# KNOWING AND CARE-TAKING THROUGH LANGUAGING IN PLACES: A MULTIMODAL ANALYSIS ON INTERACTIONS WITH AN AUGMENTED REALITY MOBILE GAME

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## INTRODUCTION

Following the rapid expansion of technology, researchers and educators have passionately adopted various types of technology for mediated language learning over the past few decades. Mobile-Assisted Language Learning has garnered attention as a new frontier for language education to expand and even exceed the traditional limitations of classroom-based education (for a review of MALL studies, see Chinnery, 2006; Klopfer & Squire, 2008; Goodwin-Jones, 2011; Holden & Sykes, 2012). In order to fully explore the affordances of mobile technology for situated language learning experiences, a research team at University of Hawai'i at Mānoa created and developed an augmented reality mobile game: *Guardians of the Mo'o (Mo'o)*, in the spring 2015. After several iterations of pilot tests and refinement, *Mo'o* was officially played by three groups of ESL (English as a Second Language) learners from Hawaii English Language Program (HELP) and English Language Institute (ELI). The design intention was to help these ESL learners not only to be fully immersed and engaged in the unique cultural and historical learning environment, but also to develop an awareness and appreciation of the cultural diversity on the campus of UH Manoa as well as to improve in linguistic and communicative skills.

The purpose of this study, therefore, is to identify how *Mo'o* affords opportunities for languaging activities in culturally-enriched and situation-contextualized places, and also to investigate and understand how place plays a role in players' problem-solving events. In other words, this study investigates specific activities which players engage in to make meaning of each other, of the game and the quests, and also of the places that all interactions respectively occur within. Through examining video-recorded play-through data, I focus on the activities that take place from both a time and locale scale in order to reveal how the players become experientially and emotionally connected to the places that they are in.

The following sections of this study begin with a review of virtual gaming and mobile gaming studies, followed by the theoretical framework for the key constructs of place and

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language, which are crucial for interpreting the data. In the methods section, I firstly explain the game design in detail as well as a particular quest related to the data. Within the second half of this section, I introduce the multimodal analytical procedure that is adopted throughout this study. Following this procedure, an in-depth analysis of the data is provided, and further discussion and implications offer a conclusion as to the findings and final thoughts of this project.

***From 3D Virtual Gaming to Mobile-Assisted Place-Based Gaming***

It has been established for the past few decades that playing video games can be beneficial for the development of language and cognition (Barab, Dodge, Tuzun, Job-Sluder, Jackson, Arici, ... & Heiselt, 2007; Zheng & Newgarden, forthcoming). On one hand, video games mostly involve goal-pursuing and problem-solving activities that require players' communication, collaboration, and negotiation, which enforce holistic practices of all language skills (Throne, 2008; Gee 2005). More importantly, video games afford players the opportunity "to transport instantaneously to a multitude of socially and materially laden situations that support impromptu, emergent interactions with non-learner trajectorie" (Newgarden, Zheng, & Liu, 2015). In essence, video game players explore and experience within the 3D virtual world in the form of avatars (their virtual persona) in problem-solving activities that are both embodied and emerged *in situ*.

Similar to the design of a 3D virtual world computer game, universities such as University of Wisconsin-Madison and MIT have developed mobile platforms and programs for designing augmented realities that allow players to interact in both the virtual story as well as a real world environment. Portable mobile devices such as smartphones and tablets extend learning environments from classrooms and computer labs to the real-world community. From a player's point of view, the gaming environment is opened up from a heavily augmented virtual reality to a lightly augmented real-world reality (for a review of the "augmented reality spectrum," see Klopfer, 2008 p. 93, Figure 7.4). The problem-solving and decision making experiences that players encounter in a real-world reality game can be nothing like in a virtual world where consequences in the virtual world usually do not affect real world situations. For example, instead of talking to a prescribed NPC (non-player character), players will need to interact with real-world people to gather clues to proceed forward in the game. The interaction trajectory is neither pre-determinable nor predictable, which makes for a much more authentic and challenging experience for players. From a designer's point of view, with the GPS tracking functions within mobile devices affording *context sensitivity* (Klopfer, Squire, & Jenkins,

2002), content can be delivered based on the current location. In other words, in a mobile gaming environment, the game's contents, including the storyline, the virtual character narrative, the embedded media files, the problems that need to be solved (quests), and so forth, are all closely tied with the place and situation that the players are currently in, and are therefore, relevant in situ in the full sense.

## THEORETICAL GROUNDING AND KEY CONSTRUCTS

### *Rethinking Place as Fields of Care: Knowing and Care Taking*

Having considered the *context sensitivity* that mobile technology affords for situated interactions, the concept of *place*, therefore, plays a significant role in understanding the learning and interacting activities occurring in a mobile gaming environment. In the domain of education, place-based education or place-based learning "emphasizes hands-on, real-world learning experiences to help students not only to increase academic achievement, but also to develop strong ties to their community as well as enhance their appreciation for the natural world" (Sobel, 2004). Taking the students from their classrooms to outside communities is an excellent first step to "develop strong ties to their community" and "enhance their appreciation for the natural world." However, building a close relationship between students and places involves concepts that require careful thinking and thorough planning.

The relationship between human beings and places can be looked at as a philosophical matter. Tuan (1979) defined place as "not only a fact to be explained in the border frame of space, but also a reality to be clarified and understood from the perspectives of the people who have given it meaning" (p. 387). Place is a *field of care,* the networks of interpersonal concern, that human beings have established in a physical setting. (Wagner, 1972; Tuan, 1979, p. 416) In Tuan's sense, the frame of space does not constrain the place: "a place can be as small as the corner of a room (a hiding spot for a child) or large as the earth itself (for a homesick astronaut)" (p. 419); rather, it's the "meaning" and the "caring" given by people who are within the space that define or transform an abstract location into place. Thus, to examine place-based activities, or to put it rather simply, the activities that were *taking **place***, is essentially to investigate the processes of *knowing* and *care-taking* within these places.

*Knowing* in place is a contextualized and ecological process. According to Ames (2011), *knowing* does not equal to our familiar epistemic vocabulary: "comprehending, understanding or grasping" which "suggest a search for an objective, decontextualizing essence behind the accidents and appearances" (p. 75). Recognizing the *interconnectedness* and *interdependence*

of all human experiences, Ames (2011) introduced a delicate system from the collateral Chinese cosmology to interpret *knowing*: "unravelling the patterns" (*lijie* 理解 or *liaojie* 了解); "finding a way and knowing how to proceed" (*zhidao* 知道); and "penetrating through" (*tongda* 通达) (p. 75). Although Ames' system does not explicitly list a strict hierarchy for the three types of *knowing*, it is arguable that *lijie* or *liaojie* usually take place when people are orienting in a new situation or place, and *zhidao* occurs when the knowledge is distributed to the situations and a way of proceeding is identified, while *tongda* is the critical *Ah-ha* moment where everything becomes interconnected and creative and prospective thinking and acting take place. Therefore, the three types of *knowing* are not isolated or strictly sequenced, neither are they static and omnipresent. During a situated problem-solving processes in a mobile game, for example, players could be *knowing how to proceed* at first, and *unravelling patterns* along the way, and the *penetrating through* moment may or may not occur depending on the trajectory of decisions and actions. In order to examine the knowing pathways of the players in our gaming environment, we adopted Ames' three types of knowing as keywords, and assigned the associated keywords to the related projects in the data (see detailed analysis in section 5).

*Care-taking*, on the other hand, can be illustrated into various forms. Hodges (2007a, b) proposed the hypothesis that we converse primarily in order to care for others, for ourselves, and for the world we inhabit. He believes that the distinctive character of caring embodied in conversation emerges from two features of complex dynamical systems: context-sensitivity and interdependency (Hodges, 2009). That is to say, like knowing, care-taking is established in relationships and interdependence, and at the same time, it is grounded in the ecological contextualized places. Zheng et al (2012) illustrated care-taking in places when analyzing the interaction data in the *World of Warcraft (WoW)*[1] virtual gaming world, the authors emphasized that in this virtual gaming environment where *killing* takes place frequently considering the content and storyline in WoW, yet *killing* is always coupled with *caring*. In other words, the seemingly violent killing actions actually involve a huge amount of care-taking occurrences. In order to explain care-taking in detail, Table 1 offers an overview of the various forms of care-taking (shown as keywords) in WoW environment according to Zheng et al (2012). The third column demonstrates the care-taking that we adapted and identified in our mobile game environment. Also note that Zheng et al.'s (2012) keywords are

[1] WoW is one of the most popular massive multiplayer online role play games in the world. Players of WoW usually involves in battles against monsters in the virtual Warcraft world, thus, *killing* and *healing* frequently occur in this game.

under the group of *value-realizing*, which is a highly related concept to care-taking, and will be further discussed below.

Table 1

*Care-Taking in WoW (Zheng et al, 2012) and in Mo'o*

| **Keyword group (Zheng et al)** | **Keywords (Zheng et al)** | **New Keywords (this study)** |
|---|---|---|
| Values Realizing | Leading others | |
| | Taking care of *self* | |
| | Noticing others' condition | |
| | Understand others perspective | |
| | Sharing perspective | Committing to totality |
| | Appreciating others | |
| | Helping others | |
| | Including others | |
| | Learning from others | |
| | Having fun | Enjoying together |
| | Enduring suffering together | Enduring suffering together |

Considering the different gaming environment in this study, we[2] re-organized the keywords to investigate the care-taking occurrences in our game play: committing to totality, enjoying together, and enduring suffering together. We combined *leading*, *noticing*, *understanding*, *sharing*, *appreciating*, *helping*, *including*, and *learning from others* into one keyword: committing to totality. All these keywords in Table 1 that include the word *others* can be described with the common social phenomenon: when in a team, work as a team, which is what we call *commitment to totality*. Especially in a gaming environment, people make decisions together, move forward together, help and support each other, and leave no one behind. The last two keywords in Table 1, *having fun* (or as we call it *enjoying together*) and *enduring suffering together*, represent players' emotional engagement, which also occurs regularly in our data.

