

# **‘BEING A SPACE MINING CREW’: HOW PARTICIPANTS JOINTLY DISCOVER THEIR COMPLEMENTARY RESOURCES WHILE ENGAGING INTO A SERIOUS GAME AT AN INTERACTIVE TABLETOP (ITT)**

**B. Arend<sup>1</sup>, S. Heuser<sup>1</sup>, V. Maquil<sup>2</sup>, H. Afkari<sup>2</sup>, P. Sunnen<sup>1</sup>**

*<sup>1</sup>University of Luxembourg (LUXEMBOURG)*

*<sup>2</sup>Luxembourg Institute of Science and Technology (LUXEMBOURG)*

## **Abstract**

This paper is concerned with how an interactive tabletop (ITT) mediated gaming activity is prompting and supporting collaborative conduct in a face-to-face setting. By studying video fragments of situated gaming interactions, we can point out how the serious game ‘Orbitia’ is fostering the players’ joint engagement into the gaming process. A fine-grained video analysis allows us to investigate and visualize how three participants jointly discover their mutually complementary resources and thus build up a shared understanding of relevant game features and challenges. Our current findings suggest that our ITT mediated serious game generates and strengthens participants’ collaborative experience thus providing relevant insights into collaboration processes in a digitally mediated environment.

Keywords: Interactive tabletop, gaming process, complementarity, collaboration.

## **1 INTRODUCTION**

In the present paper we investigate and highlight how instances of engaging into an interactive tabletop (ITT) mediated game are collaboratively performed by the participants and thus enable next joint actions. In the context of an interdisciplinary project (social and educational sciences meet computer sciences), we have designed the tabletop mediated activity ‘Orbitia’ [1] [2] aiming at inducing collaborative conduct in a face-to-face setting. Within our project ‘Orbit’ [3], we are developing and setting up an interactive serious game design in order to contribute to understanding the dynamics of collaboration as an observable fine-tuned multimodally embodied conduct. Moreover, at this stage of our research, we can show how our game scenario, which is built amongst others on cooperative learning considerations, is strongly encouraging and supporting the participants’ interdependently and reciprocally coordinated work as well as their joint construction of understanding [2]. In this vein, we can point out how ‘Orbitia’ is concerned with one of the contemporary societal challenges by leading participants to process information together and thus achieve meaningful synergies. We designed the storyline of the game as an incentive for participants to work together as a space mining crew building up and sharing a common object. Three participants are asked to find and mine valuable minerals to be transferred to a marked location on an imaginary planet. One of the challenging components of operationalizing this request consists of jointly steering a rover and detecting hidden minerals and other items *via* activating a camera drone. Moreover, each participant occupies a so-called control station (panel) and takes on a specific role enhanced with customized but mutually supportive resources: damage controlling, mineral collecting, energy controlling. In the course of their missions, the crew members have to cope with several obstacles and constraints (sand storm, energy loss, hostile environment).

By relying on relevant video fragments (taken from a large video data corpus of the project), we will show in the following sections how three participants jointly discover their mutually complementary resources and thus build up a shared understanding of the game challenges. We can highlight how the participants expand their understanding of the above mentioned roles and assigned competences in a multimodal dialogue; and how this ‘new’ shared understanding launches next jointly performed actions in order to accomplish the space mining mission.

## **2 GAME KEY FEATURES AND CONCEPTS**

For reasons of reading convenience, we will shortly describe in this section the key design features of ‘Orbitia’. Then, we will outline the conceptual background on which we rely for our study.

## 2.1 'Orbitia', a serious game: 'what is it like?'

'Orbitia' is the name of an imaginary planet where three participants act as a space mining crew in order to mine minerals and to transport them to a starting point by steering a rover "Fig. 1". While manoeuvring, the participants have to deal with diverse constraints (obstacles, sharp rocks, energy, sand storm). A control station is assigned to each crew member. Thus, complementary responsibilities are distributed among the players: being in charge of damage controlling and repairing, of mining or of managing energy. Each station, i.e. participant, is provided with individually allocated steering options: touch controlled arrows enable the participants to move the rover in an appropriate order into six different directions (two per player). Furthermore, each participant has access to extended information regarding the features of his/her station through pressing different buttons. A (tangible) drone can be operated by every participant to disclose hidden items in the sand storm area. After pushing the button on the drone, the nature and the location of the items in the surrounded area is briefly displayed. This called-up information is then distributed to the corresponding mini-maps in the three control stations; dots are appearing in the mini-maps and thus signal the location of the revealed items (sharp rock, mineral, energy) in the respective stations. Moreover, in the here depicted game version, a (tangible) highlighter can be used to mark or unmark cells, for tracing or planning purposes.

