excerpt 23, RealAcorn makes several additional changes. The first, and perhaps most obvious, is in the style of his writing. While the third comment has 56 words—comparable to the length of the others. However, the total number of CPs in the contribution is 9, higher than in the other two comments. This is because RealAcorn has moved to making shorter sentences or statements. They are clearer and straight to the point, devoid of unnecessary or unwanted pragmatics. While there are several shifts in communicative purpose, the Adjusted CP Variation score of this contribution was 2.78, still lower than the mean values of Phase 1 and Phase 2. This comment also contains one reference to the mesosystem, where RealAcorn tells the "guys" not to worry. There are also several references to exosystems, including botnets, whales (not part of the *xmrtrader* subreddit), and a bull market in the cryptocurrency world. More importantly, RealAcorn expresses understanding about how each of these exosystems can impact

their local ecology, even predicting a specific percentage drop in the future. In Excerpt 23, RealAcorn refers to Monero by its non-standard ISO 4217 code, XMR. This is a practice commonly demonstrated by experts in the *xmrtrader* subreddit. He also mentions botnets while still using standardized practices of shortening words, such as writing *B* in place of *billion* and *IMO* instead of *in my opinion*. Again, he refers to terminology common when discussing markets, such as a *bull* market and *whales*. Excerpt 23 ends up receiving 6 total upvotes. This comment reflects not only the skill of RealAcorn's writing, but also his experiences and understanding of how multiple systems interact. His past first-hand experiences and reflections on those experiences are what afford him the ability to take the skilled linguistic action demonstrated in his comment. Through his writing, RealAcorn shows the ability to manage "activity under material and cultural constraints, ... [linking] linguistic patterns ... with affect, artifacts, and social skills" (Cowley, 2012, p. 13). He uses his experience-enriched encounters with the world to guide his language and, even more importantly, his actions.

These three excerpts reflect more than just language learning. As has been discussed, they show a process of development that reaches past Reddit's boundaries and into the real world. RealAcorn moves from being a passive observer to a trader of Monero. When his values shift from believing Monero is "an engineering masterpiece [*sic*]" (April 18) to being "tired of this guy [Monero's founder]" and "[selling] all my xmr" (June 4), he begins to act differently. He refines his actions, he trades multiple kinds of cryptocurrency, and he begins to chase the money, not the fundamentals. This not only modifies his patterns of trading, but also develops his linguistic skills. This is evident in everything from the words he uses to the associations represented in his writing. RealAcorn shows ample evidence of true agentic development.

## Summary

Due to the limitations of this work, generalized statements about language learning in online settings are difficult to make. However, it has been credibly demonstrated that in both self-reported and analyzed data, the development of language skill (be it at the local or global level) appears to be connected to the development of the language learner as an agent in the spaces he or she frequents. The results strongly suggest that the desire to coordinate action with others leads to the modification of second-order language behaviors. Additionally, when large changes are made in the roles that learners fulfill in a space, several significant changes occur to the language appearing in the affinity spaces in a relatively short period.

While these gains may not be readily measurable using quantitative assessment instruments, this progression of novice toward expert aligns with van Lier's (2004) definition of language learning. As learners become more adept at acting in their common endeavors (Gee, 2005), they also become more proficient in their ability to assess social situations and predict what others are anticipating (Thibault, 2012). This is the development of first-order languaging skill, and its mastery is reflected in the increased number of votes that RealAcorn receives.

Finally, when RealAcorn encountered new words and phrases, they appeared to serve to co-author his future contributions. Similarities between the language he read online and the language he wrote are too many to be left to chance. But most interesting is the fact that some of the phrases he encountered (i.e., *being in it for the money, not the fundamentals*) also appear to have had an influence on the actions he took and the roles he pursued as he developed.

RealAcorn aligned with what others wrote, but he then took it a step further and enacted it. He became a hypecoin trader, sold the Monero he was hodling, and then began chasing the money, stating that he had already made "10 times more" than he ever did before making that jump.

Individually, each of these modifications might suggest a lone modification of language, and not necessarily any evidence of learning. However, when taken together with all the other changes that happen consecutively and the changes that RealAcorn undergoes as an agent, it is difficult to not view the process as a connected, ecological form of learning. And because being a cryptocurrency trader is an activity in which wordings play a part (Cowley, 2014), improving in that role requires, by extension, improvement in skilled linguistic action.