In summary, on the establishment of the affordance of *context sensitivity* in a mobile gaming environment, we discussed the concept of *place* being *a field of care*. In order to transform abstract spaces into fields of care, we need to pay attention to people's *knowing* and *care-taking* within these places. In order to examine these processes in our game play, we adopt Ames' (2011) knowing system, namely unravelling patterns (*lijie*, or *liaojie*), finding a way

[2] While this is an independent research paper by myself, the keyword coding process is done collaboratively by Dr. Zheng, Daniel Holden and me.

and know how to proceed (*zhidao*); and penetrating through (*tongda*). We adapted Zheng's (2012) care-taking keywords in to three: committing to totality, enduring and suffering together, enjoying together.

***Rethinking Languaging: A System of Coordinating and Value Realizing***

Hutchins (1995) questioned the traditional understandings of the human cognition where the focus has been laid on the properties of individuals heavily and solely. He proposed a distributed view of cognition such that the boundary between inside our brain and the sociocultural world should be softened. The individual bounded by the brain is usually treated as a unit analysis. Learning is either looked at cognitively within the skull or socially outside the skull. Language, as well as other so-called mediators such as tools, procedures, or artifacts, can be seen as mediating structures, which contribute to the comprehensive function system. A competent learner, therefore, is someone who has the ability to coordinate different sorts of mediating structures within the system in which actions are to be taken. As a result, learning can be redefined from a distributed perspective as an adaptive reorganization in a complex and dynamic system.

Once the distributed frame has been set, we can take another look at the concept of language and how it emerges: languaging. The term *languaging* can be traced to Maturana (1988):

> "... Languaging is taking place when he or she observes a particular kind of flow in the interactions and coordination of actions between human beings. … It takes place in the domain of the co-ordinations of actions of the participants, and not in their physiology or neurophysiology."

It is clear that Maturana's definition of languaging can be echoed within the distributed framework. The "interactions and coordination of actions" can be taken as actions that include both verbal activities and non-verbal activities. Languaging encompasses both the verbalization process in one's mind and the actions in the real world. By seeing languaging this way, we also align ourselves with the distributed view where a softened boundary between the mind and the world is called for.

Zheng's (2012) eco-dialogical model is another demonstration of how we can understand distributed languaging. Incorporating ecological psychology and dialogicality, Zheng connected the quadruple communication triad (I-you-it-we) that Linell (2009) proposed with the distributed languaging process where perception and action are ongoing cycles of meaning-making and value-realizing (See Figure 1).

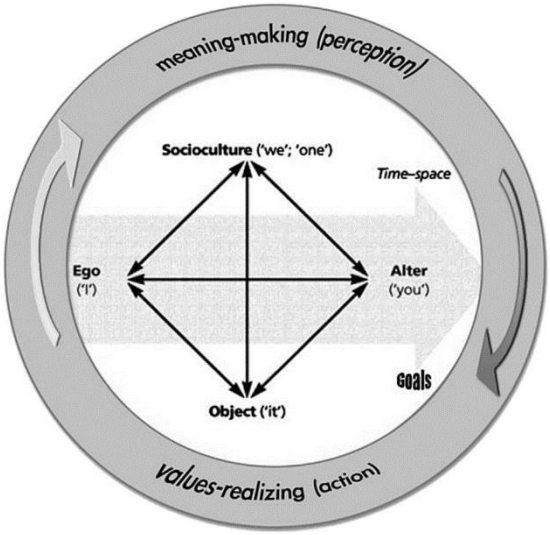


*Figure 1.* Eco-dialogical Model (Zheng, 2012).

Newgarden, et al. (2015) further discussed the perception and action system of languaging. They adopted the concept of *skilled linguistic action* (Cowley, 2012) to interpret the meaning-making perceptions. According to Cowley (2012), skilled linguistic action "provides a basis for explaining how speakers coordinate form, meaning, pragmatics and emotional expression in a given action" In Newgarden, et al. (2015), they conceptualized three types of skilled linguistic actions that may sequentially occur within a meaning-making cycle, namely common ground alignment, prospective coordination, and coaction. The authors further explained these concepts as follows:

> "*Common ground alignment* can be a process that, beyond aligning to information, involves coordinating by all eco-dialogical agents in some shared material and/or cognitive space so as to move toward their (emergent) goals… *Prospective coordination* … was defined as players' inviting of others with language or action to move forward with a task … *Coaction* can refer either to players' verbal interactions with seamlessly orchestrated avatar actions that occur either simultaneously or sequentially, or to avatar and avatar interactions that are highly coordinated without simultaneous verbalizing." (Newgarden, et al., 2015, p. 29, emphasis added in italics)

In this study, I utilize the three concepts as keywords to investigate and interpret the languaging activities that the players engaged in the Mo'o gaming environment. The keyword coding procedure will be further discussed below. Note that Newgarden, et al. (2015) used these concepts in a WoW environment, where co-action can be manifested on either the player-avatar level or the avatar-avatar level. In a real-world gaming environment, on the other

hand, co-action refers to player-player interactions that are highly coordinated with or without the need of verbalization.

Zheng's (2012) model is not complete if we do not talk about locomotive action, namely the values-realizing system of languaging. Hodges and Baron (1992) claim that the purposes of all actions are values realizing, which take priority over both rules and laws in constraining our ongoing perceiving and acting. Values are defined as "the real goods that action must realize sufficiently for an ecosystem to exist" (Hodges, 2009). Newgarden, et al. (2015) took up the view, and proposed their types of value-realizing activities: wayfinding, orientation to we, and dual-value realizing. According to their understanding, *wayfinding*, adopted from Hodges (2009), "involves the active orienting of perceptual systems to environmental information, and then using information that is revealed by that exploratory activity to guide further performatory and exploratory activity." Wayfinding should always be anchored in situated places where active perception and action can be afforded in the ecological system. *Orientation to we*, as explained in Newgarden el al (2015), comes from Linell (2009)'s quadruple communication triad (the inner circle of Figure 1). The *we* in Linell's sense can be understood as a generalized, abstract *other* across contexts that people constantly orient to in their interactions, such as social-cultural norms or shared experiences and so forth. The rules and instructions in a gaming environment, for example, are common *we* that players orient to during the game play. Finally, *dual-value realizing* is to be understood as more than the realization of the two values that were mentioned above (wayfinding and orientation to we). More importantly, dual-value realizing is the "reflecting on not only the most rewarding experiences of play, but of being the type of emotionally engaging experiences that create … changes in the Eco-dialogical system" (Newgarden, et al., 2005, p. 29).

To fully comprehend the activities in a mobile gaming environment, one needs not only to focus on the language that players were using, but also to take the entire ecological system into account. Instead of narrowing the view of language use in places, it is our hope to illustrate the activities that were taking *place* in the contextualized gaming environment. In order to accomplish that goal, we adopted *knowing* and *care-taking* systems to help us understand how players establish a relationship with the places that they are in. Furthermore, we also adopted the distributed view of languaging, namely the coordinating and value-realizing system to analyze the perceptions and actions that take place in the situated gaming world.

## METHODS

### *Game Design: Guardians of the Mo‘o*

In the spring of 2015, our research team designed *Guardians of the Mo‘o* using the open-source platform ARIS. Developed by David Gagnon at UW-Madison, ARIS, or Augmented Reality for Interactive Storytelling, allows us to design place-based quests using GPS tracking functions on mobile devices without an on-site program, and also to create a non-linear and complex storyline for our game. Inspired by Hawaiian mythology, our team created the game *Mo’o* around the story of players being the helpers or Mo‘o, who is a Gecko (or Lizard Goddess in Hawaiian culture), that is ill and in need of help. Players are required to discover and follow the storyline of Mo ‘o by completing a series of quests while travelling around the campus. Powered by GPS technology, the quests are prompted in a place-based manner. New quests will appear on the players’ mobile devices such as iPads or iPhones when players are in certain sections of the storyline as well as the related physical places for the story to be contextualized in both realities.

To highlight some of the distinctive features of our game design, firstly, several rich culture laden places on UH campus have been selected for the players to explore after multiple field trips by the designers. One of the places later shown in our data analysis, for example, is the Center for Korean Studies, where learners can appreciate a diverse array of culture and history. The players are required to find an antique chest in this building in order to proceed in the game. Secondly, specific physical artifacts, such as the chest in the Center for Korean Studies, are often included in the augmented reality of the game. By including physical items in the virtual storyline, we are able to allow the players to fully engage in the hybrid gaming environment. And lastly, inspired by the rich symbolizations of the tree for healthy being and environments in ancient Chinese tradition, we incorporated trees located on different game-related places. The trees in *Mo‘o* serve as wisdom givers who offer players location specific guidance for quests as they also raise the students’ awareness of the unique natural environment on campus. Considering that trees also provide shade and shelter from the sun and rain, they are also a reminder to the players not to be afraid to take a break and recover their strength under the trees, as the length of the game is usually around two to three hours.

### *Participants and Data*

The data that I selected for this study are from the play-through that a group of HELP students participated in. This group has three players who all come from South Korea and

speak Korean as their first language. The three players: Anhee, Eunjin, and Kwang (pseudo names) are classmates at HELP, which means that they have similar English proficiency levels: intermediate (according to HELP class placement). This group was accompanied by two researchers, who provided technical support for the players and video recorded the entire play-through. It is also important to mention that while this group was playing the game, there was also another group of players (Jason and Mike, pseudo names) led by two other researchers playing. There was no competition between the two groups, as during most of the play time, the two groups were separated. The exception to this separation occurred when the two groups both encountered some difficulty doing one particular quest: *The Riddler's Chest.*

The specific quest *The Riddler's Chest* begins when the players virtually *pick up* an item: a picture of an antique chest (see Figure 2). Acquiring this item triggers the new *The Riddler's Chest* quest popping up on the players' iPad. At this point, the players had been following the storyline in game for about an hour, and they had already gotten used to the ARIS system (see Figure 3 for the quest history before *The Riddler's Chest*). *The Riddler's Chest* quest requires players to decipher the riddle called *Windward not Leeward, Mauka not Makai*, and follow its directions to locate an antique chest in the Center for Korean Studies. Figure 4 provides the quest information that players have on their iPads. Note that the detailed description of the quest not only refers to the storyline in the virtual world, but also addresses the players directly by taking their voice: I wonder if it has anything to do with the time travel. By doing so, we include the players in an active role in both the virtual storyline and the real world situations.