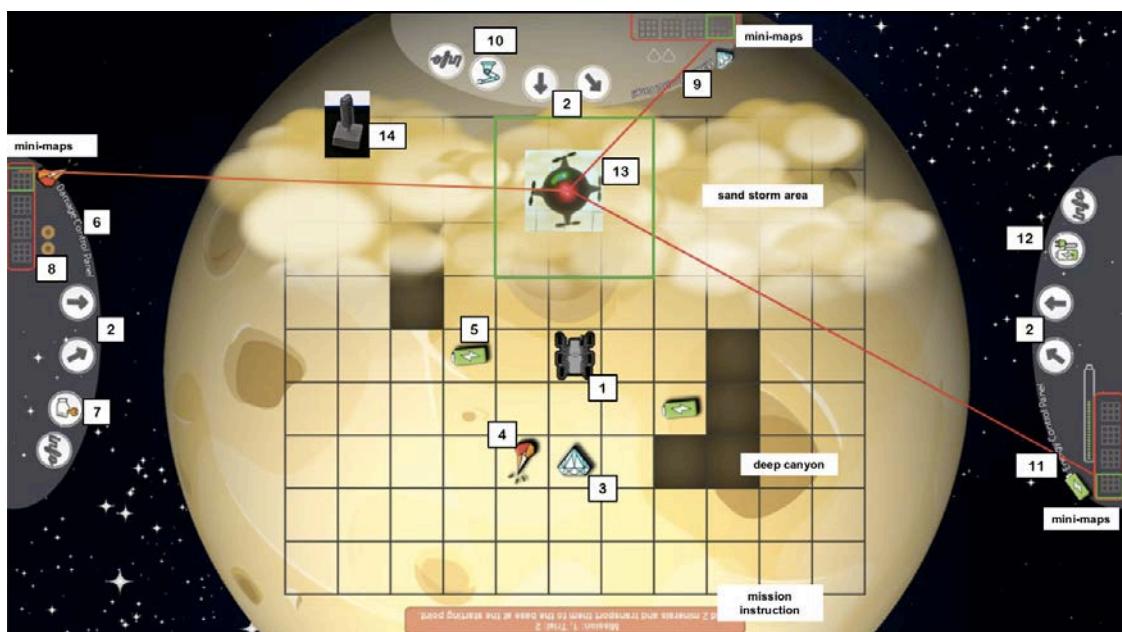


Figure 1. ITT display: Annotated 'Orbitia' screenshot of a randomly selected game moment.

1. mining rover	9. mineral control station
2. directional arrows	10. picking up button
3. mineral	11. energy control station
4. sharp rock	12. recharge button
5. battery	13. camera drone
6. damage control station	14. highlighter
7. wrench button	
8. spare wheels	

Figure 2. Legend "Fig. 1".

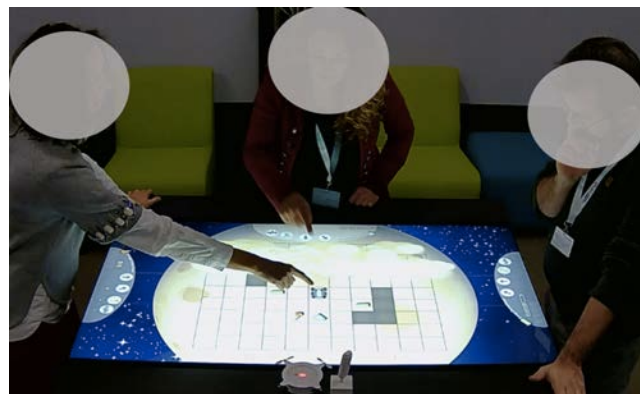


Figure 3. Gaming moment.

