Mobile Games

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The Expanding Field of Mobile Gaming

The International Telecommunication Union (ITU) estimated that there were more than six billion mobile phone subscriptions in the world in 2012. Thanks to miniaturization and the possibility to implement mobile video games, today's mobile games are an increasingly notable and growing area of game business and culture. An expanding range and increasing number of games are being produced and published for handheld consoles, mobile phones, and tablet devices. The expansion of mobile gaming is noteworthy also in terms of quality, as mobile games have become a site for innovative, new play and game design practices. Many of the novel innovations that mobile games have introduced benefit from the specific characteristics of the mobile media ecosystem, including the online digital distribution channels, new interface modalities, and sensor capabilities available in modern mobile devices.

Other significant factors in mobile games and game play are the daily contexts and practices related to mobile application use. A 2011 study of more than 4000 Android phone users found that the average user accessed some application or another on their handset about 50 times per day, for a total duration of more than one hour daily. The average session from opening an application to closing it, however, lasted only 71 seconds (Böhmer et al., 2011). Even though average gameplay sessions on a mobile device are probably longer than that, designing a game for the quick and short mobile usage sessions is different from creating a typical computer or console video game. There are only a few game genres that are unique to mobile devices; it is possible to access most of the popular video game genres also as mobile versions. It is important to address mobile games in both dimensions: as "scaled-down videogames," and as emerging new forms of gameplay, possible only using the opportunities that mobile devices and their mobile user contexts open up.

Defining a Mobile Game

Despite being a common enough term and phenomenon in today's technologically intense societies, it is not necessarily self-evident what exactly constitutes and defines a "mobile game." The literature on mobile games is often technically focused, and generally moves directly to discuss the implementation of games for mobile phones and other mobile devices without clarifying the key concept itself (see, e.g., Hamer, 2007). However, there are multiple different kinds of mobile devices, and even personal computers could be considered "mobile" today, because of the popularity of small and lightweight laptop computers. The most common ways of understanding mobile games nevertheless relate to two distinct lines of game development and publishing. The first one is mobile phone games and the second relates to handheld electronic games and video game consoles. Outside the consumer product market there is also important work that links mobile games to mobile computing and augmented reality experimentation, for example. Such research has often stimulated innovations in consumer electronics and the game industry.

This entry aims to discuss the games designed for mobile phones, and while the full treatment of mobile games needs also to take into account handheld video games and many other portable electronic gaming devices, the history and economics in these various areas are so different that they invite treatment in separate entries. Handheld video games, for example, have much closer ties with the major video game console manufacturers, while mobile phone game makers need to take into account the characteristics of multiple different kinds of phone models and

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differences in mobile operators' services. The distribution of handheld video games through sales in retail stores is also very different from the distribution of mobile phone games, which either come preinstalled to the handset, or are installed by the user over-the-air (OTA), using mobile data services. Some phone manufacturers have experimented with add-on memory cards as a game distribution medium, but without major success.

The Long History of Mobile Games

The early history of mobile games does not start with the introduction of the first handheld electronic games in the late 1970s. Rather, there is a continuity that can be tracked from the early simple electronic gaming devices such as the Merlin by Parker Brothers (1978) to the earlier mechanical toys on the one hand, and to ancient travelers' game sets on the other. A deck of gaming cards or a small version of a board game are easy to use while on the road, and the portability of such analog gaming devices has no doubt played an important part in their evolution and popularity. There is evidence of traveling dice and board games being used by the Roman emperor Claudius (10 BCE–AD 54; see Joannou, 2007). The idea of playing games while traveling is most probably much older than that.

The digital mobile game can be identified as having at least two roots. The early arcade video games were miniaturized into handheld electronic games and consequently they acted as precursors for the handheld video gaming consoles. The second strand of evolution was intimately linked with the mobile phone as a particular kind of application and gaming platform. In terms of suitability for gameplay, a dedicated handheld gaming device benefits from a form factor and controls that are optimized for gaming. Mobile phones are, in contrast, multipurpose devices; therefore generally, in the design of their form and keyboard, the phone's uses (e.g., making calls, typing text messages) have been set as the top priority.