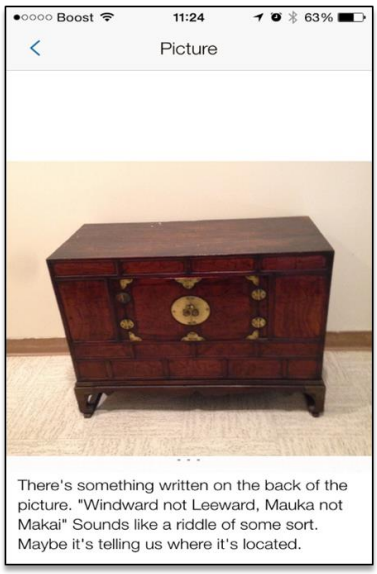


*Figure 2*. A picture of an antique chest that players virtually picked up.

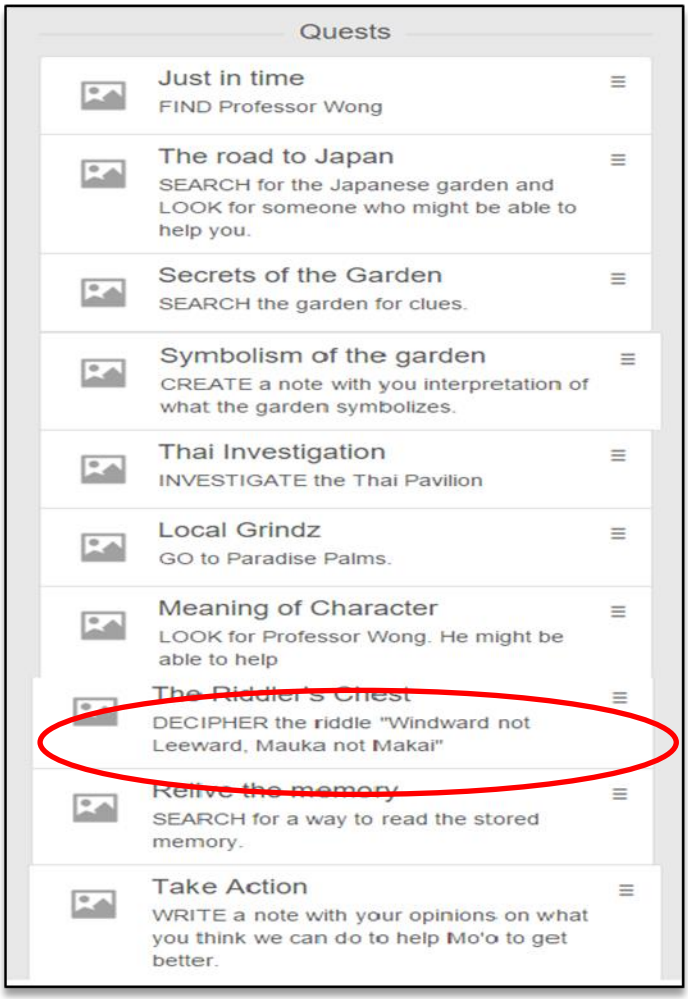


*Figure 3.* Quest line in Mo‘o.

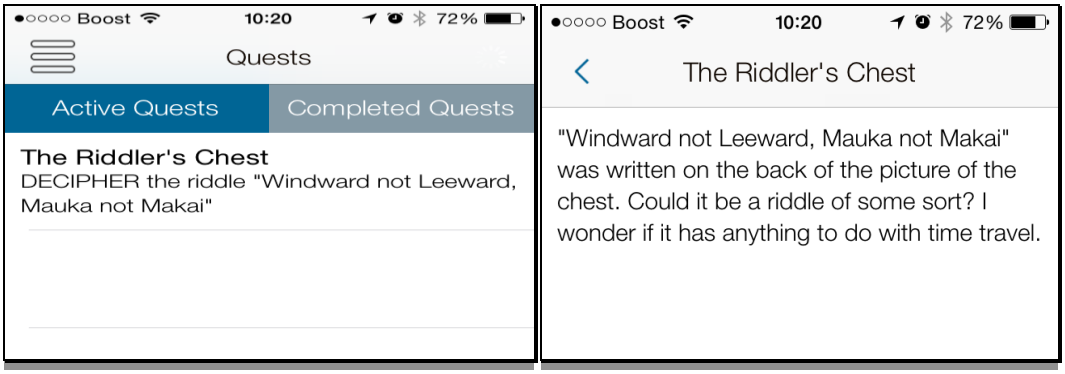


*Figure 4.* The objective (left) and description (right) of quest: The Riddler’s Chest.

In the storyline, the picture of the chest belongs to an NPC: Professor Kahanamoku, who has some solutions to help the Mo‘o, including possibly travelling back in time. The previous quest leads the players to the 4th floor of Hamilton library to *find* Professor Kahanamoku. The designers put a QR code next to the drawing of the Professor on the wall on the 4th floor of Hamilton library with permission from the library staff. By scanning the QR code, the player is

able to *interact* with Professor Kahanamoku, and he helps the players decipher the riddle and suggests the direction that the players should move (head east toward the mountain). Following this direction leads the players closer to the Center for Korean Studies, and once they are within a relatively large radius around it, information about the Center for Korean Studies pops up on their iPad along with a suggestion that players should go inside and explore. The chest in the picture is located on the second floor inside the center with a QR code next to it. Scanning that QR code to *interact* with the chest completes the quest and they then move on to the next one. That is to say, although the quest does not specifically ask players to move to a different location or to locate the chest, with all the information provided (the quest, the picture, the dialogue with Professor Kahanamoku, and the information about the Center for Korean Studies), the solution to this quest becomes more evident and unravels itself as players move forward in game.

When our participants Anhee, Eunjin, and Kwang were doing this quest, however, it took them about 48 minutes to complete this one quest. During that time, they had multiple rounds of negotiations and coordination among themselves, they also asked Hamilton librarians both on the 4$^{th}$ floor and on the 1$^{st}$ floor several times to identify the chest in the picture for them, and they even shared ideas with the other group of players because both groups were not moving at that point. The complicated nature of this quest results because: (a) it requires careful synthesizing and comprehension of all sources of information; (b) it involves transitioning from one place to another within the same quest; (c) and, this quest requires players to take certain level of abductive actions without straightforward directinos like *go to X and do Y*, which means that the players do not know for sure if they were on the right track until they make an attempt and actually move. For these reasons, I will take a close look at Anhee, Eunjin, and Kwang while they play this particular quest in order to understand how they engaged in the different places and found ways to solve the problems.

### *Analytical Procedure: Multimodal Analysis with Abductive Keyword Coding*

Looking at the aforementioned quest specifically, the 48-minute long video recording of the entire quest play was selected for data transcription and analysis. This sampling captured holistically the interactions, conversations, actions, and so forth that were taking place within this one quest. One limitation is that there is some bias due to the videographer's shot-selections and camera angles. To understand the various layers of linguistically and culturally laden discourse, I chose to use multimodal analysis (Baldry & Thibault, 2006) to dissect and consolidate the different modes of interactions in the data. I adopted Linell's

(2009) Communicative Projects (CPs) as my unit of analysis (for a review of *units of analysis*, see Hodges, 2007b, Zheng, 2012). CPs can be used to deal with the emerging topics and events that are relevant for the participants, and they can also be analyzed after parsing into nested and sub-nested CPs. By adopting this method, I was able to parse the multimodal data and examine meaning patterns at a multiple scalar level and from dialogical perspectives.

I chose the video transcription software Transana to help me transcribe and make meaning of the 48-minute-long video data. The goal was to see the activity trajectory as the players transition from place to place within the game. After transcribing the verbal interactions and non-verbal actions in the data, my colleagues, Dr. Dongping Zheng and Daniel Holden, and I divided the data into 17 CPs, and under each CP, multiple nested CPs were also divided up. There was no formulaic approach to identifying the breakdown of CPs and nested CPs; through thematically evaluating players' multimodal actions and activities, we were able to codify these events in an organized fashion. The three of us independently studied the patterns and themes in the data and separated the whole transcription text into CPs. After comparing and discussing our individual evaluations, we formed an aggregate list of the agreed upon CPs and nested CPs. We then coded the 17 CPs under the keyword group *event*. See Figure 6 for the detailed information from the events.

The keyword coding process aligns with Peirce's (1955) approach of abduction. The underlying assumption of abduction is that data analysis begins with observations that give rise to certain assumptions which relate to the general framework of the research project (Zheng, et al., 2012). In my case, the keyword groups and keywords were from both the theoretical framework that I introduced above, and the emerging themes from the data that help me better understand the data as well as answer my research questions. Figure 5 is a list of the keyword groups and keywords that we created from the data. (The unexpanded keyword group information can be found in Figures 6 and 7). In terms of internal consistency of keyword assigning, Dr. Dongping Zheng and I relied on our contextual judgement and alignment with the conceptual framework to ensure that keywords were assigned systematically across CPs and nested CPs. This process is highly contextual and abductive, which requires multiple rounds of negotiation and discussion to reach full agreement of the keyword assignments.