When starting the game application, an introductory text is displayed on the tabletop and simultaneously read aloud by an integrated voice "Fig. 5": "Welcome to the space mining station on the planet Orbitia. Here, minerals are mined to be shipped to Earth. As a space mining crew you will operate a rover and a drone to find and to collect the required minerals and transport them to the base

at the starting point. Be aware that you are operating in a harsh environment. Do not let your rover run out of energy and do not destroy it. Get ready, take a position and start the first mission.” Subsequently to the contextualizing and briefing narrative, a short instruction is emerging on the screen: “Find 2 minerals and transport them to the base at the starting point”. The participants are supposed to accomplish three missions, i.e. going through different levels of increasing difficulty. They are informed about failure or success; if the latter applies, a new instruction will introduce the next mission challenging the participants through augmented constraints (for instance, an increased number of collectables and of sharp rocks, and a larger area of sand storm).

In the following (section 3), we will show how three participants progressively discover and familiarize themselves with game features and challenges by reciprocally building up a shared understanding of each other’s resources and roles. The participants’ recognizable orientation to their resources - both the own and the others’ - and their production of actions in the light of ‘reciprocity’ and ‘complementarity’ leads us to assume that their interactions are collaboratively performed.

In order to provide further clarification before analyzing the video fragments in section 3, the next section will outline some underlying theoretical concepts of our research focus.

## 2.2 Conceptual background (at a glance)

In line with the research issues of our project ‘Orbit’, which is concerned with the design of a collaboration-inducing game scenario, we rely on a process-oriented meaning-making approach on collaboration as specified by Roschelle & Teasley [4]. They define ‘collaboration’ as a “coordinated synchronous activity that is the result of a continued attempt to construct and maintain a shared conception of a problem”. In this line of thought, according to our purpose, we focus on collaboration considered as the players’ mutual engagement in a coordinated effort to accomplish a mission. Furthermore, we argue that the collaboration process takes place in a shared space and is instantiating in the participants’ situated recognizable actions of joint commitment. In the case studied here, we show how the participants’ collaborative conduct is actualizing in the accounts of jointly building up a reciprocal understanding of each other’s resources (with regard to the game challenges).

We noticed that the participants’ placement during the gaming activities is not arbitrary. We observed actually that each of the three players takes a position ‘around’ the tabletop in view (in the literal sense) of a control station “Fig. 4 a, b, c, d”, as intended by the design. In the focused gathering [5] around ‘Orbitia’, the participants’ body positions open up a visual access to each other’s embodied conduct and to the imaginary planet area as well as to the others’ control station display. In sum, the spatial ‘off game’ configuration and the game design are closely intertwined and enhance the participants’ mutual attention as well as their shared engagement into the challenging game ‘mechanics’. We touch here upon a key element with regard to coordination and shared understanding in a collaborative game performance: reciprocity. According to Schutz [6], ‘reciprocity’ allows for the possibility of understanding, beyond being oriented towards someone else. Schutz emphasizes the importance of ‘the reciprocity of perspectives’ in interactions (taken for granted in the common-sense world); in describing the interchangeability of ‘here’ and ‘there’, the reciprocity of perspectives emerges as a necessary condition for mutually shared understanding. It means that objects of experience are available as commonly shared and that subjects (here: the players) mutually grasp the simultaneity of each other and continuously and methodically coordinate their perspectives. In the present case, we will point out how the three participants mutually discover their own and the others’ resources as being complementary. By ‘interchanging’ their respective point of view, they realize that each resource “is partial and incomplete. However, when joined together in local contextures of action, [...] resources mutually elaborate each other” [5].

