Design Methods for Democratising Mobile Game Design

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Abstract
Playing mobile games is popular among a large and diverse set of players, contrasting sharply with the limited set of companies and people who design them. We would like to democratise mobile game design by enabling players to design games on the same devices they play them on, without needing to program. Our concept of *fluidic games* aims to realise this vision by drawing on three design methodologies. The interaction style of fluidic games is that of *casual creators*; their end-user design philosophy is adapted from *metadesign*; and their technical implementation is based on *parametric design*. In this short article, we discuss how we've adapted these three methods to mobile game design, and some open questions that remain in order to empower end user game design on mobile phones in a way that rises beyond the level of typical user-generated content.

Author Keywords
Mobile games; casual creators; metadesign; parametric design; end-user creativity; mixed-initiative interfaces.

ACM Classification Keywords
H.5.m. Information interfaces and presentation: Miscellaneous

Figure 1: *Wevva*. The game (top) is modifiable in the design overview panel (bottom). Modifiable parameters include scoring, win/loss conditions, character icons, music, spawning, physics forces, collision responses, etc.

Introduction

Our starting point is the observation that mobile games have attracted a large and diverse set of players, but a smaller and less diverse set of designers. Mobile development requires programming on computers using development environments such as Apple's XCode or Google's Android Studio. Furthermore, even skilled programmers familiar with these tools rarely treat mobile game design as a casual activity to engage in on a bus ride, the way they treat mobile game playing.

A way to bring game design into the same contexts as game playing is to allow end-users to change designs at runtime. In videogames that we could call *maker-games*, some of the appeal comes from creating new content. One successful mobile-game example is *Big Bang Racing* (Traplight, 2016) where players have created and shared millions of tracks for a driving game.

Options for customising such games can be extensive, but are usually limited to the player providing or modifying what is considered "content": art assets, levels, etc. These are important design elements, but leave much of the game design still reserved to the designer. Game elements such as scoring, spawning, and progress mechanisms; or aspects of the underlying physics simulations such as collisions and forces, aren't "content" and not normally exposed for players to modify.

We are interested in maker-games that empower creation of casual games with genuinely new game mechanics, but which require no programming, and can be carried out directly on the target device (i.e., a mobile phone or tablet). Our motivation here is to lower the barrier to entry to levels enjoyed by other creative domains, such as drawing, painting or writing stories.

Fluidic Games

To support on-device casual design, we are developing what we call *fluidic games* [5-7]. These blur the line between game play and game design, to the extent that games we ship with the app are simply examples of what can be created, with even key mechanics possible for players to tweak or completely replace. This allows players to not only provide content for a fixed game, but to make new ones, either by designing novel game mechanics directly, or by experimentation where they notice and exploit emergent mechanics [1].

We have built two fluidic game prototypes thus far, *Wevva* (Figs. 1-2) and *No Second Chance* (Fig. 3), and experimented with them in several cultural contexts, such as rapid game jams and game-design curricula. That experimentation, and an overview of these two fluidic games' designs, is explained in [7]. In this paper for brevity we focus only on the design thinking behind fluidic games, and how this approach can (we argue) meaningfully democratise mobile game design.

Design Methods

We draw on three existing design methods, each of which speaks to an aspect of the overall problem. The interaction style of fluidic games is that of *casual creators*, design tools that aim for fun interfaces supporting autotelic exploration. The design philosophy is *metadesign*, leaving design decisions open to post-release adaptation by end users. And the technical implementation is *parametric design*, posing design as navigation of explicitly parameterised design spaces.

Casual Creators

A casual creator is "an interactive system that encourages the fast, confident, and pleasurable exploration of

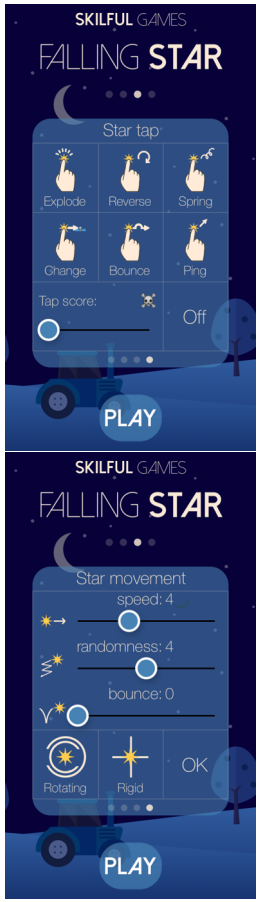

Figure 2: Examples of two of *Wevva*'s design screens through which specific parameters can be set. These open when players tap the respective box in the design overview panel (Fig. 1, bottom).

a possibility space", aimed at supporting autotelic creativity rather than supporting task completion [2]. Key to a casual creator for games is that it should be enjoyable to explore the design space, just as it's enjoyable to play games within that space, with easy switching between those modes.

