

# Walking and Talking as a Group: Interactional Practices for Playing an Augmented Reality game on a Mobile Digital Device

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**Abstract:** To better understand the use of mobile digital technology for place-based language learning, and more generally as a factor in human interaction, this paper describes the methods used by small groups to accomplish quest-type tasks in an augmented reality (AR) game. The ARIS game ([arisgames.org](http://arisgames.org)) was available on mobile devices (iPhones) and played outside the classroom. Video-recordings of each group were made using two head-mounted cameras and one hand-held camera. Analysis focused on the groups' orientation to the device as they accomplished game activity. Results show that the device and the holder of the device were frequently oriented to for instruction and leadership via verbal and non-verbal communication. We outline communicative practices used by the groups, how participants made information from the game publicly available to one another, and how they interfaced cartographic resources and the physical environment in way finding activity.

## Introduction

This paper describes the design and pedagogical implementation of an augmented reality (AR) language learning game designed in ARIS ([arisgames.org](http://arisgames.org)). AR games leverage GPS-enabled mobile media (e.g., Apple iPhone) to engage players in spatially enacted narratives and informational and interpretive quests that are arrayed across physical places, with the goal of interfacing language learning affordances with embodied experience in the world. Such use of mobile technologies has made relevant research on talk-in-interaction while moving (Haddington, Mondada, & Nevile, 2013; McIlvenny, P., Broth, M., & Haddington, 2014) and the orientation to mobile devices in such interactions (Brown, McGregor, & Laurier, 2013). Our primary interest is to better understand how players of an AR game manage the interface of the virtual and the physical through talk-in-interaction. Focusing particularly on serial quests as a design element of the AR game in question, this research investigates how participants engage vocally, visually, and haptically in order to coordinate spatial movement.

Since the advent of the iPhone in 2007, way finding with smartphones has become a high frequency life activity that includes visual perception of the physical and built environment, digital cartographic resources, and communication with co-present parties. In the research reported here, we focus on way finding activities by small groups of English language learners playing an AR game that involves a series of game-like quests. The student-players are asked to find five designated locations in which green technology is used. Participants file a video report of each example they see (Thorne, 2013). This setting allows us to analyze and uncover participants' sense-making practices as they situate, and enact through talk-in-interaction, the mobile device's two-dimensional map representation in the broader context of the multi-dimensional, sensory-rich physical world.

## Review of research

Although researchers of social interaction have studied the situated relevancy of objects during interaction (Knorr Cetina, 1997; Goodwin, 1994; Nevile et al 2014), there are few studies of the organization of people's talk-in-interaction around mobile devices as they walk, a common practice for groups using smart phones (hereafter 'device' or 'mobile device') for information gathering or way finding. De Stefani and Mondada (2007) studied how movement influences the organization of talk. Movement was seen as relevant in that the immediate physical context for talk changes because of the co-participants' mobility, and talk being sequential, participants must orient its sequentiality to changes in physical surroundings. In a recent edited volume (Haddington, Mondada, & Nevile, 2013), De Stefani addressed moving while interacting in supermarkets and illustrated that co-participants often come to a stop in order to introduce next actions. Broth & Lindström (2013) describe how walking results in a changing contextualization for talk: "places materialize as meaningful 'places in sequence' in and through the embodied mobile interaction of a group" (p. 91).

Research on interaction around the use of mobile phones includes a number of studies focused on the sequential structure of talk as well as on how the portability of these devices influences the interactions of those in the vicinity of the device (Arminen & Leinonen, 2006; Arminen & Weilenmann, 2009; Licoppe, 2009). Of these studies, only

Licoppe focused on the way participants connected virtual location on the device to the physical location of the device holder. Most closely related to the focus of our current study is the research by Brown and colleagues (Brown & Laurier, 2005; Brown, McGregor, & Laurier, 2013). These are a series of empirical studies of meditational tools for way finding used by small groups. In Brown et al 2013, video recordings were made and screen captures were collected of participants visiting various places in a city (Stockholm) on a 'typical day'. Their analysis showed that participants used the devices in order to be informed about locations and for way finding.

For the research reported here, we had similar questions to those posed in Haddington et al 2013: "how does mobility impact social interaction...how do people interact as they attend and respond to the passing environment" (pp. 3-4). Although there are numerous meditational affordances available for our participants who are exploring green technology and sustainability projects on a university campus, for this paper we focus on the interactional practices used by participants to orient to the device and device holder in order to facilitate the movement of the group toward the accomplishment of their activity.

## **'Serious games' and mobile devices**

Developments in contemporary digital learning have recently come to include 'serious' games, which involve the use of computer and mobile devices for game-like activities with an explicit educational focus.