In the field of handheld electronic games and handheld game consoles, Nintendo has been the leader. Originally a playing card company, its first major success in consumer electronics (after a few television game systems) was the Game & Watch series (1980–91). This was a series of devices that originally featured monochrome, segmented LCD screens, each capable of displaying a single video game. As the name indicates, the devices also doubled as an alarm clock. While the original devices had a single screen, dual screen ("multi-screen") games were also published and later color screens were used as well. It has been reported that more than 43 million Game & Watch devices were sold. The series also served as an important precursor for the next generations of Nintendo's handheld gaming devices that became even more popular. The Game Boy series (1989) was the first of these (rechargeable) battery-powered game consoles. For the US market, the device was bundled with a game cartridge for *Tetris*, the popular puzzle video game, a combination that was partly responsible for the Game Boy becoming adopted widely by "casual gamers" as well as by young video game enthusiasts. The handheld form factor also appeared to smooth the gender gap in video gaming. Nintendo of America reported in 1995 that 46% of players on the handheld Game Boy were female, as contrasted to 29% on NES and 14% on SNES consoles (*The Gainesville Sun*, January 15, 1995). The cumulative total sales for the Game Boy line of devices have crossed 200 million units. The popular 32-bit handheld console, Nintendo DS (2004–07), proved Nintendo was capable of building on top of earlier successes while making use of new technologies such as color touch screen, wireless connectivity, and built-in microphone.

While the evolution of mobile games for handheld consoles has enjoyed the benefits of a rather unified development and publishing environment, that has not been the case for mobile phone games. Since the 1970s and 1980s, there have been many different mobile phone manufacturers in the market, each regularly releasing phone models that support diverse feature sets. Such key factors as the screen size, keyboard, memory, processor, operating system, as well as wireless capabilities all differ, making game development for mobile phone ecosystems a rather challenging undertaking. The most popular early mobile phone game was a version of arcade game *Snake* (1997), which was delivered preinstalled in Nokia handsets and could therefore be found on more than 400 million devices (Wright, 2008).

Before the smart phone application ecosystems such as Apple's iOS and its App Store were launched, there were several competing development platforms for mobile phone games, including Macromedia Flash Lite, Doja of NTT DoCoMo, BREW by Qualcomm, and Sun's Java ME. When combined with the early mobile internet protocol (WAP), such technologies made possible, in the late 1990s, the over-the-air sale, download, and installation of a game to a mobile phone via a wireless carrier network. Also, text messaging (SMS) was used for implementing simple games, such as quizzes, where the price of each text message was included in the phone bill (De Prato et al., 2010; Feijoo, 2012).

The visibility of such downloadable game content was at the time largely decided by placement of the game on the "carrier deck," meaning the mobile internet landing page the customers saw first on the browser of their handset. Without a prominent placement in these operator maintained listings, it was hard to distribute the game. With the slow data transfer capabilities and small screens of the available mobile phones, the operator listings were usually rather limited; for example, at one point the US operator Verizon Wireless listed about 350 games and its competitor Sprint about 250 (Rabowsky, 2009, p. 157). Most users, however, did not scroll down tens of menu screens, and thus placement at the top of the deck, along with an immediately recognizable title, was critical to success. Tie-in releases based on popular movie, television, or book franchises were therefore popular choices.

