Pervasive Persuasive: A Rhetorical Design Approach to a Location-Based Spell-Casting Game for Tourists

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ABSTRACT
REXplorer is a pervasive game service launching in June 2007. The game aims at persuading on site tourists to explore and enjoy the history of the UNESCO world heritage city core of Regensburg, Germany.

In the game, historical and mythological spirits are stationed at touristic points of interest throughout the mostly Gothic and Romanesque city core of Regensburg. Players rent a special "paranormal activity detector" - a device composed of a mobile phone and a GPS receiver in a custom designed shell - at Regensburg's tourist information. Players interact with the location-based and site-specific spirits by performing a gesture, i.e. by waving the wand-like detector through the air in a specified fashion, thus "casting a spell". Situated gestures allow players to evoke and communicate with spirits to receive and resolve quests. With their detector, players can also take pictures, which appear on each player's individually generated souvenir, a weblog. The weblog also maps a player's route, describes spirits a player has encountered, and lists books and deepening URLs for each character and site.

In this paper, we focus on the rhetorical approach behind REXplorer, and discuss exemplary formal and dramaturgical persuasive design tactics. These tactics, we believe, can not only help to make "serious" activities such as city exploration and history learning fun and sustainable, but also influence player behavior during pervasively computed and situated gameplay.

Author Keywords
Pervasive game design, game rhetoric, persuasive technology, serious games, situated gameplay.

INTRODUCTION: THE RHETORICITY OF REXPLORER

REXplorer is a part of the Regensburg Experience (REX) museum in Regensburg, Germany, cf. www.rex-regensburg.de. The museum itself contains interactive exhibits to allow visitors to experience different aspects of the city's cultural heritage, such as medieval music, and poetry. REXplorer is designed to extend the visitor experience beyond the museum walls, showcasing the most significant attraction of Regensburg: its mostly gothic and romanesque urban silhouette and architecture. Regensburg is a UNESCO world heritage site and if not the best-preserved medieval city in Germany, mostly untouched by widespread bombings in WWII (see Figure 1).

Figure 1: Playability testers enjoying the game of REXplorer on site Regensburg.

REXplorer engages and influences players to narratively and, by physical mobility, link city sites, creating an interconnected mental map, and changing the visitors' perception of the destination whilst enriching her knowledge of Regensburg's history and mythology.

Situated Play, Proceedings of DiGRA 2007 Conference

REXplorer related research and design has been described and documented at different development stages, thereby making transparent how the game has been evolving over a period of almost two years since 2005.

Pervasive games and rhetoric

Pervasive games "extend the gaming experience out into the real world – be it on city streets, in the remote wilderness, or a living room" [4]. An attractive pervasive game approach equips the touring player with high performance mobile computing devices such as smartphones that not only sense the position of the player, but also let the player interact with what is available at the current location with the help of novel mobile mechanisms. One example of a location-based pervasive game is REXplorer, a service that targets day tripping tourists in the city of Regensburg in Germany and lets players cast "spells" on site of city sights with a rental game controller shell housing a smartphone and a GPS receiver.

To us, the interactive nature of any given computer based game has a unique ability to captivate and intrinsically motivate their audience – not only in classical desktop computer, console, or computer enhanced board game situations, but also when on the move; it has been argued that, by their nature, digital games already have implicit rhetorical and persuasive qualities [23].

Explicitly, and with a persuasive strategy in the service of goals beyond mere entertainment, the field of "serious games" [20, 19] tries to leverage these qualities to inspire, educate, and train their audiences. Ultimately, serious games can be thought of as examples of persuasive technologies, i.e. "interactive computing products created for the purpose of changing people's attitudes or behaviors" [11]. REXplorer applies the serious game concept to the domain of tourism, helping visitors engage with the history and culture of their destination in an innovative way.

Although explicit in how they engage the player in a non-everyday gameplay situation that has a non-entertainment purpose – for example, real world learning – serious games conceptualized before a persuasive technology background have been accused of being manipulative in that the idea of persuasive technology "conjures the sense of capture, of arrest and incarceration by an authority" [5]. This critique further argues that the notion of persuasive technology bases on socio-psychological design principles and intentions rather than on rhetorical ones - the latter which demand the designer to make ideological processes clear to the player by creating awareness of the process at display instead of assuming that given circumstances such as a game's power structures – for example, a client's end for –„always devise ethical and desirable goals".