The particular focus of this research is the empirical examination of English language learners engaged in playing an augmented reality (AR) place-based mobile game which presents scenarios and prompts that encourage participants to expand beyond the traditional subject positions associated with that of 'student' or 'learner' (Firth & Wagner, 1997). AR games are a more recent entry into the arena of educationally oriented game development, but similar to commercial recreational games that have been studied as learning environments (Gee, 2007; Thorne, 2012; Thorne & Fischer, 2012; Thorne, Fischer, & Lu, 2012), AR games represent a shift away from models of learning based on information delivery and toward theories of human development rooted in experiential and situated problem solving. As Squire describes:

Although mobile media learning has mostly been framed as "anytime, anywhere" their more profound impact may be in the experience of place. Mobile media enables a multiplicity and hybridity of place that causes opportunities and challenges to learning and education. (2009, p.70)

Designing AR games to highlight and more fully understand and appreciate specific places is a growing phenomenon, with numerous projects that include scientific themes (e.g., metallurgy), urban studies, architecture, and history (for examples, see <http://arisgames.org/>). AR games are rapidly appearing in museums, community-based education projects, and in formal educational settings. Existing AR games (e.g., Holden & Sykes, 2011; Squire, 2009; Thorne, 2013) and accompanying mobile resources for learning share certain objectives, such as to increase engagement in the language learning process by moving students and language learning experiences out of the classroom and into the world and to provide *in situ*, contextually-relevant prompts for communication and language use for the topical activity at hand.

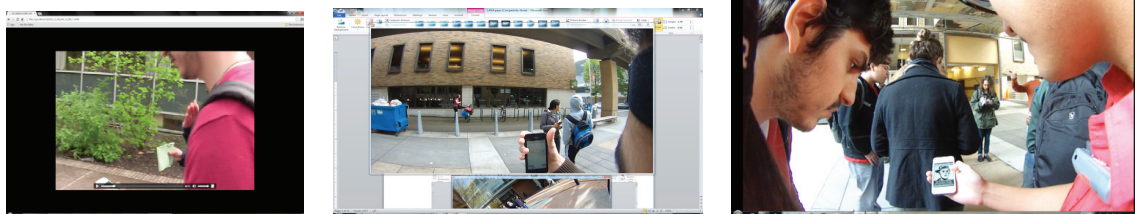
A prosocial AR game recently developed at Portland State University by an on-campus group (The 503 Design Collective: a team of students and faculty), which takes the university's emphasis on green technology and sustainability as its core focus, is called *ChronoOps* (standing for 'chronological operations'). The conceit of the game is that students play the role of an agent from the future (the year 2070). The game narrative is that in the year 2070, the planet has suffered massive environmental degradation and the player-agent has been sent back in time to the year 2015 (as of this writing) in order to learn from the "simultaneous dawn and dusk of green technology" that is in evidence on and around the university campus located in Portland, Oregon. When players enter certain physical locations, they receive video, audio, or text information and/or directions in one of numerous languages (currently English for ESL students, French, Japanese, Russian, or Spanish). Players are given tasks that result in visits to the electric avenue (a location where electric cars can be recharged), a large solar array producing electricity for the city, local public community gardens, recycling projects, and environmentally designed "green structures" on campus. En route, players are prompted, in their role as agents tasked with investigating sustainability projects that could yet save the future of the planet, to record verbal narratives of what they observe using the target language. At various points, they are also asked to make text notes, shoot video, and take photographs, all of which are later used in language-learning assignments such as the production of written reports and oral presentations. Participants are asked to play in small teams of three and group interaction while playing the game involves various types of task- and way finding-related communication.

This research analyzes the interactions of two small groups as they play the *ChronoOps* AR game. A distinctive feature of the context for our study is that only one participant in a group of three was carrying a mobile device. This created a dynamic in which the group would orient toward a single device, prompting the need to communicate information to one another.

## Data collection

Participants were eight groups intermediate-level students of English as a second language (twenty-four students total) at the university where the research took place. At the start of the data collection, students downloaded the app to access the game. The teachers had the students work in groups of three (one phone per group) to find examples of green technology in the area.

Intensive video recording (approximately twelve hours of video total) was made of the interactions and the recordings were transcribed. Two members of each group wore head mounted cameras that captured an approximately 170 degree visual field in the direction they faced (Figure 1).



**Figure 1: Three views from a head-mounted camera**

These cameras captured audio of the camera wearer and the group. A third member of the group wore a wireless microphone that fed audio to a third, hand-held camera operated by a member of the research team (figure 2).