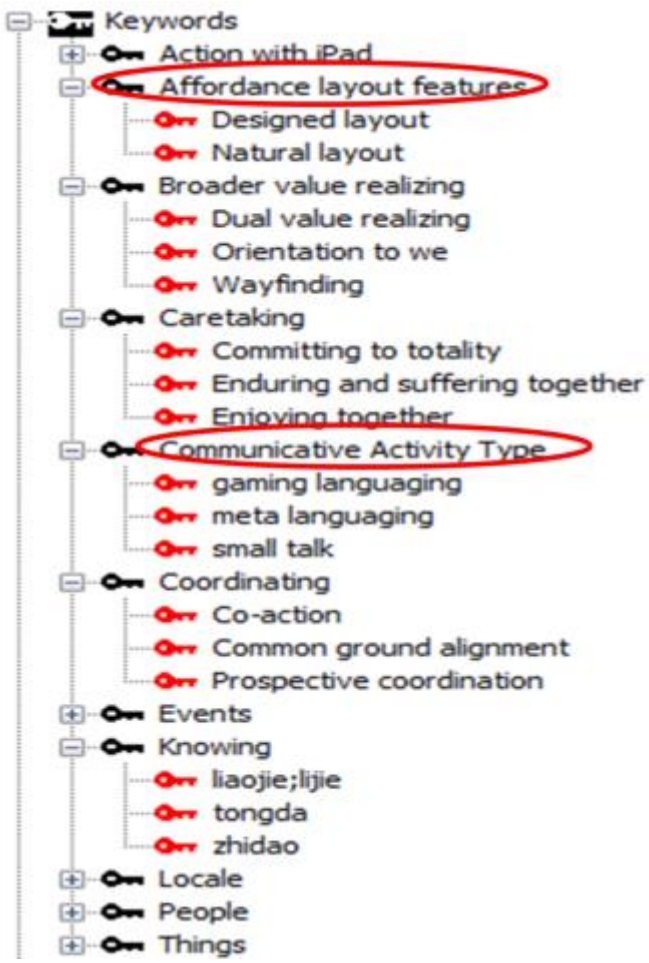


*Figure 5.* Keyword groups.

The process of formulating and assigning the keywords to the CPs and nested CPs involves correlating and integrating the verbal and action data with the contextualized concepts of place and languaging in mind. In addition to the keyword groups introduced above (knowing, caretaking, coordinating, and broad value realizing), we also created the keyword group *affordance layout features* to differentiate the activities taking place in the designed gaming environment from the natural environment. The keyword group of *communicative activity type* was adopted from the concept that was introduced by Linell (2009), which is associated with certain types of social situations or encounters, such as court trials, doctor-patient encounters, job interviews, and so on. In our data, we mainly look at the type of languaging activities that our players encountered, namely, *gaming languaging*, *meta languaging* and *none-game small talks*.

## DATA ANALYSIS

### *Events in Time and Place*

Using the keyword mapping function within Transana, researchers can select a certain combination of keyword groups to analyze in multimodal data from a certain angle. In this study, the research interest lay in the activities that occur in different locations. Therefore, I chose, firstly, the keyword group *events* and *locale* and generated a keyword map (Figure 6). This keyword map provides an overview of the activity trajectory as well as the place transitions throughout the whole 47 minutes 56 seconds.

The main part of this keyword map is the different colored bars which represent different video clips in the data. In this map, bars with the same color indicate that they are from the same video clip. As mentioned above, my colleagues and I agreed on 17 events throughout the entire quest completion, which are shown in time order with a simple description in the upper half of the map. Together with the locale information on the lower half of the map, we are able to see events' progress over time and the place transitions for each event.

From the locale scale, we can see that the players stayed on the 4$^{th}$ floor of the library initially for quite a while (event 1 through 7, in the grey frame). However, when we look closely at each event that took place, it is easy to see that they were delayed because they read the Professor Kahanamoku (Prof. K in the keyword map) dialogue three times (event 1 to event 3), and they also waited and asked librarians for some help (events 4 & 5). They stayed in the library to further look for clues and exchange ideas among themselves before they decided to step outside and reorganize their information (events 6 & 7).

Another interesting finding regarding the library is that the players went in and out several times (events 7 through 12, in the green frame). Again, associating the place transitioning with the events, we can see that the players stepped out of the library to discuss their thoughts and re-orient themselves in place (event 7). Outside the library, they found a tree (event 8) that did not really help them, so they had another round of negotiation (event 9). They went back in and asked the librarian on the 1$^{st}$ floor about the chest (event 10), where they found the other group was working on the same quest, that is when they decided to work together (event 11). After coming up with a different question for the librarian and getting the correct direction (event 12), the two groups finally moved out toward the Center for Korean Studies (event 13).

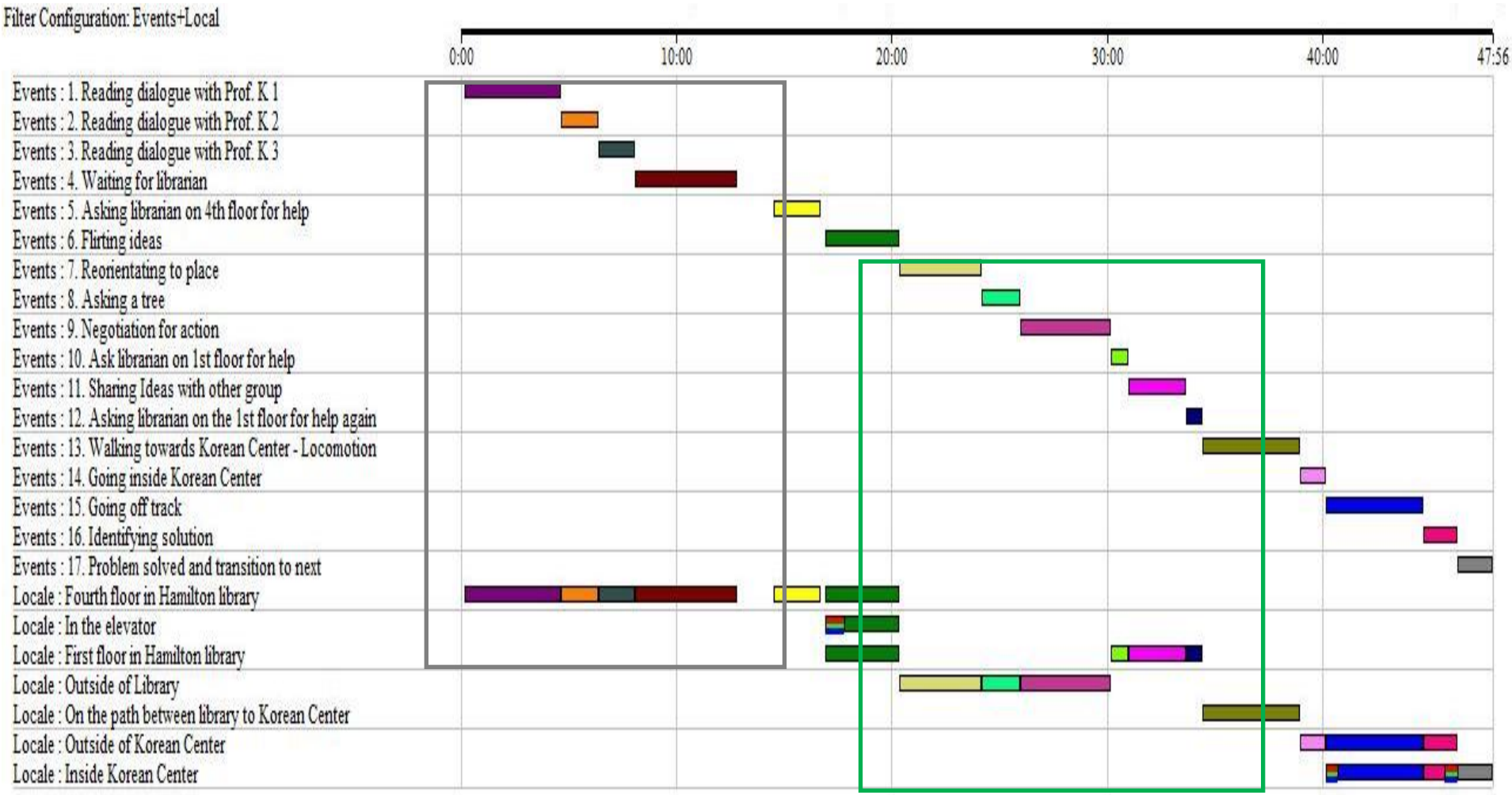


*Figure 6.* Event progress over time and locale.

The same sort of orientating themselves to new places occurred in the Center for Korean Studies too: the players went in and out of the center several times. We named event 15 as *going off-track* when they players got distracted by an icon on the iPad and went outside the Korean Center. Fortunately, the players soon recognized this *off-track* incident, so they went back inside the center to ask a staff and found the chest in the end (event 16 & 17).

From the time scale, it is also clear in the keyword map in Figure 6 that certain events took the players longer to accomplish while other events cost very little time. Take the first three events where the players read the text dialogue with Professor Kahanamoku as an example, the players read the same dialogue three times in order to fully understand the dialogue and locate the key information within the text. Each time they read, they used their iPad to scan the QR code to access the dialogue. That is also how we divide the three events. Interestingly, we can clearly see that each time they read the dialogue, they spent less time. As a matter of fact, by the third time, they skipped most of the dialogue and directly located the key information to help them solve the riddle and do the quest. These events, along with the timeline, demonstrate the players' ability to navigate quickly in the mobile game setting as well as their utilization of the skimming skills that they learn in language classrooms to solve the problems at hand.

Another noticeable finding from the time scale is that during the attempts to solve the quest, there are a couple of times when the players ask other people for help (event 5, 10, 12, & 16). While it is arguable that the interaction time for those events is relatively short, it is also worth noticing that each time before the players asked someone for help, they had a long negotiation and discussion themselves first. For example, before they went back inside the library again and ask the librarian on the 1$^{st}$ floor (event 10), the players pondered and synthesized all the information that they had gotten so far, and what is more, each of them expressed their thoughts on how to proceed until they established agreement (event 9). On one hand, it is evident that through languaging, the players were coordinating and finding a way together, on the other hand, through these languaging activities, not only did the players negotiate well on the emergent problems at hand (finding the chest), they also became faster at locating help. Problem solving is a continuous and relational process, nothing should be seen as isolated. If we only look at the *talking to people in the real world* events (namely events 5, 10, 12, and 16) independently without connecting them into the whole process, it is most likely that we will overlook a great experience characterizing collaborative and coordinated activities that lead to these seemingly short interactions.

