FREE 2 PLAY

Making Money From Games You Give Away

WILL LUTON

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YOU GIVE AWAY

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Free-to-Play: Making Money From Games You Give Away
Will Luton

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For Frodo

"Cow's cock and hambone"

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Because this is my first book, I read a few acknowledgments to get a feel for how to construct one. Authors commonly talk about their struggle, but for me writing the book was nothing but stress-free fun. This is of course thanks to a number of people.

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ABOUT THE AUTHOR

Will Luton is a consultant in free-to-play games, advising companies such as SEGA and Pocket Gamer. He has been making games for over ten years, most recently as Creative Director at the award-winning studio Mobile Pie. He regularly contributes articles to *Gamasutra* magazine, *Develop* magazine and *GamesIndustry International*, has a BA (Hons) in Computer Games Design and in 2011 was awarded a 30 Under 30 by *Develop* magazine. He lives in Bristol in the UK with his partner Michaela. He blogs at www.will-luton.uk.

FOREWORD

Welcome reader! You hold in your hands a book that covers a topic very important to the success of my company NimbleBit, which has been developing mobile free-to-play (F2P) games for over three years now. In that time we've racked up nearly 50 million downloads and many millions in revenue, and have earned a reputation for being the studio that does freemium "the right way."

Like many children of the 80s and 90s, the childhood of my twin brother and I revolved around video games. Growing up 15 years ago, the games we played were expensive and few and far between. We wrung every bit of value out of each $50 cartridge or CD-ROM and then some. When we had to be at school or somewhere we couldn't play, we would discuss games at length with friends. Every issue of each video games magazine was poured over from front to back to decide which game to save up for or put on our gift list.

By the time I had graduated college in 2005 and joined my brother in my first games job, the prices of games and how you paid for them had changed very little. Although the Internet had exploded and people were getting used to some free digital services, such as email, very little of this free revolution had spilled over into gaming. Ad-supported free-to-play web games had found a niche, but to the industry as a whole, they were little more than distractions. Little did we know that we had entered the game industry just as it was about to change in a very big way.

DISCOVERING F2P

The first place my brother and I worked together was at a little mobile games studio that made licensed games for the basic feature phones of the day. (Remember the crappy mobile games that you had to pay $5 or so a *month* to your cellular provider to play?) As game makers, not only were we at the mercy of the license holder of whatever property was involved, but also the publisher and design whims of every cellular provider that distributed our games.

By the time my brother and a co-worker had experienced their fifth or so studio closure (and a lot of creative frustration), they had started to think more seriously about going independent. Both had been spitballing game ideas for a while and with the ability to distribute games on Valve's Steam service without a publisher becoming a financially viable option, they wasted no time in creating NimbleBit. NimbleBit's first title was a multiplayer physics-based kart game called *Zero Gear*. I joined the team toward the end of development.

During the market research for *Zero Gear* we kept hearing amazing numbers relating to a game coming out of South Korea called *Kart Rider*. The game was a free download but allowed players to rent cosmetic items for a short time. Microtransactions (in-app purchases) were still pretty unknown in the West and unsupported on Steam at the time we released *Zero Gear*; however, we decided we could still be a free to play game by offering two versions, one free and one paid. We planned on all players being able to play online together, but the paid players would have the luxury of being able to customize their player and kart.

Unfortunately, *Zero Gear* was less than a success for a couple of reasons: It was a very ambitious first project, taking over two years to develop. And near the end of production we learned that we couldn't have free players connect to paid players on Steam, which forced us to stick with a traditional paid model.

Luckily, *Zero Gear*'s failure coincided with the arrival of Apple's App Store in 2008 and some success I'd been having developing apps on my own. Although the App Store didn't initially support in-app purchases, dropping the price of our games to free in well-publicized promotional events was very successful: Many thought we were crazy to give our games away, but it actually generated a large audience and increased our word-of-mouth advertising.

F2P SUCCESS

When in-app purchases finally made their way to the App Store, we tested the waters by adding a few purchasable themes to *Scoops* (our most profitable game at the time) and making it free. Again, people

thought we were crazy, but the game ended up making the same amount of revenue as when it was a for-purchase game and generated ten times the audience. For us, the strength in this marketing method was that we had released many games and were able to cross-promote them, increasing the chance that an incoming player in one of our free games might buy one of our paid games at a later time.