While mobile "middleware" technologies such as Java ME continue to be popular in low-end handsets, such as those which run on Nokia's Symbian Series 40 operating system, smartphones have radically changed the face of mobile games. In 2003 there was an attempt by Nokia to launch a dedicated mobile phone based gaming system called N-Gage, but the selection of games, prices, and user experience of N-Gage compared poorly to those offered by the dedicated handheld gaming consoles such as the Game Boy line of Nintendo. It was the release of iPhone by Apple in 2007, followed by the App Store distribution service in 2008, which had the most powerful impact on the mobile software and game ecosystems. In 2013, Apple reported that its users had downloaded more than 40 billion applications from its App Store, and that the store carried at that point more than 800,000 mobile applications ("apps"). Other similar digital distribution channels include Google Play (originally launched in 2008 as "Android Market") and Windows Phone Store (launched in 2010 as "Windows Phone Marketplace"). All such mobile stores provide users with access to thousands of applications, some of them free, some paid for.

The rising popularity of mobile application ecosystems can be attributed to the better quality of mobile games, the better user experience provided by touch screen-enabled smartphones, the faster access via mobile broadband (3G and 4G networks), and the successful distribution of models provided by other, nonmobile platforms, such as Steam (developed by Valve for Windows computers), Wii Shop Channel, Xbox Live Marketplace, and PlayStation Store. In industry sources, it was estimated that the number of smartphone users worldwide exceeded one billion in 2012, far surpassing the numbers of any other gaming platform, except gaming in personal computers. Similarly, the Finnish game developer Rovio reported that their popular Angry Birds franchise of mobile games had reached the cumulative number of one billion downloads in 2012.

New Directions in Mobile Gaming

Rovio's successful Angry Birds series represents well the mainstream world of mobile games developed for contemporary smartphone ecosystems. Based on earlier, trusted gameplay formulas, such casual games make efficient use of both the touch screen interface and the audiovisual strengths of smartphones' processor and memory capabilities. Many of these types of games are first released as free downloadable versions, then they tempt players to upgrade into full, paid versions of the applications, which – because of the benefits of scale – can be priced at an affordable level, sometimes at less than a dollar. An alternative approach, called the "freemium" model, relies on in-app purchases of "premium" features such as better equipment or additional game levels that take the otherwise free game beyond its built-in limitations. While commercially successful, such techniques have been criticized by

players and developers alike. The low complexity and effortless gameplay that characterize casual mobile games do not necessarily attract dedicated gamers and some critics consider the monetization strategies employed in freemium games as unethical (see, for example, the discussion in www.gamasutra.com).

In addition to business model innovation, mobile games have also been at the forefront of some technological experimentation. There are modes of play that are only available for gaming on mobile devices, such as location based gaming. While there are several decades of history in mobile and ubiquitous computing research, which also includes such game experimentation, it was in the early 2000s that the first commercial location based mobile games were launched. Long before that there had been various kinds of treasure hunt-style games that later were turned into the "geocaching" hobby with the availability of precise GPS navigation devices (Montola, Stenros, & Waern, 2009, pp. 32–34). The first commercial location based games such as *BotFighters* (It's Alive, 2001) used less precise cell location services and SMS messages to relay game commands and information between the players and the game server. The augmentation of physical, urban environments with virtual gaming content has gradually increased, leading to mobile devices used in a rich range of alternative reality games (ARGs e.g., The Nokia Game series, 1999–2005), pervasive games (e.g., *Can You See Me Now?*, 2001) and massively multiplayer mobile games (e.g., *Shadow Cities*, 2010). Such complex forms of mobile gaming are growing in popularity but have not reached anywhere near the level that casual mobile games enjoy.

Thousands of new mobile applications are added to the different online application stores every month, and games are the most popular category among their hundreds of millions of users. Consequently, the commercial and cultural significance of mobile games has greatly expanded from their modest beginnings in the 1990s. Today, games in mobile devices are seriously challenging the PC and console gaming, particularly if tablet devices are included in the mobile device category. Mobile gaming is also becoming increasingly integrated with popular social networks, such as Facebook. Industry reports point toward the majority of the one billion Facebook users actively using the service with their mobile devices. There is an increasing number of mobile games that provide some kind of online social gaming experience, including comparing top scores among one's social network, or sending challenges, gifts, or invitations to one's friends from inside the mobile gaming application. It is also noteworthy that in some industry studies, a slight majority of mobile social gamers is reported to be female.