**Figure 2: Hand-held camera view**

**(The head-mounted cameras can be seen in the students on the right and left)**

Additionally, the students used their group's mobile device to record video reports from each of the green technology sites, which were uploaded and available to the teacher and students after the class.

## Analysis methods

For this paper, data analysis procedures were influenced by conversation analysis (CA) (Goodwin & Heritage, 1990) and linguistic anthropology (Goodwin, 1994, 2000). The authors were camera operators during the data collection and participant observers. The instructors of the classes in which our participants are enrolled are part of our research team and we are familiar with the curricula and other contexts of the courses in which the AR game was used.

Although our analysis used close CA transcriptions of the talk-in-interaction, the visual record of the interaction available via multiple camera views was imperative for understanding the role of the physical environment and interaction via mobile devices. Group data analysis sessions were conducted and the transcriptions include embedded images of the participants' gaze, gesture, direction of movement, interaction with objects, and the digital and physical environments to illustrate how these resources interact with the talk-in-interaction (Goodwin, 2000; Mondada, 2008). Although we conducted sequential analysis of the talk, the use of multiple video recordings and our research questions required multimodal analysis allowing us to foreground and describe sequences of actions as much as turns of talk (Ford et al 2013), where actions are designed as "complex multimodal gestalts" (Mondada, 2014, p. 139).

The availability of one phone per group required that small groups work together to accomplish the game activities. They moved around the university campus as a coherent group of 'mobile withs' (Jensen, 2010, based on Goffman, 1971). As was expected, the investigation showed that the mobile device played an important role in the way the groups managed their interaction (Brown et al 2013) and progressed toward completion of the game, with two

primary orientations in evidence: 1) explicit orientation to and staying near the device holder, and 2) group members physically orienting to the device itself (a richer description of this interactional work is given in Hellermann, Thorne, & Jones, in preparation).

### Situating work: explicit orientation to staying near the device-holder

The first excerpt illustrates the importance of the device-holder in organizing the physical location of the members. The participants of this group are Max, Prius, and Trek. As they move toward their first destination, Max is holding the device as the three participants walk three abreast down a sidewalk in a park. At the start of the excerpt, Max slowly comes to a stop (line 11). Trek observes something to her right and points to it. Prius mimics the gesture and utters a change of state token (balloon caption) in overlap with a try marked proposal for a place or direction from Trek (balloon caption). The gestures become indicative of a next place or direction and Trek and Prius walk in that direction until Prius turns his head (image just before line 19) to see that Max, the holder of the phone, had stopped. Prius shifts the direction he was walking to move back to Max. Trek notices and follows suit. It is then that Max notices the two had moved away from him and utters a reprimand in the form of a question (lines 19 and 22).

[ESL131002AC1G2HC1.1 6:19-6:30 ESL123AC1G2RC1 w audio 1:23]

10 Max: there are a lot, ((gazes to device))  
 11 (1.3) ((Max comes to a stop and then looks up))  
 12 Trek: ((points to her right))



15 (2.0) ((Max looks to device))  
 16 Prius: hey.  
 17 (2.0) ((Trek and Prius walk in direction of gesture))  
 18 (2.0) ((Trek faces Max whose gaze is to the device))



((Prius follows Trek's gaze toward Max))



19 Max: ↑what you are doing.  
 20 Trek: ha [↑heh heh heh  
 21 Prius: [heh hah heh

22 Max: [↑what you are doing  
 23 Trek: [we are l\_::st! heh



The orientation to maintaining physical proximity to the device is seen in (1). When two group members move away from the one group member who has stopped walking (the holder of the device), it is one of the two strays (Prius), not the device holder, who first orients to the device holder's lack of movement and his separation and begins moving back to the device holder (Max). The device holder orients to this separation and makes a joking reprimand. Here, a provisional direction to the next destination had been selected (nonverbally) by two members who moved in that direction. That destination, however, appeared to be subject to verification by the device holder

as Prius and Trek changed their course and re-configured around Max as Trek suggested that the direction she initiated was not a correct one (line 23).

The excerpt shows group members' accountability for straying from the device holder. Although we have seen examples in which it is the device holder who makes a directive to the group ('hey, come back here'), in the excerpt we present it is the observation of one of the strays that redirects the two straying members back toward the device holder. The reprimand by the device holder and a negative assessment by one of the strays as to their chosen direction show straying to be an accountable action.

## Participants looking at, doing looking at, or directing others to look at the phone

Other than orienting closely to the physical location and instructions from the phone holders for purposes of finding their next location, participants also display an orientation to the device itself, even when they are not holding the phone. This orientation involves one or more of the group members standing in close proximity and directing their gaze towards the device. This is seen most often in the group members' persistent orientation to attending closely to the device as a guide for the group's movement. The following excerpts show how the device serves to create a focal point for their coordinated attention (Goffman, 1981; Goodwin, 1981) to the collective task as a 'team' (Goffman, 1959). The group members display this orientation non verbally and verbally.