Since we investigate the players’ accounts i.e., their recognizable embodied conduct of mutual engagement into the ITT mediated gaming activity, there is need to capture the process in real time. Thus, we collect video footage with four cameras. The recordings of the game sessions with four cameras “Fig. 4 a, b, c, d” offer a multi-perspective visual access to the real-time unfolding of the game as it happens moment by moment. In order to analyze the data, we refer to an EMCA inspired approach (ethnomethodology and conversation analysis) [7]. “EMCA’s starting point is with the activity, and it seeks to advance rich descriptions of what might be said to adequately constitute actions from the perspective of those producing them; the aim is thus to discover what is important and/or problematic for the participants.” [8]. EMCA is indeed concerned with how people achieve current actions by communicating with each other and how they make accountable to each other their understanding of these actions. For the concern of our research issue, we build upon an ‘extended’ conversation analytic approach which goes beyond investigating talk. In our analysis we identify

accounts of joint engagement and mutual understanding in their multimodal occurrences (talk, gesture, mobilization of material resources, body movement, gaze).

### 3 ANALYSIS

The case study data analyzed in this paper are to be considered as a small sample of our 'Orbit' Data. All the game sessions are recorded with four cameras, three installed so as to provide front views of the players, and one is offering a ceiling view of the recorded tabletop screen "Fig. 4. a, b, c, d". The four views are synchronized and can be edited as a 'joint screen' [9] in order to enable analyses of the coordinated actions of the players, taking into account their embodied conduct and their moves on the screen.



Figure 4. a, b, c, d.

In this article, we mainly rely on two camera perspectives "Fig. 4. a", "Fig. 4. c", for analysis and illustration purposes.

#### 3.1 Engaging in 'Orbitia' mission 1

The application has started: The participants are standing next to each other at the tabletop, thus having visual access to the display.



Figure 5. Introductory text.

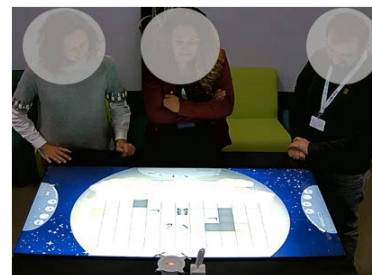


Figure 6. First look at 'Orbitia'.

Participants from left to right: Ada (A), Viv (V), Joe (J).

We join the excerpt as the participants see for the first time what 'Orbitia' looks like "Fig. 6". The previously vocalized and written instructions (see section 2.1 and "Fig. 5") are supposed to get enacted and to take actual forms through the participants' gaming procedures, with regard to the displayed game 'mechanics'. In the following, we will highlight how the participants discover relevant game features both by mutually taking into account the others' suggestions and jointly orienting to 'items of interest'.

### 3.1.1 Transcription Part 1

The 'mission instruction' text is displayed on the screen.

1 A it works with [that ((A points to the directional arrows of the mineral control panel))

2 V [what is the starting point/

3 J AH we have three:: ((while pointing consecutively to the three control panels))



3

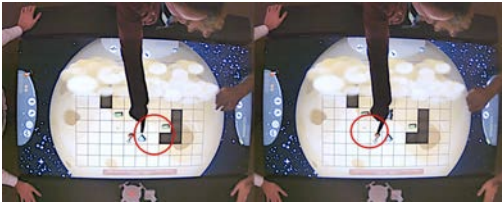
4 V ok .. the starting point

5 A the starting point eh::

6 V so that is our energy ((while pointing to the two battery icons on the planet area))

7 A yes

8 V that are the minerals



8

9 A ok

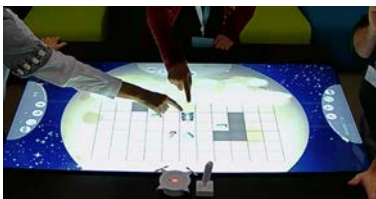
10 V that is our trans[port] ((pointing to the rover))

11 A [yeah] transport

12 V find two minerals and transport them to the BASE at the starting point ((reading aloud the displayed instruction))

13 A the starting point [it is there]

14 V [it is there]



14

15 J yeah

16 V ok

17 A what shall we do we shall use the arrows here ((A is pointing to the directional arrows at the damage control panel))