***Three-Dimensional Interaction: Person – iPad - Place***

With the overview in Figure 6 in mind, in this section, let's take a look at another keyword map that is more detailed in terms of all the assigned keywords on the nested CP level shown in Figure 7.

In Figure 7, the 17 events on the top part of the map serve as references to help us locate and identify the actions taking place at the nested CPs level. Unlike the previous keyword map where the same colored bars represent the same video clips, in this map, same the colored bars represent the same keywords horizontally. By doing this, it is easier to visualize the amount and frequencies of the same actions throughout the entire quest.

For example, if we are interested to know how frequently the players interact with the iPad, we can direct our attention to the keyword group *Actions with iPad* (in blue frame). One might imagine that in a mobile gaming environment, players would be fully attracted to the virtual world within the mobile device; despite this, it is clear in the keyword map that the players used the iPad throughout the quest sparsely. The times when the players actively used the iPad coincide were in events 1 to 3, 7 & 8, and 14 to 16 (in red circles). Events 1 to 3 and event 8 involve players reading dialogues with NPCs, and that is also why those are the events where players use the iPad the most. While reading and skimming information is one of the major actions that players do with iPad considering that there is a storyline in the game to follow, other actions, such as checking the game built-in map, or showing the picture on iPad to other people to get help, also emerged from the data. Take checking the built-in maps for example, the players were not only trying to look for more clues in the virtual world, with the GPS tracking their current location, they were also orienting themselves in places. In that sense, the player-iPad interaction was pinned from sections of the virtual story to the actual contextualized places. While it is still arguable that it was the designers' intention to have players navigate from virtual to real world, the players' usage of the virtual information is absolutely their own agentic doing. When players asked the librarians in the library (event 5 & 10) as well as the staff in Center for Korean Studies (event 16), the players held the iPad on their hands and asked these people to identify the chest in the picture (see Figure 8). In doing so, to some extent, the players *dragged* the items in virtual world to the real world.

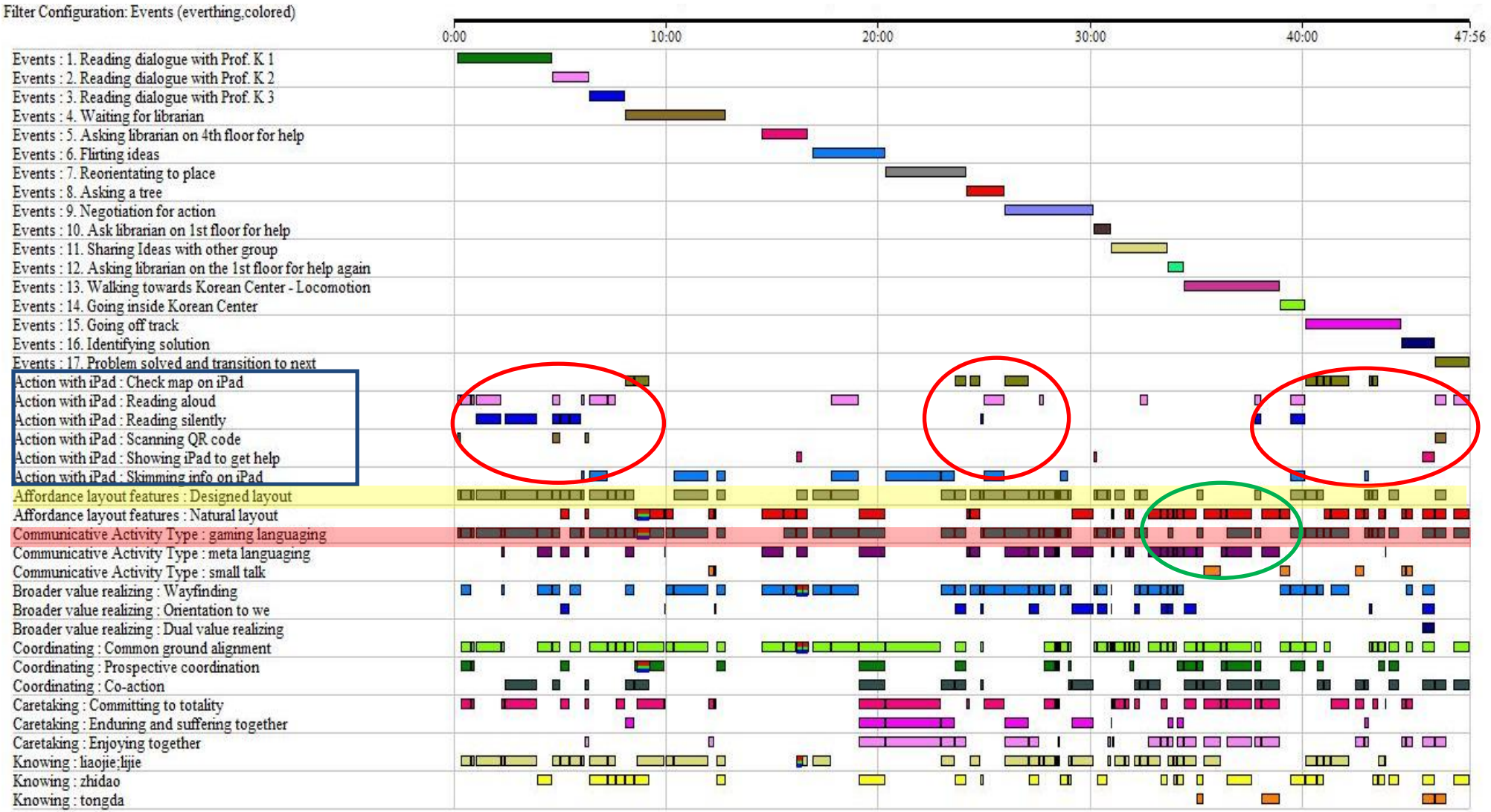


*Figure 7.* All the assigned keywords on the nested CP level.

It is, therefore, necessary for us to take a step back from the input-output model of interaction, such as *I-you* or *I-iPad* interaction, and instead, look at languaging as whole three-dimensional holographic *person/persons-iPad-place* coordination. All of these interactions are resulted from coordinating among players, the virtual storyline, the GPS place-based tracking within the iPad, and the places. Note that the iPad not only connects with the physical world because of the GPS function, but it is also a portable device that can be manipulatively played with. More importantly, the iPad also connects to the virtual gaming world that the players actively engage themselves within. It is therefore also arguable that the players' agentic associating the virtual reality to the physical world creates a fourth layer to this interaction model.

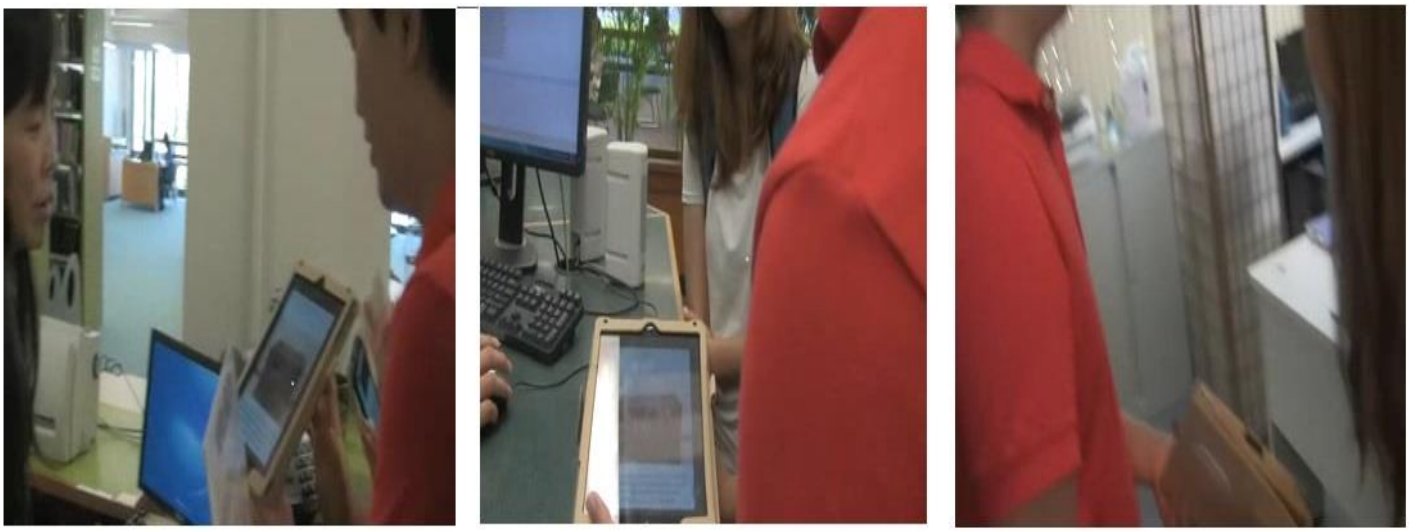

*Figure 8.* Players show picture on iPad to other people

This 3D interaction model can also be supported with two other keyword groups: communicative activity types and affordance layout features. By comparing the gaming languaging occurrences (red highlight area) and the designed layout affordances (yellow highlight area), it is safe to say that these two are highly correlated and codependent. Taking also the *actions with iPad* into consideration, it is clear to see that the heavy reading and skimming actions coincide with the heavy gaming languaging within designed layout as well. This was not at all unexpected, given that reading and skimming are certainly gaming languaging activities and that the designed layout would certainly afford this type of languaging. However, the gaming languaging in the designed layout get extended to another dimension when the natural layout affordances come into play. Although the natural layout consistently takes a place throughout the entire timeline, it is most salient at the second half of

the quest where the players started to organize their ideas and move forward in places (from event 11 on). When we take another closer look at the communicative activity types during that time, multiple types of languaging such as meta languaging and none-game small talks took place as situated topics emerged in physical places. In other words, various communicative activity types, including gaming languaging itself, were afforded by the natural layout in places. A good example of this is event 13 (approximately in the green circle). After the players got the correct direction from the librarian, they started moving towards the Center for Korean Studies. During this locomotive action, players not only frequently checked the game map for the potential information to pop up (gaming languaging), they also actively reflected on their gaming strategies and their predictions of what should happen next (meta languaging). There was also a non-game small talk episode taking place within this event time.