This is, of course, not a new philosophy of how communicative strategies should be applied as means of persuasion. According to ancient Roman orators Quintilian and Cicero, the rhetorical core principles („virtutes") demanded that only a *vir bonus dicendi peritus – a virtuous man skilled in the art of speaking* (transl. by authors) – would render a speech to be righteous, and therefore rhetorical per se, but only given that, in addition, the speech's narrative itself would reflect virtue.

REXplorer as a pervasive persuasive game

From the preceding short discussion, we can think of REXplorer as an interactive rhetorical ecology where during gameplay, the processes intended by us designers only come to life through the interactive negotiations between the player, the gaming system, computing and network infrastructure, as well as the locative, situated nature of the game. On the other hand, and in the context of rhetorically designing pervasive games, we do not define "persuasion" classically, and extremely, as the main rhetorical act of changing the audience's attitude. This definition would afford us to empirically prove the success of given persuasive acts in REXplorer. We plan to conduct such empirical work in April with a school class and once the game has been launched in June of 2007. Rather, and for this paper, we define persuasion as the intentionality of affecting the player towards situated history learning and city exploration with the help of game mechanics.

To exemplify this rhetorical design approach, we first give an overview of the REXplorer and its gameplay, following which we discuss related work from the fields of (serious) pervasive games, and computer supported sightseeing, succeeded by a discussion of the persuasive tactics of the game's design.

GAME OVERVIEW

The target group of REXplorer mainly consists of younger visitors with German language proficiency. The theme of the game is techno-magical: Visitors are asked, as scientific assistants, so called "REXplorers", to examine paranormal activity recently discovered outdoors in the Regensburg medieval city core within one hour. Fictional "scientists" have discovered that the phenomena seem to be linked to a child's gravestone inscribed with a mysterious secret language shown in Figure 2.

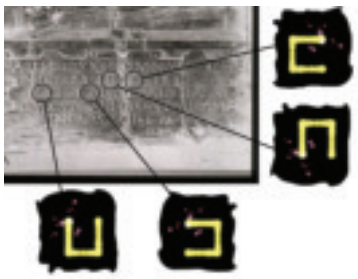

Figure 2: Gravestone with gesture symbols.

Figure 3: REXplorer game controller – a scientific detector.

The gravestone is a real artifact in the Regensburg cathedral, and historians (factual) have found that the symbols used instead of letters cover up the identity of the child buried, who is thought to be an illegal offspring of a Regensburg cleric – a scandal in the 16th century!

For field research, the scientists have developed a special detector device (see Figure 3) that is able to measure paranormal activity at specific sites in the city core in the fashion of a Geiger counter. The detector has artificial intelligence and is able to talk directly to the players.

Players rent the detector as well as an infographic Regensburg map brochure depicting all building sites found to possess paranormal activity as well explaining the detector's functionality (see Figures 4 and 5) from the Regensburg tourist information, centrally located at the gothic city hall building. Before REXplorers embark upon their scientific fieldtrip, they watch an intro movie explaining the background of the game, and the functionalities of the detector. Chief among the latter is the capability of letting roleplaying tourists evoke one of the gravestone symbols by drawing the symbol through the air, similar to casting a spell with a magic wand.

Figure 4: Buildings and locations with paranormal activity on the letterfold brochure map (back).

Figure 5: Letterfold brochure with gesture and functionality legend (front).

Each symbol draws power from one of four medieval elements earth, water, fire, or wind, and establishes a communication channel to the spiritual world. The detector notifies REXplorer when they are in the vicinity of paranormal activity (and a point of interest) through its own excited heartbeat. At each paranormally charged site, players can, by casting one of the spells, awaken site-specific historical or mythological spirits who tell their "cliff-hanger" story through the loud speaker of the device. These stories are accurate accounts of the characters' historical or mythological backgrounds, and at the same time they serve as quest offers to the player. REXplorers needs to listen carefully to the clues written into these stories in order to cast the proper spell to pick up the quest.

For example, at Regensburg's former salt storage building, the "Salzstadel", a salt ship hauler from the 18th century tells the scientific assistant about his profession, and asks the REXplorer to deliver a salt sample "from the belly of the earth" to a salt trader located somewhere else in the city. By choosing the earth spell, the REXplorer accepts the quest, and is being instructed where to bring the salt sample. Having arrived at her destination, the REXplorer uses the pick-up gesture to complete the quest and listen to the receiving character's closure of the cliff-hanger, as well as to a new quest offer.