Research and the Future of Mobile Gaming

Research into mobile games has not formed the mainstream of contemporary game studies, and the study of mobile phones has mostly focused on the communications element rather than on mobile game studies. Nevertheless, there are several notable strands of research work that relate to this field.

In Europe in particular a few research centers have carried out sustained research work on mobile games. One of the background factors has been the European Union, which has been active in its support of mobile game research and development. For example, the "Mobile Entertainment and Industry and Culture" (MGAIN) research project (2001–04) aimed to situate mobile games in the wider context of mobile "content" and entertainment industries, and suggested that mobile gaming would continue to grow in popularity, alongside other mobile applications and services, such as those related to mobile music, messaging services, multimedia, gambling, and location based services (MGAIN, 2003). Another large European research project, "Integrated Project in Pervasive Gaming" (IPerG, 2004–08), focused on the new artistic, technological, and business opportunities related to how new mobile technologies allow the extension of gaming experiences in spatial, social, and temporal dimensions (Montola, Stenros, & Waern, 2009). IPerG produced both scholarship that mapped out some of the design space and player experiences opened up by mobile technologies, as well as several prototype games on emerging gaming subgenres such as mobile treasure hunts, urban adventure games, and massively multiplayer mobile games.

The sociology and ethnography of mobile communications have also touched upon mobile gaming. The work of Larissa Hjorth is particularly noteworthy, as she has carried out substantial work on the sociocultural dimensions of mobile gaming cultures in the Asia Pacific region. She has shown how both video games and mobile phones serve important roles as extensions of a user's identity and as sites of user creativity in people's everyday lives (Hjorth, 2011). In Europe, the EU Kids Online project has produced research that reports children's use of online technologies in Europe, indicating that gameplay is among the most popular children's activities online today, but also that problematic behaviors such as bullying have become common elements in the children's lives (Livingstone, Haddon, & Görzig, 2012). In Finland, the Finnish Player Barometer survey has identified a significant trend showing an increase in mobile gaming in 2009–11, and has pointed out how women and girls play mobile games more actively than they do traditional computer or video games (Karvinen & Mäyrä, 2011).

As the popularity and capabilities of mobile technologies continue to increase, it is very likely that mobile applications and services will grow increasingly sophisticated, with context-aware capabilities that combine gameplay with other incentives, such as health, learning, or marketing. This is often linked to the concept of "gamification," meaning application of game elements in non-entertainment purposes (Deterding et al., 2011). Context-aware gaming integrates into the logic of games multiple sources of information including calendar data, location, and presence of, for example, RFID tagged objects, physical activity that also includes gestures, body data (e.g., arousal or stress level), as well as contextual information provided by other people and social networks (Tester, 2006). All these pieces of information can also be used to "gamify" everyday experiences and activities, supporting the motivation to have a healthy walk rather than to drive the car, or to provide an incentive to pick up a special offer from a nearby restaurant. The applications of gamification in mobile learning (m-learning) are also receiving much interest (Kapp, 2012). The popular location sharing application Foursquare has been one of the pioneers in applying badges, titles, and other game-like rewards into its user experience. The ethics and actual benefits of gamification nevertheless continue to be debated (see, for example, Bogost, 2011).

As a category, mobile games have developed into multiple directions on their own. The convergence of gaming platforms is also an important development: in some ecosystems, and by using techniques such as game streaming, it is now possible to change from one type of device to another and yet continue the same game, which is a development that contributes toward the boundaries between mobile, console, and PC games beginning to erode. The key characteristics of gaming on a small, mobile device nevertheless remain distinctive and unique at their core.

SEE ALSO: Online Games; Online Games and Business Models; Online Games, Casual; Online Games and Children; Online Games and Genre

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