Thus, through examining these two keyword groups of communicative activity types and affordance layout features, we found more evidence to support the *person/persons-iPad-place* interaction model. The players are actively engaged in both the designed layout and the natural layout settings. The various types of communicative activities in natural layout settings precisely illustrate how players take the virtual stories with themselves to move in places. It is the players' agentic connecting between virtual and physical that brings another layer to this 3D interaction. In fact, all of the interactions within the Moʻo gaming setting interdependently resulted from coordinating among the players, the GPS place-based tracking and the virtual storyline within the iPad, and the actual places.

### ***What Is Taking* Place*?***

The four keyword groups that are in the lower third of Figure 7, namely *broader value realizing*, *coordinating*, *caretaking*, and *knowing*, are what we established in previous sections as the activities that take *place*: coordinating and values realizing can be understood as the perception and action system of languaging; knowing and caretaking are actions that transform the relationship between place and the players, thus form a field of care. It is noticeable that more manifestations of these activities took place during the second half of the quest when compared to the first half. Since place is a major focus in this study, we will take special care to evaluate the data-rich latter half of the quest in terms of two places: Hamilton Library and the Center for Korean Studies.

The keyword map in Figure 9 shows the activities taking place around the library during the second half of the quest. In order to better interpret these activities, I also included the exact locale and event information as well as the people and things that were involved in these events.

In this case, the players talked with the librarian on the 1st floor twice (event 10 in blue frame and event 12 in red frame), and they decided to share ideas with players from the other group (refer to section 4.2 for the group information) from event 11 on. The iPad was relevant for almost every event, except when they asked the librarian for the second time (red frame): instead of asking about the chest in the picture, they directly asked about the riddle, which finally got the players moving in the right direction.

While it seems that the difference between event 10 and event 12 was that the players asked a more relevant question in the latter. However, by comparing the languaging activities during these two events, we can develop a deeper understanding of what was actually taking place. For example, the act of asking the librarian to help them to proceed in the game for both events qualifies as *wayfinding*. Also, this particular librarian was aware that there was a game of some sort going on considering that the researchers were following the players with cameras in their hands. Therefore, both the players and the librarian had the same *orientation to we*: in the sense that they were all orientated to the game frame and rules. Take this instance in the following transcript of event 10 for example:

Event 10: Asking Librarian on 1st Floor for Help

```
393.   K: Excuse me?
394.   L: Mm hm?
395.   K: Have you ever seen +this one before? No?
                            +pointing to iPad
396.   L: No, I have never seen it
397.   A: Ah thank you
398.   L: Did it say it was here? It's supposed to be in the
399.      library?
400.   K: I don't know, but-
401.   A: Yea maybe (4th floor)
402.   K: We think it is inside of building, so
403.   L: Mm hm
404.   K: we don't know where is it, but +(.)+this one is inside
                                       +tapping iPad
                                           +pointin iPad
405.      of +this building, so I- we think +it also in here
              +pointing behind his back
                                                 +pointing iPad
406.   L: Um if it's here, then it'd probably be: 4th floor
407.   K: Un:: Can-
408.   L: You- $you've already looked at the 4th floor$?
409.   K: $Yea$ hhh
410.   L: Hehehe
411.   K: Thank you so much
412.   A: Thank you

K= Kwang
L= Librarian
A= Anhee
```

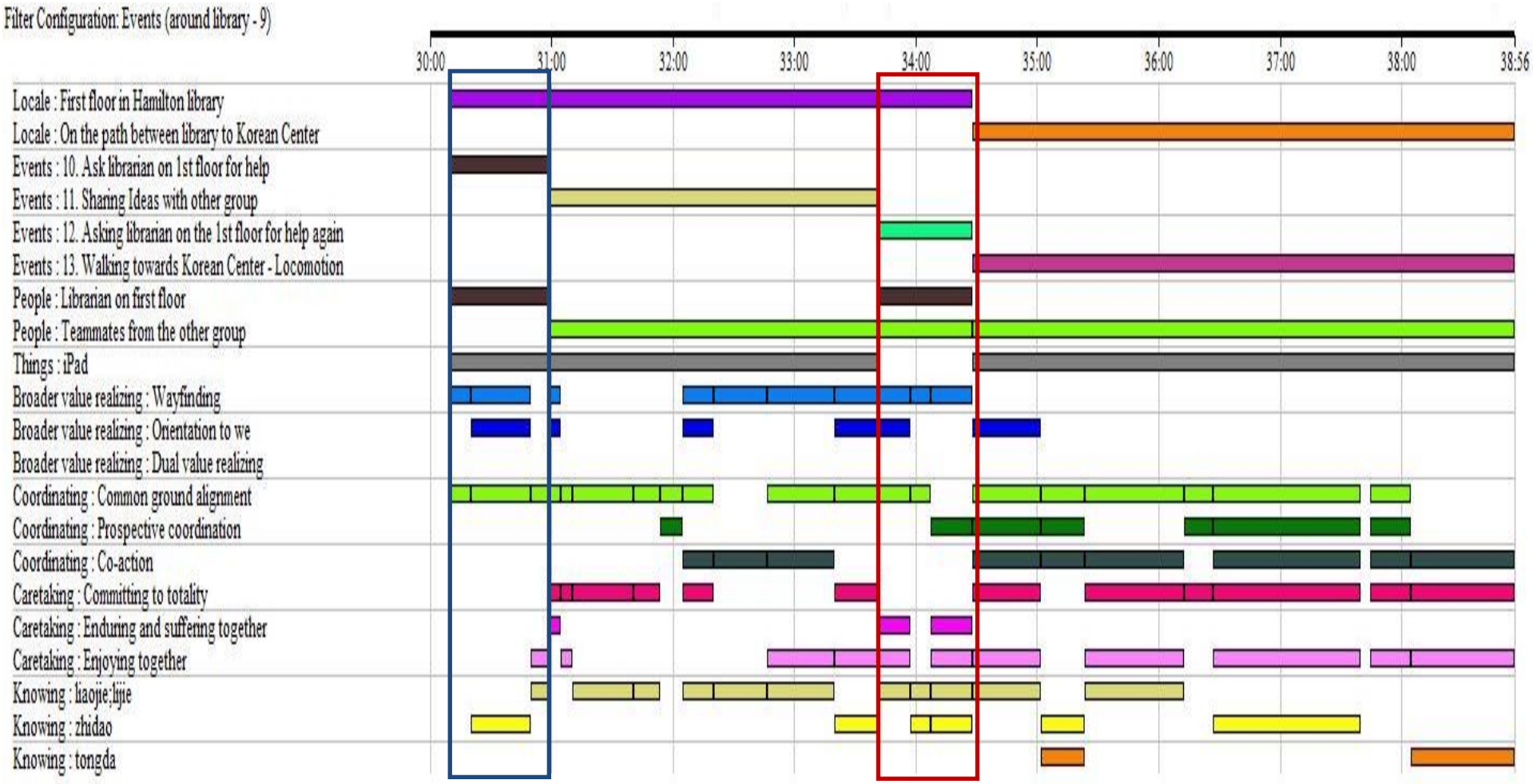


*Figure 9.* Activities taking *place* around Hamilton Librar

When asked if he had seen the chest in the picture before (line 395), the librarian firstly responded directly to the yes-no question in line 396. However, he further asked: "Did it say it's here? It's supposed to be in the library?" in line 398 & 399, clearly referring to the iPad or the game. Similarly, in event 12 (see transcript lines 494-505 next page), when the players asked the librarian "where is east mountain," he said in line 498: "Is that part of the clue?"

The same orientation aligned common ground between the players and the librarian to not only pursue mutual understanding towards one another, but also correspond with their actions in places. For example, in event 10, when the librarian suggested that maybe the players should check the 4th floor in line 406 (because he knew other groups of players had been to the 4th floor), the players indicated that they had already been there (line 407 to 409). Note also here that there is a holographic interaction going on: the purpose of their interaction does not merely stay on the *I-you* meaning-making level (in this case, it is the *player-librarian* understanding each other), rather, this interaction helps both parties to track and even coordinate the actions in time and places.

What is different between the two events, however, is that there was prospective coordination in event 12, and in tandem with the prospective coordination, there were also a multitude of care-taking and knowing taking place. There was little or none of such activities in event 10. Considering that the first time the players' asking the librarian about the chest did not get any useful results, it is understandable that there certainly were not any prospective coordination taking place. As a matter of fact, in event 9, the players were fairly certain about who and what to ask. That is why in event 10 when they explained to the librarian why they thought the chest should be in the library (lines 404 & 405), they were in a *zhidao* (knowing the way) state: they knew the way to proceed. However, the *zhidao* did not last long since they did not receive confirmation from the librarian. The whole new situation got the players back to *liaojie*: unravelling new patterns. In contrast, the second time the players asked the librarian a different question: "where is east mountain?" resulted from unravelling the riddle: Mauka not Makai, Windward not Leeward.[3] Also note that even though it is Mike, who is from the other group, initiated the interaction with the librarian this time, the problem formulation and identification is collaboratively negotiated and agree upon by both of the group members.