The audience-building groundwork we had laid with these free promotions really paid off when it came time to launch *Pocket Frogs*, our first true F2P game. *Pocket Frogs* launched to critical acclaim and quickly became our most successful game to date, both critically and financially, convincing us that F2P was the business model to use moving forward.

We took the many lessons learned from *Pocket Frogs* and went on to release *Tiny Tower*, which is currently NimbleBit's most successful game and was even awarded the 2011 iPhone Game of the Year on the App Store. *Tiny Tower* put NimbleBit in the spotlight as one of the premier mobile F2P developers and proved that you didn't have to be big on Facebook, employ economists and MBAs, or spend big on user acquisition to be a success with F2P.

WHY F2P IS BETTER

NimbleBit has come to embrace the F2P model for multiple reasons above and beyond the higher revenue. The biggest draw to F2P for us is that way more people are able to experience our games. One of the biggest reasons we decided to go into game development was to share our creations with as many people as possible. Having a much larger fan base and exponentially larger word-of-mouth marketing for our games because they are free are valuable benefits. As long as we can make a living, we will always lean toward the business model that will expose as much of the world as possible to NimbleBit games.

The other aspect of the F2P model that we have come to appreciate is that it is up to players to decide how much they want to spend. More times than I can count, I've paid $60 up front for a game I could only stomach for a few minutes. So now I would be uncomfortable

having to decide what the right price is for the players of our games, because everyone has different tastes.

In addition, thanks to the "race to the bottom" that has hit markets with digital distribution, it is difficult to charge more than $0.99 for a game, which limits your potential revenue severely with a straight paid model. When F2P is implemented in an ethical way, the players decide how much the experience is worth.

WHY THIS BOOK IS IMPORTANT

Although it has proven its viability, the F2P business model is still a nebulous and unknown mystery to many developers. F2P is certainly more complex than a free demo or an up-front paid model and needs to be considered from the start of designing your game. Those with the best understanding of F2P are profiting handsomely from it and keeping their knowledge close to the vest. This makes quality sources for learning about F2P difficult to find and the reason this book is so valuable.

Will's knowledge of F2P comes from years of building games, as well as writing about and consulting with developers on the model. During that time, he's seen many different approaches and just as many different levels of success. Although F2P is still growing and evolving, this book serves as a good reference for the state of the model today. All the topics covered in it—economics, gameplay, monetization, analytics, and marketing—are important to consider when you're building an F2P game, and Will covers each with an easy-to-digest style. Take the knowledge you gain from reading this book and apply it to an F2P game with your own unique flavor. Remember that the model is simply that: a business model. It isn't inherently good or evil. Profitable or not, your F2P game will be exactly what you make it.

Ian Marsh
April, 2013

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INTRODUCTION
HOW F2P CHANGED GAMES

The *Free-to-Play* (F2P) business model has changed the video games industry completely and irrevocably. In a matter of years F2P has created legions of new and successful game developers who have blindsided the old guard, leaving them scrambling and faltering as they struggle to adapt.

F2P is a success because it allows you to make money from huge audiences created by giving your game away for free. F2P players are offered a new deal: They don't have to spend anything unless they want to. Those who love your game can spend hundreds of dollars a month as they become enamored with the experience, whereas those who don't enjoy the title can leave without ever opening their wallets.

THE OPPORTUNITY OF F2P

The F2P model has its roots in the dot-com boom where companies discovered that the most valuable asset in the internet era was an audience and that the biggest audiences were attracted by free services. The engagement of these audiences could be turned into profits through advertising and upselling to premium services. These principles gave Google, Facebook, YouTube and almost every other internet goliath their success.

However, F2P really became popular alongside the explosive uptake of the social networks and mobile devices that put games-capable platforms into the lives of over a billion people of different backgrounds, ages and genders. In addition, the openness of these platforms allowed developers previously locked out of the video games industry by platform and retail gatekeepers a route to market.

