Play in the Algorithmic City

Troy Innocent(✉)

Swinburne University of Technology, John Street, Hawthorn, Vic., Australia
tinnocent@swin.edu.au

Abstract. In this paper, the algorithmic city is introduced as a framework for understanding urban space in terms of its underlying code and systems. It is connected to urban codemaking, a playful approach to public art that asks players to engage with codes of urban space. To connect these two concepts in a framework for pervasive game design, players are framed as sensors and actuators within the algorithmic city to make it more playable.

Keywords: Urban codemaking · Playable city · Pervasive game design · Public art

1 Introduction

Over the past five years the practice of urban codemaking has explored the experience of the city as a set of codes and systems for players to discover and decode through a series of public art projects. The city is experienced as a giant board game or puzzle, with its spaces and structures recoded and repurposed for play. Can this approach be expanded by defining players as sensors and actuators, and articulate a form of pervasive game design based on the affordances of the algorithmic city?

First of all, what is an algorithmic city? During the 1970 s, the influential study 'limits of growth' [1] revealed the constraints and limitations of urban growth and the accompanying rise in human population intrinsically linked to increased consumption of resources, construction of infrastructure, and manufacturing of stuff. Will Wright, designer of SimCity [2], used these same algorithms to inform the design of the game abstracting them into a set of game rules [3].

Geoffrey West is the physicist who set out to 'solve the city' [4]. Based at the Sante Fe Institute researching cities, scaling and sustainability, he has developed mathematical formulae that apply to practically any city in the world, no matter where they are – the city is represented as a set of algorithms. Another set of researchers has identified four common patterns that based on a sample set of 131 cities, created a 'typology of street patterns' [5]. These perspectives bring into focus our understanding of cities as complex adaptive systems that arise from the interaction of a multitude of systems and processes.

Play has had an increasing role in urban life over the past century. The situationists [6] used play as a strategy to subvert the norms of city life, and combat urban alienation created by the homogenisation of cities. One of these, the dérive, developed the practice of psychogeography in which a player navigates city streets using their own personal landmarks, sensations, and experiences. There are parallels between this

R. Poppe et al. (Eds.): INTETAIN 2016, LNICST 178, pp. 266–270, 2017.
DOI: 10.1007/978-3-319-49616-0_26

practice and location-based games [7], geocaching, GPS navigators, and local search and discovery mobile service apps. These experiences situate the player in relation to the city both as an individual, and as a node in the algorithmic city as a whole.

Players of SimCity may develop a different perspective on what a city is by reflecting on the processes and systems captured in the algorithms of the game. GPS navigational systems may also reinforce this systemic view in their positioning of the player as an entity in relation to data, such as the map of a city. More recently, the immediacy, ubiquity and pervasive nature of mobile devices have changed the relationship of the individual to the city. This is the second view of the city - data visualisation representing the algorithmic city in action.

We have two views here: the systemic view of the city as algorithm (macro), and the procedural view of the city as a process (micro) in which the individual is embedded. How do these viewpoints afford opportunities for pervasive game design in big cities? One way to approach the algorithmic city is to articulate players as sensors and actuators in the mixed realities of urban space.

2 Sensors and Actuators

Mixed realities are mediated experiences that situate layers of media and data in relation to the real world. Milgram's virtuality continuum [8] articulated mixed realities across a spectrum created by increasing degrees of mediality or virtuality, indicating that there is not one definition of mixed reality but rather a multiplicity of possibilities. These could be immersive, using Augmented Reality (AR) to situate digital media into urban space; contextual, providing relevant information about a place; or poetic, activating narrative potential of a location.

This paper presents a new approach to framing the player. This approach aims to use mixed realities to set up a new set of relations between players and the city. A player may be a sensor – reading codes, observing situations, being in spaces. The player may collect data for their own experience or to share with the collective, to provide input and feedback to the game. The player is also an actuator – making places, performing actions, leaving traces. In this way they may operate as a node in the system, triggering state changes and generating new data. The idea of player as sensor/actuator may be extended to relate to the micro and macro views of the city introduced earlier – they may sense data or trigger events either locally or globally.

How does this way experiencing the city make it more playable? First of all, the playing mind [9] sees the world in a different way. The usual form and function of urban space may be cast aside to imagine new possibilities. City blocks may become zones in a board game, security cameras become eyes of the city, landmarks and buildings become checkpoints, and so on.

In addition to reframing existing objects and spaces, digital layers augment the experience and add layers of narrative. These may be used to direct players to coordinates, set up communication between players, rename locations and introduce characters, keep score, and track the game. However, these experiences are typical of many urban games – the intention with this approach that defines players as

sensors/actuators is to embody them within the city as a simulation, the city is not the backdrop for play but it becomes the site for play in a more literal sense.

This approach to pervasive game design aims to make the player feel embedded and integrated in the city through the potential for action – to create a city within the city that provides the space for play. This is perhaps the most important aspect in the algorithmic city – the player's realisation that they are part of the algorithm and have increased agency compared to non-players who don't perceive urban space in this way. The intention with this approach is to relate the player to the algorithmic cities in terms of its codes and operations, to make them part of the system.

How does this work in practice? In what ways does the view of player as sensor/actuator activate the existing infrastructure of the city for play?

3 Urban Codemaking in the Algorithmic City

This approach has emerged through observation of players and reflections on the design of a collection of street games have been staged in Melbourne, Ogaki, Istanbul, Sydney and Adelaide over the past five years. The primary mechanism for activating each city is the practice of urban codemaking [10], which is based on the placement of temporary markers in the city that operate as wayfinding markers, game tokens, and signifiers of mixed realities. Small and portable and immediately recognisable by their distinct style, urban codes (see Fig. 1) are deployed onto the streets en masse transforming the city into a game.