For each completed quest and for exploring the city core, REXplorers receive points, allowing them to level up from a rookie research assistant to a master research assistant during their game session. After the one hour of gameplay - the session time being constrained by the battery runtime of the detector – REXplorers return their wand to the tourist information, where the outro movie discloses the secret identity of the child.

Figure 6: Individual souvenir geo-weblog.

During the game, the player's progress is tracked and used to create a personalized souvenir geo-weblog (blog) each player is rewarded with. The player blog documents the player route over space by interfacing with Google maps and over time by chronologically listing all sites and characters the REXplorer has interacted with during her session (see Figure 6). The blog provides de-briefing web links concerning the characters appearing during gameplay to help the players learn more about the history behind the sites. During their game session, REXplorers can - and are reminded to - shoot pictures of their field research. This image material is also automatically added to the blog with corresponding locations marked in the interactive map.

RELATED WORK

In recent years, the field of pervasive and mobile experience design has been growing rapidly, bringing forth exciting works. Although heterogenous in scope and intent, a number of recent projects can be related and compared to REXplorer in order to contour the scope of our project.

Most pervasive games to date are event-based and of an experimental nature. The most notable exceptions have been (a) commercial and (b) attempts to establish continuing, subscription based servicing. Mogi [16], for instance, is a cell phone and web based persistent item collection and trading game where the actual geoposition of a subscriber correlates to the position in the game world. Created by the French Telecom supported Newtgames and commercialized in Japan by the operator KDDI in 2003, Mogi was discontinued in 2006.

Another example of a mobile phone subscription service is the GSM-cell positioning SMS-shooter game Botfighters [21], created by Swedish company It's Alive and launched for the first time in 2001 by Swedish operator Telia. In the spirit of Mogi and Botfighters, REXplorer is set to become a sustainable service rather than an occurrence, based on a public-private partnership between the ETH Zurich, RWTH Aachen University, REX, and the Regenburg tourist information center. The goal of REXplorer is to achieve a research prototype of a robust, sustainable service, but as opposed to Mogi or Botfighters, the REX museum and the Regensburg tourist information will operate REXplorer as a local, site-specific offer, using rental smartphones embedded into custom made shells as game controlling devices.

Many pervasive games manage the game in real-time using puppetmasters [4]. REXplorer is designed not to require exogene coordination. In fact, there are no plans to hire additional staff. Instead, the existing tourist information staff will be trained to be able to cater to customer needs.

A number of pervasive games have been designed for non-entertainment purposes such as city marketing, learning, or emergency simulation. Amongst the earliest examples of a serious pervasive game is the multiplayer indoor experience M.A.D. Countdown [24], where a "rescue" team of players - one of which role plays a saboteur - has to locate an atomic bomb within eight hours and disarm it; players use wirelessly networked PocketPCs, browse puzzle websites, call fake answering machines, and interact with physical game elements such as lockers which contain game clues. In an educational game, Savannah [4], children role play lions, practicing hunting, and thereby learning about prey behavior in wildlife habitats. Environmental Detectives [14] embeds high schoolers into an authentic situation where teams of players representing different interests have to locate the source of pollution by drilling "wells" and "sampling" with PDAs. The role playing game Frequency 1550 blends Internet and mobile phone gameplay with location-based puzzles to supplement the city history curriculum at the Montessori school in Amsterdam.

Specifically Frequency 1550 is of interest in our context, as it demonstrates how to convey site specific knowledge with the help of game mechanics. Both De Souza e Silva & Delacruz [8] and Thomas [22] describe a number of other relevant projects, examining potential uses of pervasive gaming for educational purposes. These theoretical approaches are interesting for the REXplorer gameplay, which aims at conveying knowledge about touristic sites.

Similar to REXplorer, site-specific narratives and spatial storytelling - that is, connecting site A wit. h site B through a directed "story graph" - are eminent features in History Unwired [10], which was tested during the 2005 Biennale of Contemporary Art in the most touristed city worldwide, Venice. History Unwired is not a game, but an innovative and entertaining linear walking tour around one of Venice's less-traveled neighborhoods, involving location-aware smartphones and interactive art pieces at sites which are embedded into the tour. Contrary to REXplorer, the designers of History Unwired decided for linear storytelling, where users had few opportunity to "choose their own

adventure", which is an important feature in the non-linear gameplay of REXplorer.

