On the Physical Dimension of Social Interaction in Mobile Games

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ABSTRACT
Social interaction seems to be particular relevant for mobile games. Usually understood as a joint, explicit, language-based activity, social interaction is incorporated into a carefully crafted game logic via challenges requiring collaboration and communication. But there is more to social interaction then the explicit dimension. To fathom out the potentialities of social interaction for game design we have to understand the implicit, tacit form we call the physical dimension of social interaction and its meaning for mobile gaming. In this paper we present empirical findings from our play tests confirming that the physical dimension of social interaction is naturally used and strongly featured by players as it increases the joint game possibilities and the intensity of the gaming experience.

Author Keywords
Social interaction, mobile gaming, play activity.

INTRODUCTION
Within our research we focus on mobile gaming experiences and their conceptual, aesthetical and technological foundations by exploring, developing, and play testing mobile games [2,3]. In the summer of 2006 we finished the development of our first playable game prototype On the Streets.

Our definition of mobile games consists of three characteristics:

- The player physically moves in the game world.

- The game takes place in a game world, in which real and virtual world merge into one world.

- The computational game technology works either on player side or on side of the objective conditions or to connect these two sides as it is done for example by mobile devices.

The physical movement of the player obviously plays a central role for mobile games and it is unavoidable for the

player to be involved in the game with his whole body. Further social interaction seems to be particular relevant for mobile games. For example Jegers refers to its role by his demand to not only enable, but even to encourage social interaction between players to increase the mobile game flow [4]. Montola and other members of the IPERG Group describe the domain of pervasive and thus also mobile gaming by means of the magic circle. According to them pervasive games including mobile games may expand with regard to three dimensions [5]. One of these dimensions beside the spatial and temporal is the social dimension.

Although social interaction is already identified as a relevant issue in mobile games, it usually is understood as a shared, explicit, language-based activity. Within the game logic it is bound to challenges mainly requiring collaboration and communication. But there is more to social interaction then this explicit social dimension. It is well known that social interaction has an implicit non-verbal part, but this physical dimension is rarely or never considered in the design process of games. To discover the potentialities of social interaction for game design we have to understand the implicit, tacit form of social interaction and it's meaning for mobile gaming.

In this paper we will demonstrate that the physical social interaction plays a particular role in building the magic circle of a mobile game. It further increases the joint game possibilities and the intensity of the gaming experience. Our empirical findings confirm that the physical social interaction is naturally used and strongly featured by players. They demonstrate in an at least for us surprisingly manner the relevance of this non-verbal and non-explicit form of social interaction.

To work out the physical dimension of social interaction and its meaning we (1) present the mobile game On the Streets, (2) point out the physical dimension of social interaction on the basis of our empirical data and (3) develop their conceptual meaning and present our conclusion.

THE MOBILE GAME ON THE STREETS
We developed the mobile game prototype On the Streets and play tested it for the first time in summer 2006. The empirical findings presented in this paper are based on process data collected throughout the first play test.

Game Concept

The mobile game On the Streets is played in a real world environment that is virtually divided into squares, we call fields in the following. Players are organized in gangs. A gang consists of one to five runners and a boss who is virtually located in the home base. The goal of the game for each gang is to gain power and influence by capturing as much territory as possible that means fields, and particularly the home base of the other gangs.

All runners have a virtual map of the game territory displayed on their PDAs where they can retrieve detailed information about the field they are currently in as well as about the eight surrounding fields.

In the game world there are also neutral, non-conquerable fields. They contain hospital buildings which can be used by all gangs. Other fields contain bank buildings. These fields can be conquered and the gang who owns it will get money on their gang account in periodical intervals. The boss can buy virtual robots with this money, so called Bots, place them on the map and let them defend conquered fields for him. On a conquered field items can be found like medpacks or stroke-proof waistcoats enhancing the power of the own gang.

Technology

Our game is based on a client server system. The system comprises two servers for two different tasks: The game server manages all of the game events, and the tracking server visualizes the player movements during a running game for an audience and can be recorded for further research purposes. On client side again different types of clients are used: PDA clients for the runners and PC clients for the boss of each gang as well as an admin client to administrate the game.

The runners' technical equipment consists of three elements: a PDA, a GPS mouse and a PoC[1] phone. The PDA is the platform for the game software, it is controlled via touch screen. The data link between the client and the servers is established by a TCP/IP connection via GPRS using the integrated radio module. The position data of the player is provided by a GPS mouse, which is connected to the PDA via bluetooth. Via the PoC phones all players within one gang may communicate with each other.