Excerpt 2 (below) shows that members of a collectivity may not be visually attending to the degree expected but *do attending* nevertheless as part of maintaining the public sense of a group. The members of this group are Rec (device holder), Red, and Reu. As Rec reads from the phone (line 1) and self-initiates repair (line 2), Red's gaze is toward the phone. However, given the difficulty of seeing even very sharp images on a mobile phone screen in daylight, it is unlikely that he can see the text on the screen well enough to read it. Upon hearing the information-seeking first pair part in line 2, Red initiates repair (line 3, asking for a repeat of what was said) and then repositions himself in order to be able to read the screen and provide an informed response to Rec's information-seeking first pair part.

[ESL131006SGT1G2RC1 25:34-25:44]

01 Rec: "rain water can be used."

02       what is  
          >the rain< water?



03 Red: I'm sorry?



((Red repositions to be able to read the screen))

04 Red: "th:e toilets in the: °academic°-"

Excerpt 2 shows that before the device holder (Rec) displays trouble in the interpretation of the instructions on the device, Red displays a posture that indicates his alignment with the group and engagement with the device. Positioned facing Rec, Red also bends his head so that his gaze is toward the device. When text is read from the device that makes repair relevant, we see Red shift his posture and gaze to be able to use the device to help with the repair.

## Discussion and Conclusion

As a first step to understanding this particular AR game context for language pedagogy, our analysis focused on the ways in which participants orient to mobile devices to accomplish their activity. In this paper, we have illustrated how walking, pointing, gesture, and gaze are used by participants to display and maintain an orientation to the device holder. These practices occurred when two participants strayed from the device holder and when the device holder was reading text from the device.

It is not surprising that the participants oriented to the mobile device as an important focal point and mediating tool for the activity. However, we found the interaction around the device to be even richer than we expected. From the perspective of language pedagogy, this investigation shows how an object can become a mediating and catalyzing device for language use and learning; in essence, that a quotidian activity such as way finding can result in complex instances of interaction. Moving into and out of group configurations involved a continuing process of interpreting what was visible on the device with what they saw and knew to be around them. The process of moving from place to place provided the group with a situated context for communication in the service of collective problem solving and decision making. The excerpts from the analysis highlight how the device is a catalyst for situated, embodied, and co-constructed talk-in-interaction.

The pedagogically-motivated decision to have the activity be carried out by small groups using one device per group had the effect of getting all group members to share an orientation to the device and, thus, the device holder. Our ongoing analysis is showing that in using the device, the most common orientations of the group members were (a) to the groups' current location, (b) to the next destination on the google map, and (c) the text instructions displayed by the game interface on the device. The use of one device per group also meant that participants in each group periodically moved in and out of a clustered *f formation* (Kendon, 1990). This was initiated by the need to re-orient to the device's indication of their location on its map. This clustering was also reflexive in that when all participants looked at the device, re-orientation was made relevant due to each member's need to coordinate and affirm their physical and 2-D cartographic location. The relatively under-specified nature of the AR map feature, however, facilitated a more consistent outward focus for the groups. In this outward focus we saw how 'objective' physical objects (a building, a bicycle parking area, a streetcar) are contextually re-realized by the group. Via the tasks outlined by the AR activities and negotiated among the group, objects in the environment are talked about and semiotically remediated (e.g., Prior & Hengst, 2010) within the narrative frame of environmental stewardship. Visible processes and sequential alignments included the coordination involved in making public and locally-relevant the private logic of the AR game's map. Through this process, problems in understanding as well as next actions are made public via talk-in-interaction, which served to coordinate the virtual-digital and sensory-visual information and which eventually led to successfully completing the way finding and green technology narration activities.

Although the device holder is clearly oriented to as a focal point more than other members of the group and may sometimes have special privileges (and responsibilities) by the fact that she/he is holding the device, the device was accessible to all group members. At various points, they looked at the device while the owner held it and they occasionally grabbed the device themselves for better access.

There is not space in this report to discuss the intricacies of the groups' formation as they stopped and re-started movement (Hellermann, Thorne, & Jones, in preparation). However, it is important to mention the fact that the activity demanded that participants walk to a series of destinations which made movement an important contextual feature of the talk-in-interaction. While stopped, group members had more shared access to information on the device. The momentary suspension of the sequential presentation of the immediate physical environment also allowed time for group members to interpret, assess, and make suggestions about strategies for accomplishing the activity.

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