[3] From our post-game interview, the players explained that they interpreted *Mauka* as *mountain* instead of *toward the mountain*, and therefore they thought that there was actually a mountain that is called *East Mountain*.

Event 12: Asking Librarian on 1st Floor Again

494. M: Where is east mountain↓
495. K&J: hhhhhhh
496. L: East mountain↑
497. M: Yea
498. L: I think, is that the- part of the clue?
499. M: $Yes, it is$ (2.8)
500. L: $East mountain$
501. ?: hhhhh
502. L: Cause I know +west is that way, +east should be that way
**+arm pointing west**
**+arm pointing east**
503. M: Is it?
504. J: Oh↓
505. L: Yea
506. J: So east toward this side, and toward the mountain?

M= Mike (pseudo name, player from the other group)
J= Jason (pseudo name, player from the other group)
L= Librarian

Compared to the question formation in event 10, the question in event 12, line 494 was raised very directly and bluntly. As strange as this question might sound to both the librarian and the players, the librarian actually started to describe the directions with hand gestures pointing to different ways (line 502). The librarian's embodied description magically brought the virtual *east mountain* to a physical direction for them to head towards (see footnote 3 on the previous page). That is the point when players realized that there is a direction for them to follow and started to prospectively coordinate their next actions. Therefore, despite the seemingly inappropriate way of asking a question, after the direction was determined, they actually knew the way (*zhidao*). Furthermore, in regard to the total combined group of 5 players and one one very patient librarian, all of them were enjoying and enduring the time together. In that sense, they were not only playing the game together, they were also taking care of each other.

It is interesting to also notice that these three events, namely, asking the librarian (event 10), sharing ideas with another group (event 11), and asking the librarian again (event 12) all took place inside the library. As a matter of fact, the two groups converged right in front of the librarian's information desk. The same librarian here who answered the players' questions many times[4] was actually involved in the game the entire time when the players were there.

[4] From other parts of our data, Mike's group also asked this librarian about the chest before Kwang's group arrived.

Not only was the librarian fully aware of the gaming situation and trying to help the players, the players also built a closer relationship with the librarian and therefore treated him as one of their own. When we look at the abrupt question in line 494 out of the rich context, it is likely that we might treat this as a pragmatically inappropriate utterance. However, with the notion of knowing and caretaking, it revealed a deeper and more complex connection between people and places.

***Penetrating Through in the Center for Korean Studies***

The other place that we are going to investigate is the Center for Korean Studies, where the solution for this quest lies. Figure 10 provides an illustration of the activities taking place in the center. The relevant locale and event information are also included in this keyword map to help us better interpret the activities. The two locales listed at the top of the map highlight that the players spent limited time within the Center for Korean Studies during events 15 & 16; there were only two moments, one at the beginning of event 15 and one at the end of event 16 (in purple frame and orange frame) where the players were actually inside the center. However, we can see that following this, during event 17, the players remained within the Center for Korean Studies for the event's entire duration. In addition, when the players went back inside the center again, they asked the staff to help them locate the chest in the picture, and they were finally able to see the physical antique chest before their eyes for the first time.

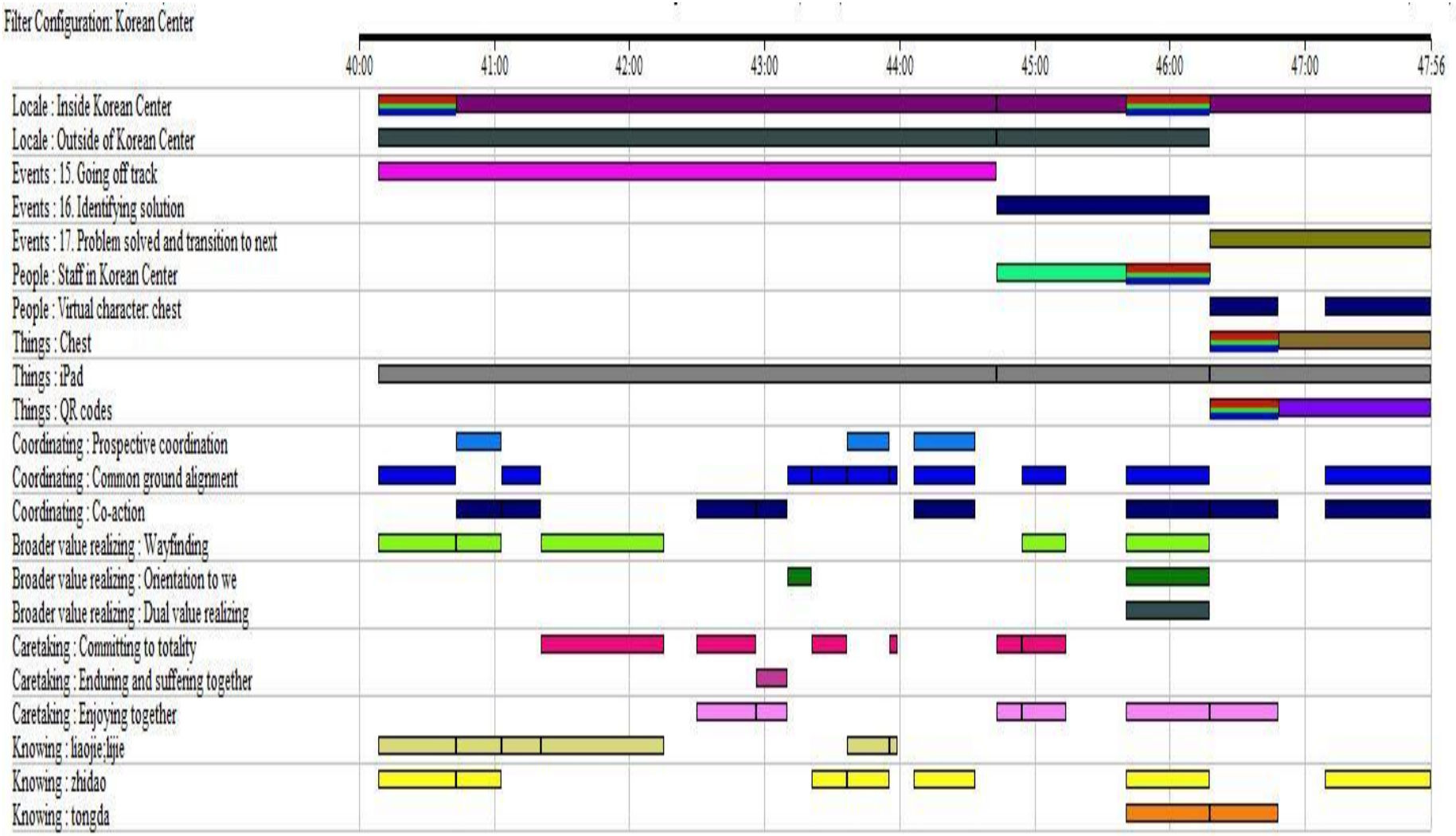


*Figure 10.* Activities taking place in the Center for Korean Studies.

Although the solution to the entire quest lies inside the Center for Korean Studies, when the players actually stepped in the center at first (in the purple frame), they were still getting themselves oriented to the new place and unraveling the patterns (*liaojie*). One of the players, Eunjin, found an icon on the game map that said *Korean Center*, which did not exactly match their location. Therefore, she decided that they should follow the map. Eunjin's actions demonstrate that she felt she knew the proper way to proceed (*zhidao*) and thus went outside. Eunjin's teammates may or may not have fully understood or agreed with her actions, but they went with her anyway. It is a strong evidence of the committing to totality: all of the three players were aware that they were a team, and therefore, that they should take care of each other by supporting one another. However, when they got to the exact position where the icon was located on the map, they were unable to locate anything which would allow them to proceed[5]. It was then when Kwang suggested that they should ignore the icon and return to the center to find the chest (event 15).

The *penetrating through* moment took place when the players asked a staff member who was working in the Center for Korean Studies about the chest in the picture. Since it is such an important event where so many activities were taking place, I will examine the keywords one by one with a detailed transcript of this conversation between the players and the staff.

Event 16.3 Identifying Solutions: Asking Staff in Korean Center for Help

727. ((Researchers followed players into the Korean Center))
728. K: Excuse me, may I ask a question?
729. S: (XXX)
730. ((Kwang looks down on iPad and finds the picture))
731. K: Where is +this?
**+pointing at the iPad**
732. A: (XXX)
733. ((The staff indicated that she didn't want to be video recorded, and the researchers turned the camera away))
734. S: Am I supposed to tell them this↑
735. R1: Sure↓ yea↓ just natural, whatever you want to do
736. S: It's upstairs on the second floor
737. K: Thank you
738. A&E: $Thank you::$
739. A: $Wah$ .hh
740. ((The players went towards the stairs))
741. E: +Ah↑:::↓
**+Anhee pointing at the chest on the second floor**

K= Kwang
A= Anhee
E= Eunjin
R1=Researcher 1
S= Staff in Korean Center

[5] This icon here was a general reference of the current location. It's not interactive, not responsive, and hence not supposed to be followed.

What we can see from the transcript first is the players' attempt at *wayfinding*: the act of finding the picture on the iPad and showing it to the staff also clearly attached the situated meaning to the wayfinding process. Like the librarian, the staff in the Center for Korean Studies was aware of the gaming situation as well, as indicated by her request of turning the camera as well as her question addressed to the researcher in line 734. The staff, the researcher, and the players, in this instance, were all orienting to the social-cultural norms as well as the game frame: the students asked a question with the appropriate pragmatic and linguistic forms (line 728); the researcher met the staff's request of turning the camera (line 733); and the staff clarified the game rules and the researchers provided confirmation (line 734 & 735). Similar to the librarian events (events 10 & 12), this *orientation to we* also aligned the common ground among them. However, this time, there was no need for prospective coordination. Since the direction given by the staff was so straightforward, and the goal was right in front of the players, all of them were instantly on the same page and moved simultaneously in co-action.