Evaluation methodology

For analyzing the data of play tests we follow a process-oriented methodology consisting of the following steps:

1. Identify the process of the whole game and the steps by which it is unfolding.

2. Identify game events, which change the conduct of the game.

3. Identify the game and play activity states before and after the game process changing events.

4. Differentiate the dimensions of the play activity: the goal oriented structure of the play activity, the rational

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behavior of the player following the game logic on the one side, and the context of the play activity and the intuitive behavior of the player on the other side.

5. Understand the changes in the game process by means of the results gained in the steps 3. and 4.

We present our empirical findings in form of tables for each example filled with the information about the process of the activity and the relevant context that may have been the trigger to the change of the activity.

The first play test

To get a first evaluation of our game we realized a core mechanism test. The core mechanic of a game is the "essential play activity players perform again and again in a game" [6] and may be evaluated by the most reduced version of the game.

Settings

Within this play test the game has been reduced to four fields (A1, A2, B1, B2), two gangs each with one runner and one boss - no items, no Bots, no bank, no hospital.

The general play activity of a runner consisted of these two main actions

- Running, changing fields and conquering them if they are vacant.

- Fighting against the opponent to conquer occupied fields respectively the home base of the other gang.

The general play activity of a boss consisted of these two main actions

- Observing the map, the movements, the fights, the status of the own runner.

- Fighting against the opponent to defend the own home base.

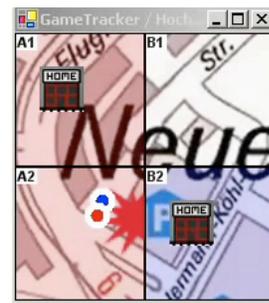A further important play action of both members of a gang is the communication with each other by means of walkie-talkies[2].

Figure 1. **Screen-shot of the visualization of the core mechanism game.**

In this game the gang Red consisting of the boss Paul and runner June competed against the gang Blue consisting of

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the boss Hodi and runner Hank. The home base of gang Red was located at field A1, gang Blue's home base at field B2 (see figure 1 above).

Data collection
We organized the data collection within this play test as follows:

- A visualization of all players' movements throughout the game;
- Participating film observation of runner June and boss Paul;
- A capture of the PC screen of boss Paul;
- Film observation from the perspective of runner Hank by means of a head mounted camera.

SOCIAL INTERACTION: PHYSICAL DIMENSION
Reconstructing the whole game process and the single play activities by means of the process data we also included the analysis of the social interaction. In studying those data we stumbled across some aspects, which added up to one meanwhile obvious feature, which we hadn't considered in that depth till then: the implicit, physical dimension of social interaction.

Fighter's Pas de Deux
One form of social interaction in our game is the fight between the runners being members from different gangs. According to the game logic the fighters have to identify the enemy in the real world and to attack him respectively to defend himself in the virtual world. That's it.

But as it turned out in our study of the game process the players in a kind of ritual dance approach each other, mutually assure the framing conditions of the fight, fight, sometimes emotionally comment on the fight results and finally leave the battlefield.

Game logic
The fight between the runners of different gangs is an essential mechanism within our game. The main goal of a runner is to conquer fields via physical movement. As soon as a runner enters a field this is passed into the holding of his own gang. If a runner of the other gang enters this field still occupied by the first runner both runners have the possibility to fight against each other for the ownership of that field. To initialize the fight the attacker has to select the enemy on his PDA screen. Afterwards the fight dialog appears for both players offering fight options to be

Figure 2. **Screen-shot of the fight-screen.**

selected within a certain time limit indicated at the top line of the screen. The attacker has to select the body part of the enemy to be attacked and vice versa the defender has to select the body part to be defended. The player fighting and being hit will lose life energy points as it is indicated in the bottom line of the screen.

Obviously the fight mechanism in this mobile game is done primarily on the virtual level (see figure 2). Just to select the enemy a player has to acquire information from the real world: he has to identify the colors of the cap and the shirt of the enemy and select these colors on the PDA to initialize the fight. Every player wears a shirt in the color of his gang and a cap which color is unique within one gang. By the combination of shirt and cap color each player may be identified unambiguously.

Empirical findings
Within this particular game both runners just start to move from their home base field to the home base field of the other gang. And very soon both runners see each other.