Of the casual-creator design patterns Compton and Mateas identify in [2], we focus most on *limiting actions to encourage exploration* and *saving and sharing*. We give players the ability to change anything within a limited parametric design space, and save and share the results. In addition, they can modify games shared by others, rapidly switching between creating, playing, sharing, receiving and modifying games.

Metadesign

Since fluidic games are a designed space of games, but also intended to enable end users themselves to design games, they fall into the category of *metadesign* [4] or *designing for design-after-design* [3,9]. This is a catchy, if unwieldy, name for a broad class of approaches that focus on designing open-ended, even "unfinished" systems that enable the systems' users to themselves continue the design process after the initial design of the product is ostensibly finished and the product shipped.

This approach arose out of participatory design, but rather than focusing on involving users in the design process up front, as in classic participatory design, design-after-design focuses on building systems where the design process is not closed when the system is done from the initial designer's point of view – instead the system is designed so that "there is design (in use) after design (in the design project)" [3]. For our purposes, this orientation is key to designing maker-games that empower users to really design their own games with as much creative freedom as possible, rather than being limited to supplying content for existing games.

Parametric Design

The metadesign approach is more of a design philosophy than a specific implementation method. In order to build fluidic games, we realise it within the framework of *parametric design* [12].

In parametric design, possible solutions to design problems are defined as points in a parameterised design space, i.e., a multi-dimensional space defined by a number of separate design choices or axes. This approach is commonly used in fields such as architecture, where parametric design methods are incorporated into standard CAD tools and are common enough that "parametricism" has been called the dominant contemporary architectural practice [10].

For our purposes, the parametric design approach has two advantages. It gives rise to natural metaphors for exploring design spaces that we believe are suitable for mobile interfaces, such as *navigation*, where one can travel from design to design by moving through a design space. Parametric design representations are also amenable to automated search for designs, which provides an underlying framework to support mixed-initiative design, i.e. the combination of user design with automated or semi-automated approaches [6,8].

Open Questions and Future Work

There is some tension between the three design methods we draw on. The enjoyable, playful user-interaction style of casual creators is often gained by radically lim-

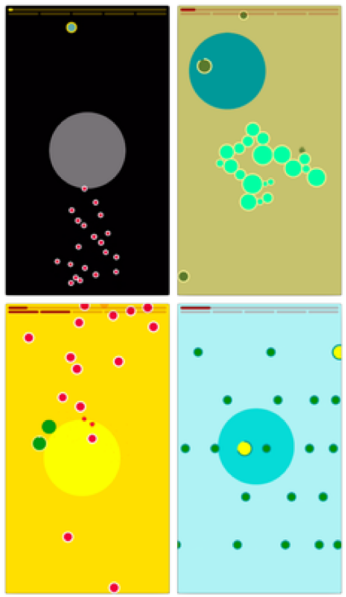

Figure 3: *No Second Chance* (four example games shown). In contrast to *Wevva*, the goals, scoring, and progression are held fixed: the player moves the large circular target to capture 5 balls within 5 minutes. The challenge instead is to design new games entirely by varying a larger set of physics parameters: spawning, collision responses, forces, etc. This produces a different type of design where designing qualitatively different games (games of patience, action games, puzzle-style games) is done primarily through emergent features of the physics simulation.

iting the design space. The metadesign approach, by contrast, argues for users being able to reconfigure designs in very open-ended ways. For fluidic games to be enjoyable to design *and* democratise game design by empowering end users, these goals need to be realised simultaneously. In a parametric design setting, the concrete challenge is to identify parametric spaces that can be made fluid and fun to explore, but large enough to contain surprising designs that are qualitatively different from the games we design as examples.

Also an open question is what people want to do (and actually do) in fluidic games, and how we can support those activities. Questions here include both concrete UI design and high-level design-thinking decisions. We are currently experimenting with three information sources: instrumented versions of the apps to log design sessions, survey feedback from participants in rapid game jams, and post-jam analysis of the games produced in these jams.

Finally, what precisely *democratisation* of design means, and how specific computational approaches can support it, is a longstanding and thorny question requiring some critical reflection [11]. Our hypothesis is that the conceptual toolkit we've chosen here, *casual creators* + *metadesign* + *parametric design*, is a solid framework for building tools that democratise mobile game design. The extent to which that is true is something we are currently investigating, by building fluidic games and experimenting with them in a number of different cultural contexts.

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