Accompanying the flow of co-action among the players was their great excitement when Anhee spotted the actual chest on the second floor (line 741). This moment was not only rewarding for the players because they were about to accomplish a quest in the game, it was also an emotionally engaging experience for the players that they were establishing a new relationship within the situated ecological environment. The newly established relationship can be counted as a *dual value realizing* moment for the players.

Echoing the dual values realizing, the knowing process for the players here also indicate that the players not only found their way to solve the problem (*zhidao*), but more importantly, the moment when players saw the chest that they were looking for the entire quest, this type of *knowing* is beyond just to know how to proceed. The Center for Korean Studies is a place where the players claimed that they had been here before[6], and the players had gone after the picture of the antique Korean chest all the way from the library to find the solution of a quest. Yet, it is so much more than a quest now, this type of *knowing* connects all the past experiences of the game, the quest, the teammates, the places that they had been and allows the players to become innovative and creative in thinking and doing. It is, therefore, the critical *Ah-ha* moment that we call *penetrating through* (*tongda*).

[6] This information is revealed from one of the non-game small talks in event 14 where they were about to enter the Center for Korean Studies.

## DISCUSSION AND CONCLUSION

This study began with an exciting mobile game project, *Mo'o*, which is an augmented reality game that allows players to immerse themselves and interact in both virtual and physical places. With the research interest of what was taking place when the players were travelling around the campus to do the quests in the game, I selected data from one group of players doing one particular quest that requires a high degree of comprehension and coordination, and used multimodal and abductive keyword coding procedures to reorganize and analyze the Communicative Projects (CPs) and nested CPs.

### *Communicative Projects are Continuous and Interconnected*

Through a detailed analysis on multiple scalar levels, CPs and nested CPs were contextualized in different locales throughout the entire timeline. The multi-scaler system allows us to view and unravel the patterns from the continuous process of players' languaging and place-taking activities. On the macro scale, whereas one might be inclined to view problem-solving as a linear function where time invested brings the individual closer to a solution, I have shown that this is in fact not the case. The players, over various attempts at wayfinding including multiple set-back or off-track experiences, make non-linear, or roundabout progress in reaching a solution. Every CP connects with the previous CP and projects the next CP. As a matter of fact, the set-back or off-track projects were usually treated as noise in the data. In this study, however, they are designed experiences as well as dynamically emergent ones. They are collateral to an ongoing, interconnected process.

### *Three Dimensional Interactions in Fields of Care*

It is also worth noting the distinctive interactional mode in a mobile gaming environment. Instead of the traditionally understood two-way interactions, our data revealed that in a highly contextualized languaging activity where meaning and caring are closely coupled, the interaction mode becomes three-dimensional. By applying Linell's (2009) quadruple communication triad (the inner circle of Figure 1) to specific interactions in our data, when players have gaming languaging activities in the aforementioned environment, we can see three dimensional interactions unfold. For instance, when they ask the librarian about a quest item in the game, the *I-you* interaction in this case could be understood as the *player-librarian*, the *player-iPad*, or the *librarian-iPad* interaction. The object *it* that they were interacting about was the quest item, while there were the social-cultural norms which

allowed them to begin and carry on a conversation (*we*). It is our belief, however, that there is another dimension that also functions in such interactions. With the portable virtual world in our players' hands, these interactions were grounded in situated places, both virtual and physical by our players' agentic manipulations of the iPad. In this sense, the place extended the meaning-making interaction to another dimension, and furthermore, because the place is not only highly situated and contextualized, but also loaded with players' values and care, it is not a meaningless space anymore; it becomes a field of care.

***Development Pathways for Place-taking Activities***

From a micro perspective, through examining the activities that were taking *place*, namely the knowing, care-taking, coordinating, and value-realizing on the nested CPs scale, we found that none of these activities were static or sequentially organized. Rather, these activities were taking *place* contingently at varying intervals of time. They were characterized by their unpredictable nature, yet showing a natural tendency towards progress which reflects the general development pathways of all human experiences. By viewing this through the lense of knowing and care-taking, we can come to an understanding as to how languaging led them to successful progression in game. At every stage of the players' involvement, we can identify players' coordinating and value realizing as the players attempt to navigate, orient, or act with places to proceed to the next step. Though the processes of common ground alignment, prospective coordination, coaction, wayfinding, orientation to we, and dual value realizing are not identical nor follow a clear pattern at various stages, the manifestation of a certain combination of the above with situated places for certain instances result in systematic progression and evolution. This process is repeated ad infinitum, with continuous supporting and care-taking, until the players ultimately fulfill their goal within the scope of the quest, and they will transition to the next round of knowing and care-taking through languaging in new places.

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Finally, I would like to humbly dedicate this paper to both of my readers, Professor Dongping Zheng and Professor Christina Higgins for all their support, help, and feedback throughout the entire writing process for paper.

## REFERENCES

Ames, R. T. (2011). *Confucian role ethics.* Honolulu, HI: University of Hawai‘i Press.

Baldry, A., & Thibault, P. J. (2006). *Multimodal transcription and text analysis: A multimedia toolkit and coursebook.* London/Oakville: Equinox.

Barab, S., Dodge, T., Tuzun, H., Job-Sluder, K., Jackson, C., Arici, A., ... & Heiselt, C. (2007). The Quest Atlantis Project: A socially-responsive play space for learning. In B. E. Shelton & D. Wiley (Eds.), *The design and use of simulation computer games in education* (pp. 159-186). Rotterdam, NL: Sense.

Chinnery, G. M. (2006). Emerging technologies. Going to the mall: Mobile assisted language learning. *Language Learning & Technology, 10*(1), 9-16.

Cowley, S. J. (2012) Cognitive dynamics: language as values realizing activity. In A. Kravchenko (Ed.), *Cognitive dynamics in linguistic interactions*. Cambridge: Cambridge Scholars.

Gee, J. P. (2005). The new literacy studies: from 'socially situated' to the work. Situated literacies: *Reading and Writing in Context, 2*, 177-194.

Godwin-Jones, R. (2011). Emerging technologies: Mobile apps for language learning. *Language Learning & Technology, 15*(2), 2-11.

Hodges, B. H., & Baron, R. M. (1992). Values as constraints on affordances: Perceiving and acting properly. *Journal for the Theory of Social Behaviour, 22*(3), 263-294.

Hodges, B. H. (2007a) Values define fields: The intentional dynamics of driving, carrying, leading, negotiating, and conversing. *Ecological Psychology, 19*(2), 153-178.

Hodges, B. H. (2007b) Good prospects: Ecological and social perspectives on conforming, creating, and caring in conversation. *Language Sciences, 29*, 584-604.

Hodges, B. H. (2009) Ecological pragmatics: Values, dialogical arrays, complexity and caring. *Pragmatics & Cognition, 17*(3), 628–652.

Holden, C. L., & Sykes, J. M. (2012). Leveraging mobile games for place-based language learning. In P. Felicia (Ed.), *Developments in Current Game-Based Learning Design and Deployment* (pp. 27-45). Hershey, PA: IGI Global.

Hutchins, E. (1995). *Cognition in the wild.* Cambridge, MA: MIT.

Jefferson, G. (2004). Glossary of transcript symbols with an introduction. *Pragmatics and Beyond New Series, 125*, 13-34.

Klopfer, E., Squire, K., & Jenkins, H. (2002). Environmental detectives: PDAs as a window into a virtual simulated world. In *Proceedings IEEE International Workshop on Wireless*

*and Mobile Technologies in Education* 2002 (pp. 95-98). Vaxjo, Sweden: Printing House of the IEEE Computer Society & IEEE.

Klopfer, E. (2008). *Augmented learning: Research and design of mobile educational games.* MIT.

Klopfer, E., & Squire, K. (2008). Environmental Detectives-The development of an augmented reality platform for environmental simulations. *Educational Technology Research and Development, 56*(2), 203-228.

Linell, P. (2009). *Rethinking language, mind, and world dialogically: Interactional and contextual theories of human sense-making.* Charlotte, NC: Information Age.

Maturana, H. R. (1988) Reality: The search for objectivity or the quest for a compelling argument. *Irish Journal of Psychology, 9*(1), 25–82.

Newgarden, K., Zheng, D., & Liu, M. (2015). An eco-dialogical study of second language learners' World of Warcraft (WoW) gameplay. *Language Sciences, 48*, 22-41.

Peirce, C. S. (1955) Philosophical writings of Peirce. In J. Buchler, J. (Ed.), *Philosophical writings of Peirce* (pp. 150-156). New York: Dover.

Sobel, D. (2004). Place-based education: Connecting classroom and community. *Nature and Listening, 4*, 1-7.

Thorne, S. L., & Reinhardt, J. (2008). Bridging Activities, new media literacies, and advanced foreign language proficiency. *CALICO Journal, 25*(3), 558-572.

Tuan, Y. F. (1979). Space and place: Humanistic perspective. In S. Gale & G. Olsson (Eds.), *Philosophy of geography* (pp. 387-427). Dordrecht, NL: Springer.

Wagner, P. L. (1972). Cultural landscapes and regions: Aspects of communication. In P. W. English & R. C. Mayfield (Eds.), Man, space and environment (pp. 55-68). New York, Oxford.

Zheng, D., & Newgarden, K. (2012). Rethinking language learning: Virtual World as a catalyst for change. *International Journal of Learning and Media, 3*(2), 13-36.

Zheng, D. (2012) Caring in the dynamics of design and languaging: Exploring second language learning in 3D virtual spaces. *Language Sciences, 34*(5), 543-558.

## Appendix A:

### Transcription Conventions (Adapted from Jefferson, 2004)

| | |
|---|---|
| [ | beginning of an overlapping turn |
| ] | end of an overlap turn |
| (1.9) | length of pause |
| (.) | micro pause |
| : | longiated syllables |
| ↓ | dropping tone |
| <u>Word</u> | louder speech |
| wor- | a cut-off sound |
| $word$ | smiley speech |
| ((word)) | researchers' report |
| + | place where action begins, description of action |