	Time m:ss	June's actions	Context	Hank's actions
	0:00		The game starts.	
1	0:21	June walks from A1 into the direction of B2.		Hank runs from B2 into the direction of A1.
2	0:21	June enters A2 and moves on.	Far away June sees Hank running.	
3	0:21	June starts running.	June and Hank approach each other.	
4	0:28	June slows down.		Hank slows down, stops immediately and attacks June.
5	0:36	June stops in front of Hank.	Game system reacts unexpected.	
6	0:39	June complains about system reaction.	Fight dialog is displayed.	Hanks looks at June's PDA and shows his own.
7	1:51	June fights.		Hank fights.

Table 1. June's play activity – actions and context

Table 1 shows the activities of the two runners: June and Hank. We divided June's activity into phases. The column Time indicates the start time of the action measured relatively to the game start. The third and fifth column describe June's and Hank's actions, while the column Context gives information about the individually relevant context that is important to understand the transitions from one action to the next.

Receiving the game start message June begins to move into the direction of her enemy's home base on field B2 (phase 1). She moves by means of fast walking. Doing so she enters field A2 (phase 2). Then she sees her enemy Hank running toward her. This sight of her enemy causes her to change her moving speed from walking to running (phase 3). She synchronizes her body movement with her opponent's movement. The next triggering context is observable when Hank slows down and stops some meters in front of her. June again changes her moving speed, now from running back to walking (phase 4). She keeps walking until she reaches him and stops about one meter in front of him (phase 5). Then again the context has to be known to understand her further behavior: Instead of showing the fight dialog as she expects the system to react it still shows the map on her screen. That causes her to talk to Hank: She laughs and says "I don't see anything" (phase 6). Hank already sees the fight dialog and knows that he attacked her first which means he has the advantage of the first attack turn. So at first he demonstrates his advantage by telling her "Ha, but I was first". Instead of staying face to face in front of her Hank then moves beside her to look at her screen and show her his current screen with the words "I have this image now". Then the system finally shows the fight screen to June, too, which lets her enter the fight (phase 7). When she expresses this change by saying "Yes, right now it's popping up here", Hank moves back to his position in front of her and they carry out the fight.

Empirical conclusion
According to the game logic the runners - already knowing the other runner - could have concentrated on the PDA for selecting and fighting. What happened instead was the perfect harmony of the synchronization (phases 3-5) of both runners approaching each other for first helping each other (phase 6) and then fighting against each other (phase 7). This happened by means of physical interaction.

Face to face - sensing the enemy and acting on him
Zooming into another fight event during the play test our empirical findings reveal that the physical face-to-face format of the fight is needed and enabled by the social interaction of the players despite of the virtual format of our fight mechanism.

Game logic
As we described above to fight against a runner of another gang it is just necessary to get the information about his shirt and cap color from the real world. Beside this the player does not need to face his enemy physically as the core part of the fight takes place virtually. There is no difference if the player is turned toward his enemy or if he watches him, except for him trying to cheat and see which body part his enemy chooses.

Empirical findings
Hanks moves into the direction of gang Red's home base. But he not only concentrates on the virtual core of the fight process, as he could have done.

	Hank's actions	Context	Time m:ss
	Hank runs in the direction of gang Red's home base.		
1.	Hank enters field A1 and approaches June.	June says (to her Boss) that she can't recover	
2.	Hank slows down and gives an advice to June.		3:19
3.	Hank moves some steps further.	PDA still shows his position on field A2.	3:21
4.	Hank stops, his back turned toward June, and attacks gang Red.	Hank's position is actualized on PDA to field A1.	3:25
		Fight dialog pops up, showing June as the attacked enemy	
5.	Hank turns toward June and fights.		3:35

Table 2. Hank's play activity – actions and context

In table 2 Hank's activity during the second fight situation is shown in detail. Hank moves into the direction of gang Red's home base on field A1. When he approaches June standing on her home base (phase 1) she just tells her boss via walkie-talkie that she still has not recovered her life energy. While passing her and hearing her complain Hank slows down and tells her "That should happen automatically, actually" (phase 2). Then Hank moves on (phase 3). June turns toward Hank moving away from her, but then concentrates on her PDA. Some steps later Hank stops (phase 4). Also concentrating on his PDA he stays turned away from June and attacks a member of gang Red telling his boss Hodi by "Now I attack their home base". With the popping up of the fight dialog he notices that in fact he attacks June. Immediately he turns toward her, looks at her and tells his boss "Wrong, I attack June". Then they start fighting.