PERVASIVE PERSUASIVE GAME DESIGN TACTICS

In the following subsections, we present what we call pervasive persuasive tactics (PPT). These exemplary PPTs have been considered during the design of REXplorer, and can be thought of as formal and dramaturgical design patterns composed of anthropological, spatial, temporal, technological, and strategic design facets. We believe that the PPTs outlined here could be useful for the design of other, future pervasive games. Yet, before turning to select PPTs, let us look at the REXplorer player first.

Persuading the player by understanding the player

When designing pervasive persuasive games, understanding the player will help to affect the player to start playing, and make the experience fun and sustainable.

Our design decisions for REXplorer have been guided and informed by a player-centered iterative design process, where we, for example, early on surveyed school classes from a city three hours away from Regensburg with the help of gameplay storyboards and board game prototypes [2]. In addition, we conducted an on-site player study structured as a product-interactive focus group [15]. Twelve participants who had just moved to Regensburg played a full hour session before joining a focus group discussion with several other players at the end of their game session.

Next to an iterative design process, and more generally speaking, the persuasive quality of a pervasive game design increases if designers consider attributes of the player such as

- gender, age, language, constraints, and background;
- prior game and technology experiences;
- primary and secondary activities before, during, and after gameplay, ideally including aspects of mindset, mobility, emotional attachment, and adaptability;
- "gameness": What type of game is the player willing to play, how deeply does the player want to be immersed?
- educability: Does the player want to learn (the game, the history of Regensburg)?
- budget, allotted time, and expectations;
- bodily, verbal, and non-verbal expressivity and "histrionicability";
- privacy concerns, as well as trust and risk disposition;
- company and voluntariness.

Here is an example how we translated some of the attributes mentioned in the above into a PPT for REXplorer: Tourism is rarely an activity enjoyed in isolation; instead, it is an activity that is shared with family and friends to create common experiences and memories. REXplorer is designed to support shared experiences through cooperative gameplay, where two or three people can share a single controller. To support this model, the game controller has been designed to primarily use the phone loudspeaker instead of headphones, although headphones can be still plugged into the phone through a cut out in the shell.

Formal pervasive persuasive design tactics

"Stageability": Architecture of the game board

The basis for Regensburg's listing as a UNESCO protected city is the city's historical and medieval core, which, since the 14th century, has been continuously functioning as a dense urban ensemble. This ensemble features almost 1'000 individual landmarks, mostly Gothic or Romanesque, which granted us an optimal "stageability" for a techno-magically themed pervasive persuasive game.

Generally speaking, criteria that define this PPT include architectural stage features such as the stage's

- overall and zone-based performability;
- population, including potential bystanders, spectators, voyeurs, and trespassers;
- psychogeographical type, which can be, for example, a medieval city, a bunker, a ship, a fortress, a public park;
- stability and durability conveyed through forms, structure, proportions, construction, and constraints of the macro and micro building fabric;
- dimensionality, scale, lines (of sight), and zones;
- intended utility and its actual everyday functions and usages;
- "atmospheric readability" for the player and the stage's amenity, spectacle, and imaginary references serving player enjoyment;
- colors, materials, and light/shadow conditions;
- sensorium, including smells, noises, tastes, and tangeability ("Can I touch it?")
- contrasts, tensions, and environmental conjunctions, the latter meaning the ways the borders of the stage lead over to non-stage areas;
- motion, and its overall mobility or fixation;
- (density of) attractors;
- environmental conditions, including temperature;
- pre-existing computing infrastructure as well as overall technological and interactivation fitness, for example GPS reception fidelity;
- history and future potential.

"Travelability" of the game board

In comparison to other German cities, Regensburg has a compact settlement body, leading to a dense city core fit for "short ways". We have taken advantage of this appeal, as well as the low-to-non-trafficked city core to design

REXplorer as a pedestrian outdoors experience, walkable in a leisurely mode. We call this PPT the "travelability" of a given physical game area. However, just because an area is walkable theoretically does not necessarily mean it is practically walkable, too. During the peak season, for example, Regensburg tends to be rather crowded, which may flip the advantage of walkability to a disadvantage.