18 J yes but we have to think about energy too after it is\_ we shall try at first

### 3.1.2 Engaging in 'Orbitia' mission 1: Joint discovery of relevant items

Ada takes the first turn (1) and suggests that "it works with that" while pointing to the directional arrows of the mineral control panel. By using the deictic pronoun "it", Ada refers 'probably' to an item mentioned previously in the introductory text or in the displayed mission instruction. The deictic "it" might be associated with the rover or more generally with 'starting the mission and operating the rover'. By means of her simultaneous pointing gesture, Ada makes accountable that she considers "that", i.e. the arrows, as relevant for engaging into the gaming process. Viv is searching for the starting point (2). Besides picking up the closing phrase of the mission instruction text, she seeks to

detect a local point of reference on the planet area. Subsequently, Joe's turn-initial "ah" announces his upcoming talk as bringing enlightening insights. He continues with "we have three" while pointing successively to the three control panels and moving to the energy panel (3). Joe's multimodally embodied utterance (speech, gesture, body movement) elicits Ada's and Viv's attention and entails their synchronized re-positioning 'around' the tabletop (3). Note that the participants move toward the control panels in a pragmatic way with regard to their previous positioning<sup>1</sup>. The re-positioning is organized as an other-oriented co-produced action; the participants do move into consistent and relevant positions with regard to each other. A closer look at Joe's turn construction shows us that he uses the personal pronoun "we". Thus he makes accountable that he is addressing the persons present at the game session as a team (by including himself as a member). Moreover, although Joe's formulation "we have three" is an uncompleted sentential unit (the noun, i.e. the characterization of the item related to the numeral adjective 'three' is in suspense), Ada and Viv treat his utterance as a proposal to move thus demonstrating mutual responsive understanding. We note that Joe's pointing gestures and his movement operate as 'stand-in' for the 'lacking' *linguistic* turn completion and hence contribute to prompting the participants' distributed positioning at the three control stations. They are making a setting [7]. In the next turn (4), Viv says "ok"; each participant is gazing at her/his own control panel. Viv's "ok" here can be considered as a pivotal marker. On the one hand, she refers to the recently instantiated 'discovery' of the three stations thus re-approving the re-positioning sequence; on the other hand, she projects her next action. She comes back indeed to her first 'object' of interest 'the starting point'. She has not yet received a response to her question raised in turn 2. Ada (5) is repeating the phrase 'the starting point' by making accountable ("eh") that she is hesitating and thus cannot provide the expected answer at that moment.

So far, each participant has brought 'one item' into focus: the directional arrows (Ada), the starting point (Viv), "three" positions (Joe). In the following, we will point out how the participants hold on the 'exploring' agenda and jointly shed light on the game features through their reciprocal other-orientedness.

The issue of 'the starting point' and 'the arrows' is temporarily pending: the arrows have not yet been used and the starting point has not yet been detected. At turn 6, Viv relaunches the 'item identification' process, which is then unfolding in a sequential flow. Viv's turn-opening "so" affords recognizing her next utterance as an elicitation to multiparty joint attention. "So" is used to reactivate the 'exploring' agenda. Viv is quite confidently introducing a 'new' item ("that is our energy") while pointing to the batteries on the planet area. Immediately after Ada's validation (7), Viv provides a further statement ("that are the minerals") (8) while she is pointing consecutively to a mineral and a sharp rock. Ada replies "ok" (9). (The misapprehension will be clarified at a later stage (33-36)). Visibly, Viv considers Ada's "ok" as an account of consent, and she continues identifying another item (10) ("that is our transport") while pointing to the rover. Ada agrees again (11). Viv's use of the possessive adjective 'our' when referring to the energy and the rover is in line with Joe's former 'we' and constitutes a further reinforcing account of team building i.e., of 'being a space mining crew'. Meanwhile, Joe is gazing at the screen in a posture of silent agreement.