Obviously the players need to face each other not only for playing, but also for assuring the framing conditions of the fight.

Online player intends to physically interact
The obvious need of the players to have a physical contact to the other players in the game is further supported by findings about the online player in our mobile game: the boss of the gang.

Game logic
Within the game the boss of the gang has the role as an online player. His relation to the game event and his play actions are completely mediated by the PC and by the communication device.

During the play test the boss is sitting at a PC in a room located at the first floor of the building around which the play test takes place. The windows of the room point into the direction of the street, where the runners are playing, but from his sitting position he can't see what is going on outside.

Empirical findings
During the game the boss turns several times toward the window and looks out well knowing that he can't identify anything from his sitting position.

Participating in the play action of gang member June

The first type of situations in which he turns to the window is when he follows the play actions of his gang member June by watching the PC screen and communicating with her.

	Paul's actions	Context	Time m:ss
1.	Paul observes June's actions at the PC screen and tells her about her current play options.	June asks which play possibility Paul thinks is the better one.	1:59
2.	Paul gives an advice what to do and looks through the window.		2:09

Table 3. Paul's play activity – actions and context

One example is shown in table 3, when June just won the first fight against the enemy. Paul watches the screen and follows her play activity with the information given by virtual means and by the communication with her. So he notices her victory in the fight. But then June is not sure what to do next and asks him via walkie-talkie. Paul tries to help her by telling her two play possibilities via walkie-talkie (phase 1). June asks him which ones he thinks is the better one. Paul advises her to come back to the own home base field and recover first (phase 2). While doing so he turns toward the windows and looks out of it.

Empirical conclusion
Paul wants to participate in the game play and to support his gang member or at least watch her playing. He knows that her actions will help to be successful in the game, but he can not help her right now, because his sensing and acting possibilities are to rare in this situation. By intentionally watching her he takes part in her game play.

Physical intention of interacting with the enemy

In the second type of situation Paul fights against the runner of gang Blue, Hank. He waits with his selection of a body part in every turn nearly for the maximum of the allowed time.

	Paul's actions	Context	Time m:ss
1.	Paul considers his selection for the next defend turn and extends the time doing that.	Hank changes channels on his walkie-talkie (against rules) and demands Paul to hurry up.	5:35
2.	Paul is surprised, smiles and looks out of the window.		5:48

Table 4. Paul's play activity – actions and context

In table 4 an unexpected situation takes place. Paul concentrates on his fight against Hank. He has to choose a body part for his next defend turn (phase 1). Suddenly Hank, against the rules, switches channels on his walkie-talkie and gives demands to Paul, that he should hurry up with his selection of fight zones. Paul recognizes Hank's voice, is very astonished and tells Hank via walkie-talkie "Hank? What? Why are you on our channel?". He smiles then, shakes his head and looks out of the window.

Empirical conclusion
Paul is surprised by the action of his opponent. It was completely unexpected and against the rules. In a conflict situation like this the intention of the online player for an immediate physical contact may serve the wish to re-establishing his view as common understanding of the game situation.

Physical intention of immersion in the fight

The third type of situation takes place when Paul is still involved in the fight against Hank and has to select his fight move. Paul already won the first attack turn.

In table 5 Paul's actions during the fight against Hank are shown. Paul has to choose a body part for his next defend turn. He watches the PC screen while waiting for the time limit to pass (phase 1). He knows that in the meantime

	Paul's actions	Context	Time m:ss
1.	Paul watches the PC screen. He has to select a defend zone.		4:45
		Hank selects a zone to attack Paul.	
2.	Paul looks out of the window, then again on the PC screen.		4:52

Table 5. Paul's play activity – actions and context

Hank has to select an attack zone on his PDA. Paul looks out of the window and then again on his screen (phase 2).

Empirical conclusion
From our own experiences within this situation we know that the player tries to estimate how his opponent will chose in the next turn. For this estimation it is helpful to know, see and watch the opponent. Paul knows his opponent, but he can't see and watch him. The looking out of the window may support his imagination of him.

ON THE MEANING OF THE PHYSICAL DIMENSION
In all three examples of June's, Hank's and Paul's play activities we found the social interaction to be an important and forming part of the game experience. But we discovered, that not the pure verbal communication or the indirect combat on the virtual level expressed most strongly the immersion of the players. It is the physical dimension of the social interaction, the possibility to use facial expression, body language and the synchronization of physical movement.