Navigability and spatial sequentiality

Regensburg's city core mainly evolved from a Roman fortress erected around the end of the 2nd century on command of the Roman emperor Marc Aurel. The rectangular N-S / W-E street grid allows for high navigability, because almost all streets and alleys lead to public plazas and squares, whilst also adding a rhythmical sequentiality to how the pedestrian player experiences the cityscape.

Spatial layout-progression and graphing

Spatial game progression is a PPT that corresponds with the travelability, navigability, and the spatial sequentiality of the stage. The spatial layout - most often, the level design - of display-only based digital games can help to inform the ways gameplay is being organized within the spatial layout of the stage of a pervasive game. Typical examples of level designs include a ring layout; a linear or network progression layout or a combination of both; a parallel spatial progression layout; or the "hub and spoke", where the player always returns to a center location from outreaching paths [1].

Figure 7: Formal directed quest graph.

For REXplorer, and more specifically, we have borrowed the spatial progression metaphor of a directed graph in the form of a closed walk possible within the graph, because players start and end at the tourist information. The 29 paranormally charged sites in the city core represent vertices in this graph. The edges of our graph connect vertices through quests. Each vertex spawns at least one edge, often two, and seldom three. The starting vertex of REXplorer spawns four edges, to allow any of the four gestures the player casts to trigger a potential initial quest offer (see Figure 7). Note that a player is not forced to complete an edge, but can drop the quest instead. This latter PPT gives the player the freedom to "design her own adventure" non-linearly.

Balancing physical engagement and social awkwardness

The gesture based interaction was chosen as a PPT to physically engage our players into the story. From our playability tests, most of the players found the gestures to be an important element of gameplay. They found it heightened the sense of magic and mysteriousness.

However, we also discovered during our playability tests that a few of our players (especially our older participants) found the gestures awkward, and they requested labeled buttons to select the symbols. As a compromising PPT, we designed an alternative gesture selection mechanism through an on-screen menu that can be used anytime an invalid gesture is performed, effectively allowing people to avoid gestures altogether.

Detector functionalities

For REXplorer, we have iteratively designed an aluminum shell skeleton that houses a Nokia N70 smartphone, and a GPS receiver (see Figure 8). In order to affect the player to actually play the game, we have simplified the keypad interface of the smartphone, lasering our game layout onto 2.5mm soft, stretchable, finger friendly textile that wraps around the mid section of the shell.

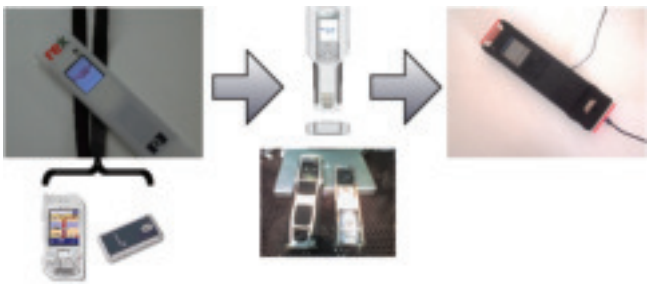

Figure 8: Game controller iterations.

Functionality of the game controller includes:

- Checking current score, current REXplorer rank, and open quests with the *status button*.
- Performing gestures by holding down the *gesture button*. Releasing the button indicates the end of the gesture. Gesture recognition is accomplished using camera-based motion estimation, as described in [3, 25].
- By pressing the *repeat button*, player can roll back what has been said last at any point in the game; this may be

needed due to traffic noises or the many other roaming tourists during the peak season.

- With the *volume buttons*, players can adjust the volume of the device at anytime to adapt to changing environmental conditions and social situations.
- Tourists generally have difficulties navigating through a foreign city. Although the navigability the Regensburg is fine, players can therefore press the *map button* to see their current position on a smaller on-screen map, as well as destinations for currently incomplete quests.
- Capturing photo and video memories with the *camera button*, and the smartphone's built in camera, which are uploaded to the player's weblog.