Except the 'deep canyon' and the sand storm "Fig.1", and apart from the 'mis-identified' sharp rock (8), the items displayed on the planet area have been designated. Now, Viv pursues the focus of interest opened up in turn 2 and renewed in turn 4 "the starting point". She is reading aloud the mission instruction by emphasizing the word 'base' (12). Then, Ada repeats 'starting point' (13) immediately followed by Ada's and Viv's simultaneously uttered statement "it is there" (13, 14); both are pointing synchronously to the rover (14). The starting point has been localized at last. With regard to the intonation that Viv placed on the word 'base' making it recognizably stand out for all the participants within her reading aloud (12), we assume that associating 'starting point' and 'base' i.e., the spot where the rover is parked, put the participants on the right track. Joe validates the new finding (15). We see here to which extend the participants mutually grasp the simultaneity of each other and continuously pay attention to each other's perspective. Through their overlapping talk and gestures (13, 14) Ada and Viv demonstrate how mutually shared understanding implies some kind of anticipation of the other's understanding and action. Viv's subsequent 'ok' (16) can be compared to her former use of the discourse marker in line 4: 'ok' serves as closing the 'starting point' sequence and elicits a next action.

<sup>1</sup> Joe moves leftward (from his perspective) to the energy control panel, Ada moves rightward (from her perspective) to the damage control station, Viv stays in position at the mineral control panel while spreading out her arms and leaning her hands at the tabletop.

In reply to Viv's elicitation, Ada asks "what shall we do" (17). We note that she is using the personal pronoun 'we' thus considering the next action as a joint performance. Actually, Ada's question reveals to be quite 'strategic'. She provides the answer herself by putting forward the use of the arrows ("we shall use the arrows here"). Note that Ada re-enacts the pending issue of the 'arrows'. As compared to line 1, where she was pointing to the arrows at the mineral control panel according to her position at that time, she is now referring to the arrows of 'her' control panel. Besides considering that her action is oriented by practical reasons of proximity, Ada makes accountable that she occupies one particular position "here" from where she has the possibility to activate the steering functions. In line 18, Joe is evaluating Ada's proposal while scrutinizing the energy panel. Let us remind the instructions regarding 'energy' (see section 2.1) "Do not let your rover run out of energy". Joe's reply is double-oriented: he is weighing up Ada's suggestion to use the arrows (i.e., steering the rover) by keeping an eye on the energy. The syntactical structure of Joe's turn is quite revealing in that matter. In the first part of his utterance, he gives an account of noticing "yes" immediately followed by a stance of objection "but we have to think about energy too after it is". Joe shows that he has already adopted his 'energy controller position' and that he is actually anticipating potential problems. He makes accountable that he infers a link between steering and energy consumption and thus favors a cautious proceeding: he opts for trying "we shall try at first". Note that Joe assigns a quite balancing orientation to this last part of his turn, combining equitably his own and Ada's purposes.

But, there will be no immediate use of the directional functions!

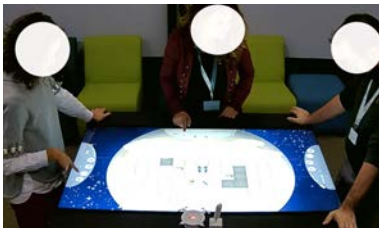
### 3.1.3 Transcription Part 2

In the previous analysis section we have outlined how Joe's short, indicative utterance (3) simultaneously supported by his pointing gestures and his leftward movement to the energy control station has entailed a mutually coordinated and consistently orchestrated re-positioning of the participants to the three panels. In the following, we will show how the participants move ahead in the process of discovering the 'tools' and roles allocated to their respective control panels whilst they are already *spatially* occupying 'their' stations. Subsequently to Joe's reflection on energy consumption (18), there is a new 'ah(a)' moment:

19 A AH ah we have different tools (while moving here index finger forth and back and then pointing to the damage control panel; the participants' gaze moves 'between the panels')

20 J ah

20 ((A points to the wrench button while gazing at the mineral control panel, V points to the picking up button while gazing at the energy control panel, J gazes at the energy control panel))



21 V I have an arm ((mimetic 'pick up' gesture then looking towards Ada's station))

22 A I have/

23 J I monitor the energy ok ((participants gazing at energy control panel))

24 A ok

25 V perhaps the arm will go from here to there and we do not need to=

26 A I have ((A is pointing to the sharp rock icon i.e., the damage control panel icon))



26

27 V = move

28 A I don't know we have eh ((A is pointing to the mineral control panel icon; the participants are gazing at the mineral control panel))