## **CHAPTER 6**

### **Conclusion**

The results from this work show that there is a connection between language learning and becoming. Several ecolinguistic studies in the past (e.g., Zheng et al., 2017, 2018) have argued in favor of this stance. This work provides additional empirically measured and statistically significant examples of agentic development in a language learner. Additionally, this change and growth came without any researcher intervention. It is remarkable to be able to observe the process of agents choosing to do something, reflecting on their actions, learning, being afforded new actions, and then shifting their behavior. This cyclical pattern results not only in language gains, but also in the development of learners as people.

### **Limitations**

Prior to reviewing the research questions that framed this work, it is important to emphasize the limitations of the study. First, the data drawn from the open-ended interviews are all self-reported. The coding, categorizing, and theming processes accurately represent recurring ideas in the data. However, just because a participant reported learning English on Reddit does not mean that he or she actually did. It is also possible that participants wanted to respond positively to someone who reached out to them in the role of a university researcher. Thus, it is important to remember that the data from the first section is only as accurate as the self-reporting. Along the same lines, it was not feasible to conduct analyses looking in depth at each participant's posts to attempt and back up some of the claims they made. Such analysis is extremely time-consuming and involved. As has already been explained, online netnography requires the researcher to become intimately familiar with all of the ecologies in which the subjects participate. Additionally, technology-extended spaces are very data-rich, and it takes a

significant amount of time to filter through each post, looking for patterns of behavior and changes to those patterns. Due to restrictions on time and labor, the survey data were not able to be verified via additional means. The creation of hyper-focused corpora (e.g., Kranzlein et al., 2020) may help to quantify and easily assess language change on Reddit in the future, but for now, more longitudinal studies are required to be able to create increased generalizability of the results presented in this work.

Second, it is crucial to note that case studies are often not generalizable. The way that case studies gain generalizability is when there are many of them which reveal similar conclusions. However, because ecolinguistics is still a relatively emerging field of language research, there are few case studies with which this work can be compared. Kramsch and Steffensen (2008) state this fact quite clearly:

Researchers working within an ecological framework are very conscious of the need for qualitative, longitudinal data that put the researcher on the line and expects [*sic*] him/her to reveal his/her subject position. An ecological research approach offers more internal validity (appropriately called ecological validity) but less reliability and inordinately less generalizability or external validity. (p. 25)

Thus, this work cannot and should not be taken as establishing ecolinguistic principles as fact. Rather, it adds to the increasing body of evidence supporting claims made by ecolinguists for decades.

Other limitations include the fact that there is no evidence (other than self-reported statements) that the language learned in Reddit is transferred, or even transferrable, to contexts outside of Reddit. While the amount of text and data is rather large (almost 200 contributions written over the course of a year, alongside a host of metadata), it all comes from one source

(i.e., Reddit). Unless a participant consents to be followed in real-world contexts, the type of language (i.e., written posts and comments) and the technology-mediated contexts of the language (i.e., social bookmarking sites) are limited.

Working in online settings also adds a slight difficulty to the maintenance of participants. Of the 36 original participants, only 21 continued to the open-ended interviews. Even the focal participant, RealAcorn, eventually left Reddit and did not return (at least not under the same username), prohibiting the use of stimulated recall interviews or similar methods of data validation. While a diverse group of nationalities and age groups were included in the original participant pool, none were living in an English-speaking country at the time. This helped to control for some mediating variables, but it also limits the generalizability to language learners who live in a country where the target language is spoken. As explained in the beginning of this work, online contexts are unique, and they afford distinct actions not necessarily possible in other online places. Thus, the results of this work may not apply directly to other online affinity spaces.

Lastly, there is always the question of researcher bias. Great care was taken to collaborate with peers and professionals both in and outside of the University of Hawai'i to systematize the methodology, validate the coding schemes, and discuss possible implications. Nevertheless, most of the conclusions were made by the author of the work. Other researchers conducting grounded coding of the data may come up with different codes, categories, and themes. The best way to combat this sort of bias is by being transparent in all of the steps taken and by collaborating with others throughout the entire research process. This work seeks to follow the suggestions offered by other qualitative researchers (e.g., Creswell & Miller, 2000; Gerber et al., 2017) to help increase its dependability, credibility, and confirmability (Brown, 2014, p. 119).

## **Review of the Research Questions**

To conclude this work, it is important to reexamine the research questions provided at the beginning and the answers to which they led. The first question guided an investigation of the features of Reddit and personal goals that drew L2 learners to Reddit. Through the interviews and the resulting thematic coding, it became evident that language learning was not the primary reason for English learners to join and participate in the various affinity spaces. Learners were drawn in by groups who shared values and similar goals. They mutually wanted to and were able to participate in those groups. The shared values and common endeavors led to online languaging, or activities in which wordings played a part. As the learners experienced encounters with others in the ecology and reflected on those encounters, their language patterns became refined.