Reward structure

Rewards are requiting and encouraging players. For the design of REXplorer, we have settled on a number of reward related PPTs to positively affect gameplay for the player:

- Short term reward I: The player has recognized the clue a site's character has given, picks the proper gesture to accept the quest, and is being rewarded with the quest.
- Negative short term reward: Players who choose to avoid gestures are penalized by not earning points.
- Short term reward II: Players receive points for taking pictures, and videos.
- Mid term reward: The player completes an accepted quest from site A at site B and scores ranking points.
- Long term reward I: When returning the detector at the tourist information, the player learns about secret identity of the child.
- Long term reward II: After the game session has ended, players receives a custom weblog as a souvenir including pictures taken and a game route / character log book.
- Long term reward III: The weblog enhances knowledhe retention because it stays Online for the player, but also serves as a springboard to third party websites detailing the history of characters encountered.
- Geo-spatial exploration: Players receive points for traveling the city.

Persuading the player to replay

One of our design goals included replayability such that if players decided to play the game again, it would be as interesting as the first time they played. There are several PPT in the game that facilitate the player's desire to replay:

(1) The number of characters in the game far exceeds the number of sites the player can reach in the limited game time. (2) During the outro, the player state is saved and logged so that the player can pick up where they left off at a later point. (3) The non-linear, self-directed nature of the game allows players to pick a unique path each time they play. (4) For each character, we designed several different quests that can be offered to the player. That means that even if a player has addressed a character before, they will receive a different quest the next time they visit. This leaves the complexity of the quest network indeterministic and seemingly infinite to the players, making them want to explore more to find new interconnections between the characters.

Dramaturgical pervasive persuasive design tactics

Bridging the worlds for a premise

In REXplorer, we use the "haunted house" and "techno-magic" themes to bridge the manifold historical eras of Regensburg into a non-linear story. This dramaturgical PPT - blending make-belief with fact - is continued by deriving the techno-magical gesture vocabulary from a real historical artifact, the child's gravestone.

Persuasive detector character design

The scientific detector – our game controller – affects the player (a) by its omnipresent guidance as well as its gameplay dependent reactions; e.g. it reminds the player to keep on playing after longer idle times; (b) by verbally - and often ironically - encouraging, supporting, praising, and rewarding the player; (c) with its anthropomorphized ascriptions. In classical rhetoric, the trope of personification (a figure of speech) employed anthropomorphism to make an emotional appeal. On site playability testing proved useful to indicate which situations occur during gameplay that the detector should react to in order to maintain immersion for the player, and persuade players to keep on playing.

Persuasive character design

In order to create the game's characters so that they could, eventually, be recorded with 19 voice actors, we reviewed the city of Regensburg's overview list of over 1'500 protected historical buildings in the whole city, describing each site's erection, make up, and usage over time. We then cross compared a number of city sightseeing guides including the city's tourist website, filtering 29 sites of interest, which represent typical sights tourists would want to see during a day long visit. With the first design document draft, we had decided that each builing or a building's main function over time should be represented by a site specific character.

To develop these characters and in order to give them personality depth, we used a character sheet format. This is a one-page description of the different characters that provided an at-a-glance overview, including character sketches, and elements such as name, building address, character ID, physical characteristics, inspiration for spoken text, and background information why this character belongs at this location. Site specific characters, we believe, appeal to the player because when listening to a character, the player enjoys the manifest building location – a PPT where the virtual game component is hefted to the manifest physical location.

Narrative persuasion through emotional and spatial bonding
The main challenge of narrative production laid in bridging the characters so that they would be connected meaningfully, as well as emotionally, through quests.

In our design document, we created guidelines as to which general emotional dimensions could bond the characters so that players would want to travel from site A to B to fulfill a quest in order to hear the resolution of a historical or mythological cliff hanger story (see Figure 9).

In the game dialogue script, we applied emotional bridges such as romance, greed, or fear to the NPCs quest stories, whilst planting clues into the NPC's sentences as to which element gesture the players needs to cast.

For example, at the site of the historical character Barbara Blomberg, we embedded the clue for the expected gesture element "water" when Barbara, crying, asks the player to take the "tears of her love" to emperor Karl V., who she had a son with, but only saw the royal once.

Figure 9: Directed quest graph, dramaturgical.

CONCLUSION

In this paper, we have portrayed the rhetoricity of REXplorer by discussing major pervasive persuasive tactics we have employed during the design process. We believe that a number of these tactics can be applied for other games and game prototypes.

However, in order to prove that the affective intentionality of the design works for a majority of players, and not only for our relatively small group of playtesters, we need to conduct greater scale empirical studies once the game launches in the summer of 2007. Before the launch, we are inviting a school class of 20 pupils from Munich to Regensburg for a final on site playtest.

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