The two runners in their pas de deux react synchronized and thus develop a shared experience while getting into the fight.

The runner shifting his focus from a considered virtual opponent to the real physically present opponent has a stronger connection to his opponent in the fight. He faces her, he communicates with and he celebrates his advantage over her to show his power.

The boss takes part in the actions of his runner, playing for their gang, tries to estimate the behavior of his opponent in the fight and to understand it in an unexpected situation. Emotionally he shares the experiences with the other players but he lacks a good part of the natural possibilities of social interaction. He wants to close this gap by establishing an eye contact with them or at least support his imagination of them.

A methodological remark (1)
But is it not somewhat trivial to observe that a GPS game requiring visual recognition causes intuitively physical social interaction? Yes and No. What seems to be self-evident for the player is neither self-evident for the game researcher nor self-evident for the game designer. The question is what follows from our observations immediately for our game and in general for mobile game design and further game studies.

The difficulty for the researcher, the designer and also for the player is that both tendencies of social interaction – the explicit and the implicit – are inseparably intertwined. Analytically we are able to separate both dimensions, but in reality they are inseparably intertwined. But does it help to know that and to separate those tendencies analytically? We will come back to this question.

For a deeper understanding of the empirical phenomena and for preliminarily generalizing our findings we now develop the conceptual meaning of the physical dimension of social interaction within three steps. We elaborate the concept of mobile play activity first with regard to its character as activity[3], second with regard to the magic circle of playing, and third with regard to mobility. Compare also [1].

Play activity
We understand mobile play activity in the first step like each other activity as a particular time-based process, encompassing actors, media, and objective conditions. The following characteristics we shortly introduce in a defining manner.

Activity is mediated. Play activity is mediated by the momentary concordance of subjective and objective conditions and by the actor's game concept and the thereby identified empirical instances of the play activity. Signs, words, tools, machines, computer systems only become media of the play activity within and by use.

Activity is instrumental and social. Social interaction and instrumental action are interrelated basic units of the play activity.

Activity has a double character, structure and context. The difference between explicit and implicit physical social interaction is one forming of the double character of play activity: structure and context. Each play activity is on the one hand rationally guided and structured by the game concept of the player and the thereby identified empirical instances and on the other hand intuitively unfolding within and as an emerging and changing context.

Context from this perspective is not something outside in the environment. Context is a counterpart of the mediating concept, an actor is using. While the concept encompasses the foreseeable aspects of the activity, the context encompasses all that from the activity conditions, what the actor has not foreseen, what is different, what comes into being unexpectedly by interaction. Thus also unforeseeable aspects of the actor himself may emerge as context.

The contradiction between both tendencies of the play activity is for the player source of the own development and source of the emergence of novel possibilities.

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[3] We here present our process-oriented version of the activity theory originally developed by Vygotsky and Leontjew.

Activity enfolds as a cycle of orientation and use. These two steps may be much more differentiated, but for our purposes here the basic two steps are enough. Each activity may start as an orientation. We look for something. We face something. We intend to do something. And then we use the identified aspects for our own purposes. Following the activity cycle and passing through the single phases an actor will experience transformation. The relations between actor and objective conditions or other ones, between structure and context, between mind and body are changing within and by activity during the cycle. During orientation we perceive, what our concept enables us to perceive. We encounter and realize the split between actor and objective conditions or other ones, between structure and context, between mind and body. During use we experience the difference between our anticipation and the effect of our action and try to understand it with reference to others. We encounter the effects of the split and its abolishment, the interaction of actor and objective conditions or other ones, of structure and context, of mind and body.

Activity is productive and reproductive. While playing the actor (re-) produces himself – as acting part of the game – in his relation to objective conditions and to others, players or non-players.

From the perspective of activity elaborated so far the physical dimension of social interaction turns out to be a part of the intuitively emerging contextual dimension of the mobile play activity.

Further studies are needed regarding the relation to the instrumental part and regarding the particular role within and for the dynamics of the play activity. But what we have understood so far is the physical dimension of social interaction as a dimension of play activity. For further understanding we will deepen our understanding of playing.

The magic circle
To get a closer look at social interaction and the particular meaning of its physical dimension for mobile gaming we refer in the second step to the concept of the magic circle as it is defined by Salen and Zimmerman in the tradition of Huizinga [6]. To play a game the players need to be under framing circumstances that allow the game to be played and they need to agree about the conditions of the game such as beginning, end, rules etc. With the intention to play the players start to create this magic circle by defining boundaries. Within these boundaries the game takes place and the rules of the game dominate the real world rules.