This observation leads directly into the second question, focusing on changes in the users' English writing over time as a direct result of their participation and values-realizing activity in online spaces. In the open-ended interviews, a majority of the learners reported learning specific local and global second-order language patterns. Sometimes these changes were prompted by explicit correction or feedback from other users. However, most occurred as users participated in the affinity spaces in different roles. Specific examples of language learning were demonstrated in the case study of RealAcorn and his online contributions. It is also worth noting that because of language's inseparable tie to action, RealAcorn's goals outside of Reddit impacted his second-order language learning and behavior significantly.

This conclusion leads to the final research question. There were several connections made between RealAcorn's second-order language use and other non-linguistic ecologies that surrounded him. RealAcorn's roles in the affinity space were directly reflected in the words and

phrases he chose to write. The responses of others in that space also appear to have impacted his linguistic behavior patterns. Taken together, these findings show that RealAcorn developed in his ability to first-order language in his most familiar affinity spaces. Several cases of co-authorship were also identified. Additionally, RealAcorn's perception of connectedness to others in the affinity space was visible in his writing. Most noteworthy, RealAcorn adopted some of the phrases he experienced online into his own real-world actions, by embodying and enacting those wordings. This shows the inseparable relationship between embodied languaging and second-order language patterns. External grammars impact internal grammars, but the reverse is also true. Together, the entire process of learning and enactment exemplifies what is termed agentic development.

### **Recommendations for Future Studies**

This work has introduced the concept of agentic development. It has also tied agentic development to the ecological view of language learning. There is a great need for more studies to attempt to bridge these two concepts. Several works have looked at how university language learners call upon differing ecological resources as they co-act to solve problems or to complete tasks in the real world (e.g., Zheng et al. 2017, 2018). However, few ecolinguistic researchers have moved into online spaces. As Yeh and Swinehart (2020a) write, there is an added necessity for long-term studies to be conducted with language learners in technology-extended environments. These calls are not new, but they are important.

One interesting takeaway from this project is the unanticipated connection with complex systems theory (CST; de Bot & Larsen-Freeman, 2011; Larsen-Freeman, 2012). Longitudinal studies allow researcher to spot periods where many changes happen all at once until a new, more stable state is reached. This is exactly how proponents of CST in linguistics posit that

language change happens (Larsen-Freeman, 2012). Further research applying cognitive event analysis to CST theory may produce interesting and even novel conclusions. The same can be said for collaborative works between ecolinguists and researchers with histories in other frameworks, such as language socialization and multiliteracies. As the number of linguists applying ecolinguistic principles increases, more researchers should be able to explore the crossroads of these differing ontologies to reach more generalizable conclusions in their studies.

It is also hoped that this work will have an impact on the general quality of ecolinguistic research. The detailed explanation of CP delimitation and analysis should serve as a sort of benchmark for future ecolinguistic studies. Because many of the constructs in ecological language theory are still relatively new, they are often defined and applied in slightly different ways. The same is true when discussing constructs such as affordances or languaging. It is important to have clear definitions that are accessible to the larger linguistic community as a whole. With luck, this work can help to begin bridging the gap that is sometimes felt between ecolinguists and researchers from other frameworks.

Lastly, one of the reasons why researchers may feel hesitancy in approaching social media sites such as Reddit is because they do not know how to harvest all the data, nor what to do with it once it is harvested. Many social network sites have publicly accessible APIs and free tools that allow anyone to collect data. While it may seem daunting to download hundreds or thousands of online contributions, the public tools allow for relatively quick and easy organization of the most important data. It is hoped that the methodological principles outlined here can serve to make online data harvesting seem more accessible and easier to tackle. Additional information on this topic can be found in the work by Gerber et al. (2017), and is highly recommended.

## **Practical Implications**

More intriguing than the fact that spending time in online affinity spaces can teach someone new words is the idea that co-acting with others who share the same values can move a learner to try new actions, take on new roles, and to develop as agents. This development can then foster the improvement of skills including the use of second-order language. Furthermore, that language can then go on to shape the future actions of the learner. In sum, language learning affords new potential actions. This is one of the most valuable considerations to take away from this work.