28

29 V mineral control panel so we don't yet have anything ((gazing at her panel))

30 A no . damage control panel .. [we have] ((shifting her gaze between Viv's and her panel))

31 V [[[gazing consecutively at planet area, at A's control panel and her own control panel]]]  
DAMAGE control ((simultaneously pointing to the sharp rock at A' panel))



31

32 A damage

33 V yes but then ((the participants are gazing at the planet area))

34 A then that is what/

34 ((A and V are simultaneously pointing))



35 V yes then it is not a mineral ((V is pointing to the sharp rock icon on the planet area))

((In the following minute, Ada, Viv, and Joe are exploring the button functions of their respective stations to get further information about the 'tools'. When Ada pushes 'her' mini-map button, the following text is displayed: *These are the scans retrieved by the drone, showing the location of sharp rocks*. Ada concludes that there must be sharp rocks somewhere on the planet area. Then, Joe takes the next turn.))

36 J it must be that ((pointing to the sharp rock icon on the planet area))

37 A ah yes

38 V I have to take that in order to pick up ((pointing to the picking up button and repeating the previously made mimetic gesture))

39 A and ((pushing the wrench button)) I have for mounting the spare wheels

After that, the participants will focus on the directional arrows and start steering the rover. They will successfully accomplish the first mission.

### 3.1.4 Engaging in 'Orbitia' mission 1: We have ... I have ...

Referring to the second excerpt transcribed above, we notice that the participants' observations and assumptions actualize in short (or even uncompleted) phrasing units made understandable and relevant by means of gaze and gestures. In that matter, we point to how the participants' visual access to each other's control panel and to the planet area affords and supports shared understanding as developing in complex and intertwined trajectories of mutually oriented embodied action. Different foci of attention (icons, items) are mobilized and 'compared' with each other in relation to their local occurrence and availability. In the focused gathering around 'Orbitia', the participants explore the displayed items by informing each other in order to get deeper insights into their roles and resources. Their multimodally embodied conduct is actualizing in a mutually coordinated 'networking' of complementary points of view.

In line 19, Ada's turn-initial "ah" points to an informing and illuminating upcoming utterance (see also 3.1.1., 3). Here, Ada builds upon Joe's former turn-constructing procedure (3) in order to announce



her 'new' expanded understanding of the three control stations ("we have different tools"). In linguistic terms, as compared to Joe's verbal utterance in line 3, Ada's phrasing is completed. Furthermore, in terms of enhancing the shared understanding of the game 'mechanics', Ada makes an enlightening contribution: she states that each member of the team ("we") occupying a control station can rely on customized tools. The participants proceed immediately to an embodied 'crossover' searching for distinguishing features displayed at the panels, in order to grasp the personalized 'station-related' tools (19, 20). In line 20, Joe makes accountable ("ah") that he treats Ada's contribution as an additional revealing key information about the players' resources. We note here how the reciprocity i.e., the interchangeability of perspectives applies as one aspect of intersubjectivity that underpins interaction between people and between people and material (digital) environment. According to Schutz [6], "what we say, perceive or do is part and parcel of a world known in common" and, moreover, "we assume that the material world is arranged in a way as to refer to such common knowledge". Thus, for all practical purposes, each participant can assume seeing the same objects that the others see. Here, according to the participants' purpose, 'seeing' allows them to make assumptions and statements about the 'tools' with regard to recognizable distinctions, while drawing on mutual understanding.