In the games *Urban Codemakers* [11], *Zydnei* [12] and *Xawthorn* [13] the urban codemakers are game designers surveying and tagging locations in the city to make it more playable. Each urban code tags a site as part of a survey city infrastructure – one week all of the sites that had a active security camera were tagged, another week unidentified doorways, and so on. As they collect and claim urban codes they are operating as sensors (mapping the space defined by the game) and actuators (activating the sites by visiting them) by generating stories in the game via their participation. Players choose one of three clans that frame their approach to urban space: revert the city to its past, renew the present, or remake the future. Urban planning is typically a lengthy bureaucratic process that aims to balance a network of systems and rules that

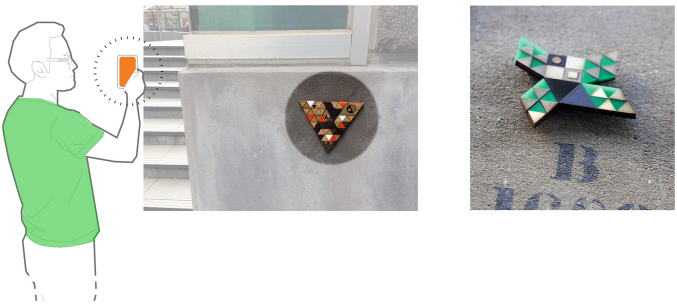

Fig. 1. Various types of urban codemaking in action. Codes may be scanned or collected.

are social, institutional, spatial, commercial and cultural. This game asks the question: what would happen if players recoded the city from within?

Another game, *noemaflux* [14] situates a mixed reality within a city to create abstract architecture. Thematically, it combines street art, geometric abstraction, synaesthesia and pictorial language. Each edition of the work is staged in a different city, and through strategies of urban codemaking aspects of the intersubjectivity and performativity of outdoor play are explored. It aims to create 'placemaking' encounters situated around large urban codes in cities such as Ogaki, Istanbul or Hong Kong. Activating a code using a mobile device displays abstract architecture that responding to the space of each site, accenting site lines and other structural aspects. Players are sensors (scanners of codes) and actuators (revealing the digital layer).

A more recent iteration of the project uses a similar strategy, but with a more deliberate emphasis on the player as sensor/actuator. In *navitag,* players find and scan codes using a mobile device as part of a multiplayer experience, and may sense the proximity of other players via Bluetooth. The codes simultaneously operate as a visual notation system, as wayfinding markers, signifiers of an alternate world, tokens in a game, and as material objects. In this game, the city becomes a site for spatialised musical notation and a competitive game of tag.

These examples foreground the possibilities of relatively simple interventions into urban space that activate its potential for play. Framing the player as a sensor/actuator in an algorithmic city opens up a different set of relations and affordances in the design process.

4 Conclusion

The algorithmic city opens up the possibilities for certain modes of play with the city. Unlocking urban codes and readymade sites for game design by providing the right contextual framework for play transforms infrastructure already existing in smart cities. Integrating players into the framework as sensors and actuators provides a way to explore pervasive game design in almost any urban environment – even if it does not meet the usual expectations of a smart city.

Activating players as sensors and actuators also sets them up in relation to one another both via immediate interaction or asynchronously through the traces and codes they may leave behind in the city. This way of thinking is presented as an approach to play that blends micro and macro views of the algorithmic city that frames the game design process in terms of simulation and systems, an approach common to digital game design but perhaps novel in the pervasive game design.

Urban codemaking demonstrates the initial potential in applying this framework to create playable cities, and articulates a particular approach to game design that focuses on the algorithmic city. Future work will explore these ideas further, working with both greater games literacies in players and an increased awareness in cities of the potential they afford for play.

Acknowledgments. Games cited in this paper were developed with the assistance of the ANZCA and City of Melbourne Laneway Commissions program.

References

1. Forrester, J.W.: Urban Dynamics. The MIT Press, Cambridge (1969)
2. Lauwaert, M.: Challenge everything?: construction play in will Wright's SIMCITY. Games Cult. **2**(3), 194–212 (2007)
3. Bogost, I.: Unit Operations: An Approach to Videogame Criticism. The MIT Press, Cambridge (2008)
4. Lehrer, J.: A physicity solves the city. NY Times Mag. (2010)
5. Louf, R., Barthelemy, M.: A typology of street patterns. J. R. Soc. Interface **11**(101) (2014)
6. Debord, G.: Society of the Spectacle. Zone Books, New York (1994)
7. Montola, M., Stenros, J., Waern, A.: Pervasive Games Theory and Design. Morgan Kaufmann, Burlington (2009)
8. Milgram, P., Takemura, H., Utsumi, A., Kishino, F.: Augmented reality: a class of displays on the reality-virtuality continuum. In: Proceedings of Telemanipulator and Telepresence Technologies, vol. 235, pp. 282–292 (1994)
9. Dekoven, B.: The Well-Played Game: A Player's Philosophy. The MIT Press, Cambridge (2013)
10. Innocent, T.: Code switching in mixed realities. In: Cleland, K., Fisher, L., Harley, R. (eds.) Proceedings of the 19th International Symposium of Electronic Art (ISEA2013), Sydney, 11–13 June 2013, pp. 1–5 (2013)
11. Innocent, T.: The lost art of urban codemaking. Commun. Res. Pract. **1**(2), 117–130 (2015). Terry Flew (ed.)
12. Innocent, T.: Urban Codemakers. Melbourne (2010). http://urbancodemakers.net/
13. Innocent, T.: Xawthorn. Hawthorn (2014). http://xawthorn.net
14. Innocent, T.: Zydnei. Sydney (2013). http://zydnei.net