With regard to the concept of the play activity above, the magic circle describes the spatial, temporal and social limitations of the game world – defined by the player's concept of the game.

Sniderman notes in his article Unwritten Rules that humans are "constantly noticing if the conditions for playing the game are still met, [...] always aware (if only unconsciously) that the other participants are acting as if the game is 'on'." [7]. For doing this they constantly monitor and react to the behavior of the other players.

One form to monitor and to react to the behavior of the other players is the physical dimension of social interaction. By means of the physical social interaction players assure themselves about the 'ongoing' of the game and by means of the physical social interaction they constantly (re-) create the magic circle at least on the social level [1].

The magic circle separates the game world from the surrounding environment. The traditional understanding of the magic circle is challenged by mobile games as Montola and the IPERG Project found out [5].

Play activity and the magic circle in mobile games
Mobile Games are based on the bodily movement of the players in an augmented or mixed game world the players get access to by means of computational technology.

The situation of a player in a mobile game is different compared with the situation of a player in a computer game, a board game, or an online game. Mobile players move beyond the desk. The real world – not completely defined, developed and controlled by the designer or the player – becomes a basic foundation of the game world.

As mobile games pervade everyday life various aspects and objects of this world have to be constantly integrated into the game world. Influences from the outer world to the game world may produce new gaming possibilities as well as disturbances. The spatial, temporal, and social limitations of the game world are becoming permeable to that extent that if one limitation vanishes the game is no game anymore as Montola and others stated [5].

From this perspective the mobile game world gets a dynamic character compared to other games. Tensions emerge between the inside and the outside of the magic circle and as a further consequence between the physical and the virtual dimension of the game world.

This will have consequences for the play activity in that the re-creation of the magic circle will gain importance. Also within traditional games players play and enable the game at the same time. But they do this traditionally within an enduring magic circle mainly being questioned by the players themselves. The magic circle of mobile games becoming dynamic itself requires a play activity permanently re-producing the game world and the coherence of the physical and the virtual dimensions.

The physical dimension of social interaction seems to play a particular and necessary role for the reproduction of the game world within and by the mobile play activity. Via instrumental action the players notice differences between their real experience and their expectations. Via social interaction they share their experience, develop a common understanding of the game, maintain and strengthen the limitation of the magic circle against disturbances and integrate novel aspects to be part of the game. Via the physical dimension of social interaction they do this spontaneously and fluently without explicit endeavor. And they do this by means of the whole person, the face and the body of the player. Of course the mediation via the physical dimension will have limitations demanding

explicit social interaction – but this is not our current topic.

A methodological remark (2)
As we stated before both tendencies of social interaction – the explicit and the implicit – are inseparably intertwined. We come back to the question: does it help to know that and to separate those tendencies analytically?

Both tendencies characterize not only social interaction, but each activity in general. On the one hand there is the explicit or rational structure of activity and on the other hand the implicit or intuitive context of activity. There is no social interaction, which is solely and purely explicit as there is no activity in general solely and purely rational. Even the activity of a mathematician is always both, rational and intuitive. And vice versa there is no social interaction, which is solely and purely implicit (i.e. physically) as there is no activity in general solely and purely intuitive. Even the activity of the artist or even sex, another basic form of an at least sometimes mainly intuitive activity, is always both, intuitive and rational.

The analytical separation helps us to understand the dynamic forces at work within an empirical play activity and to identify dominance relationships between ratio and intuition and their transformation within a particular activity.

This might enable us to develop a design approach for understanding, enabling and creating forms of motions for both tendencies and for counterbalancing tendencies within a game.

Preliminary ideas for mobile game design
In all three examples of June's, Hank's and Paul's play activities we found the physical dimension of the social interaction to be an important and forming part of the game experience, the use of facial expression, body language and the synchronization of physical movement.

Understanding the meaning of the physical dimension of social interaction for mobile games we may support this dimension directly. This may happen by means of reducing, expanding or shaping the sensing and acting abilities of the player. In our game On the Streets for example the transformation of the PDA to a weapon for direct interaction with the enemy would integrate the virtual and the physical level in form of a tangible means and emphasize the physical dimension of the fight.

Understanding the interplay of the explicit and the implicit, physical dimension of social interaction we may focus on and play with the contradiction between both tendencies and challenge the gamer as producer of novel play possibilities.

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