In line 21, Viv launches the 'tool description' procedure ("I have an arm"). By orienting to Ada, she invites her to take over. However, in relation to Viv's prior turn construction, Ada's reply (22) is instantiating in an uncompleted phrasing ("I have"). Ada is still deliberating on the issue. Joe states that he is the one who monitors the energy (23). By his turn design focusing on the activity potential ("I monitor"), he shows that he is familiarizing with his role. Then, while Viv is making assumptions about the functionality of the aforementioned picking up arm (25, 27), Ada re-orientes to 'her tool' (26). Ada's pointing gesture to the sharp rock<sup>2</sup> icon, adjacent to her vocal utterance "I have", completes the phrase and operates as a turn-closing token (although she has not yet attributed any name to 'what' she has). In line 28, Ada shifts her attention to Viv's station and points to the mineral icon while making accountable that she is rather confused ("I don't know we have eh"). Viv opens the next turn (29) by a nominal clause "mineral control", thus verbally 'labelling' for the first time her position. Subsequently, she concludes that the team ("we") has not yet collected any mineral. Ada provides an account of acknowledgement ("no") (30), and after a brief pause, she also 'labels' her station ("damage control panel") by reading aloud the displayed text. Then, she hesitates ("we have") while orienting towards Viv. Meanwhile, Viv's gaze is traveling consecutively to the planet area, to Ada's control panel and to her own panel display before shifting again towards the damage control station (31). Right after, she repeats "damage control". Her synchronous pointing to the sharp rock icon at Ada's panel, as well as the emphasis on the noun 'damage', can be considered as an account of a rather puzzling noticing. Ada repeats "damage", here she confirms that Viv was referring to the icon related to the damage control by her pointing gesture (32). Viv's next "yes but then" initiated utterance (33) (while she is focusing on the planet area) is both connected to Ada's immediate prior turn and her own former turn (31). Her 'yes' marks approval; the 'sharp rock' icon is definitely allocated to the damage control function. However, the affixed clause 'but then' performs a refocusing action. Furthermore, building upon the previous sequential flow focused on distinguishing panel features, Viv's elliptical and double-oriented turn construction implies a claim for clarification. Ada and Viv jointly achieve this work (34). Ada completes Viv's turn and both are synchronously pointing to the 'sharp rock' icon located on the planet area. We note that A and V are mutually elaborating and jointly projecting a relevant issue "then that is what". Their symmetric pointing is an additional account of intersubjectivity instantiating in a finely coordinated embodied conduct. The deictic expressions 'that' and 'what' become meaningful as situated and contextualized within the 'tool description' procedure. Ada and Viv are revisiting the characteristics of the 'sharp rock' icon. Viv's subsequent answer (35) is provided in a negative turn construction acting as a first repair with regard to a former commonly approved item detection identifying both the 'sharp rock' icon and the 'mineral' icon as minerals (8-9). She concludes that "then it is not a mineral" while pointing again to the 'sharp rock' icon on the planet area. The participants' analysis here is both retrospective and prospective. Thus they are invited now to review the 'sharp rock' icon.

Subsequently, the participants explore the button functions at their respective control stations. The term 'sharp rock' appears for the first time when Ada touches the mini-map button (see transcription). She is reading aloud the displayed text. Immediately after Ada's reading aloud, Joe takes the next turn (36) and states that "it must be that", while pointing to the sharp rock icon finally identified as such in

<sup>2</sup> We use the term 'sharp rock' as determined by our design "Fig. 1"; we remind that at a former moment there has been a misapprehension (8-9), sharp rocks and minerals have both been identified as minerals by the participants.

Joe's repairing action. Ada agrees (37). The pending misapprehension has been brought to light and resolved through the participants' mutually oriented complementary points of view.

Then, the participants carry on with the 'tool description' procedure. Viv highlights the functions of the picking up arm ("I have ...") (38). And, finally (39), Ada makes a statement about her role: "I have for mounting the spare wheels".

## 4 PERSPECTIVES

In this paper we show how three participants jointly engage in the serious game 'Orbitia' while discovering their respective roles and resources through a mutually other-oriented embodied conduct. Seeing the other's resources both as different and reciprocally complementary allows the participants to describe and to familiarize themselves with their own roles. Furthermore, the jointly elaborated 'item identification' procedure and the shared understanding of the game features mutually enhance each other. We will address and expand this relevant issue in subsequent publications.

## 5 COMMENTS

Talk is transcribed according to conventions commonly used in Conversation Analysis. In order to enhance the readability of the transcription and to present details of embodied actions, we have added relevant frame grabs, numbered and laid out in accordance with the timely associated speech utterance. The granularity of the transcription is adapted to the purpose of this paper.

Ethical considerations are taken into account. The participants gave their informed consent in writing. The names are fictitious.

## ACKNOWLEDGEMENTS

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