One of the hopes for this work is that practitioners may find some principles or details that can be applied in their classrooms to empower their students as they continue to develop as agents in the future—whether it be through the modification of in-class activities or the provision of out-of-class interactions with others who speak and write the target language. As instructors of youth and young adults, language instructors can provide students with the ability to walk in new paths and to see the world in new ways. Educators should consider what opportunities for novel actions they provide to their students and provide increased opportunities for students to choose their actions and to practice with increased responsivity and anticipation. Making class projects public can lead to an increased level of engagement (Larmer & Mergendoller, 2015), in part, because it expands the ecology with which learners must dialogue. Without diminishing the need for or effectiveness of individual instruction, acting in environments where increased numbers of students can dialogue together allows for the taking on of new roles and the development of the learner as a person. Even extending normal in-class activities over extended periods of time can allow for increased reflection and co-authorship from past experience.

It is also important for language instructors and researchers to consider how their students or participants change over time. Given that the early college years are part of the time where young adults make many of their lives' most consequential decisions, professionals should be careful not to ascribe a linguistic result to one specific input or variable given to a treatment group over the course of a semester. Pre-test and post-test measurements can sometimes overlook the impact of co-authorship and previous experience. Additionally, while the input and feedback provided by instructors may be controlled by researchers, the agentic development that happens (or does not happen) outside of the classroom cannot be controlled. And because agentic development impacts language learning, it should be continually considered by scholars as they do their research.

Along similar lines, language instructors should do what they can to provide learning opportunities in which students are able to exercise agency. There has been a recent push for project-based learning, especially in the field of language instruction (e.g., Dooly & Sadler, 2016; Kettanun, 2015; Zhao & Beckett, 2014). One of the key elements of project-based learning is the provision of student voice and choice (Larmer & Mergendoller, 2015; Larmer et al., 2015). Providing learners with the options on how to complete a learning project affords unique actions, experiences, and opportunities for reflection. These can have considerable impact on language learners. Similarly, forcing a student to complete a task in only one way can have negative impacts on his or her agentic development. Student activities should have connections to the real world, allowing them to transcend the boundaries of the classroom and take learning and experiences with them. This can be done by connecting students with the general public or providing them with the ability to share what they have learned with others, be they peers,

younger students, friends, or even strangers. Whenever teachers allow students to act in new roles, they develop more than just their ability to use second-order language.

### **Closing Remarks**

The purpose of this work has been to highlight languaging as an activity and the position that language learning occurs in tandem with the development of the learner as an agent and as a person. Large-scale studies can sometimes overlook the individual stories like those of RealAcorn. The experiences that learners have which enable the reflection and learning consequential to their identity development frequently go unnoticed. While it does admittedly take longer for generalizations to be drawn from case studies, the data gathered in such works are invaluable. Seeing the difference in RealAcorn's writing style over time helps to shed some light on the connection between agentic development and language. His becoming an experienced redditor is reflected in his language, and his language is reflected on the actions he takes in the real world.

These same processes are observable throughout everyday life. On a personal note, I believe that one of the greatest changes in my own life has been my development from an undergraduate student to a doctoral candidate. As I have been writing this dissertation, my perspectives on the world have changed. I have learned new words, phrases, cryptocurrency jargon, internal and external grammars, and more. But the biggest change in me has come after gathering all the data and reviewing the results of my analyses. My greatest learning has come as I have tried to take all these data and make sense of them. The process of perceiving and then writing about my perceptions has developed my ontological views, and it has forced me to take stances on my views of language and language learning. Writing a dissertation is an activity in which wordings play a part. Yet, I believe that the purpose of writing a dissertation is to help the

students shape themselves into people with a solid and deep perspective of their fields of study. That process is what I refer to as agentic development. And using language to become a greater agent is powerful.

**Appendix A**  
**Recruiting Statement**

*Hi [username],*

*My name is Banovik, and I am a researcher at the University of Hawai'i. I just wanted to ask you what English you have learned on Reddit. I am writing a research article on how participating in online communities can help people learn a language on their own, and I was wondering if you had any experiences you would like to share. What English have you learned through your time on Reddit? Any info would help.*

*Thank you so much! Wish you all the best! Take care,*

*Banovik*

## **Appendix B**

### **Open Interview Guiding Questions**

1. What English have you learned because of your time on Reddit?
2. Do you have any examples of language you have learned?
3. Do you consult outside resources (like other sites) when you write in English?
4. Do you feel like you can recall different phases of your participation on Reddit?
5. What made you choose Reddit over another social site?
6. Do you feel like you are part of an online community?
7. How do you think others view your posts?
8. Are there any other social sites you participate in using primarily English (like Facebook, Twitter, Tumblr, etc.)?
9. Are there other special interest sites you visit that only use English?

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