Today, single F2P games can generate revenues in excess of $25 million each month as fans repeatedly spend on what they love. This popularity has caused a handful of F2P companies, occasionally less than ten years old, to hit market valuations that exceed $4 billion.

Meanwhile, more devices and more developers are embracing the model, including the slowly morphing giants of boxed-product gaming. F2P is a revolution that shows no signs of slowing.

HOW THIS BOOK WORKS

I wrote this book because I believe that F2P is the best deal for developers and players as the model makes games more accessible to both: Today, you can build a game and within minutes have people all over the globe play it on a device they already own without having to pay a cent.

This accessibility has brought with it new players who couldn't or wouldn't have previously played hundred dollar games for "gamers"; F2P demographics are wide ranging and include players from financially emerging nations. This finally allows the medium of games to obtain the same cultural significance as music, film or TV. F2P allows games to be for everyone and by anyone.

This book was written to help you:

- **Understand.** This book provides you with a complete understanding of the underlying framework of F2P, including how it works and how the components affect each other. This theory will help you apply your knowledge to an ever-changing market and help you make the best decisions for your game. To this end, the book is platform-neutral wherever possible.

- **Build.** This book equips you with what you need to build and operate an F2P game, ranging from how you get players to keep coming back to how to use analytics to continue to improve your game.

- **Profit.** This book tells you what you need to know about making money from your F2P games, including how to market your title.

EXAMPLES OF SUCCESSFUL GAMES

Throughout this book the following three games are used to highlight real examples of what is discussed:

- *FarmVille* **by Zynga.** One of the most widely known and played F2P games, *FarmVille* exhibits many of the archetypes found in the model. It is available on Facebook.

- *Bejeweled Blitz* **by PopCap.** A successful example of using F2P in a traditional puzzle game, *Bejeweled Blitz* operates across multiple platforms including Facebook and iOS.

- *Dungeons & Dragons Online* **by Turbine**. A classic role-playing adventure with big worlds and 3D graphics that you would more commonly associate with box-product titles, yet *Dungeons & Dragons Online* has enjoyed enviable success with F2P. It is available for Windows.

Regarded as leaders in F2P, each game represents slightly different approaches to the model. Although it is far from essential that you play these games, it is recommended, not just for the sake of this book, but because they provide good research (and are fun to play). Plus, of course, they're all free.

THE CHAPTERS

Each of the five chapters in this book covers a single, key F2P topic:

- **Chapter 1, Economics: How the Money Works.** How F2P works financially is the key to understanding the model and how to build your game. This chapter explains how fundamental differences between physical and digital products have led to a new thinking that allows F2P to work while explaining the simple math that creates profit.

- **Chapter 2, Gameplay: Keeping Players Coming Back.** This chapter focuses specifically on designing games to keep players coming back repeatedly through the use of rewards.

- **Chapter 3, Monetization: Players Reward You with $$$.** Making money from F2P games is one of the toughest and most discussed aspects of modern game design. This chapter looks at the various revenue streams and how they work, covering topics such as what you can sell in your game and how you create demand for those items.

- **Chapter 4, Analytics: Understanding and Serving Your Players.** This chapter provides you with what you need to capture data from your players' behavior, comprehend it and use it to make continual improvements to your game.

- **Chapter 5, Marketing: Attracting Players.** This chapter discusses how to get players into your game, going beyond simple acquisition strategies and explaining how to position your app and consider player quality.

Together these chapters provide you with everything you need to put F2P to use, placing you at the forefront of a revolution that will improve your business and help your games reach millions of players. But first you need to grasp a new and surprising way of thinking about the economics of the digital world and the impact that has on games.

4

ANALYTICS
UNDERSTANDING AND SERVING
YOUR PLAYERS

Analytics is the collecting and understanding of data generated by your players' actions that allows you to use a scientific theory to constantly test, understand and improve your game. This chapter gives you the knowledge to make analytics work and includes how to collect, process, interpret and use data to understand your players.

Analytics have reached prevalence because always-connected platforms facilitate the transmission of live data constantly during play. Yet this connectivity has a second advantage: You can continue to update and modify your game. Together these elements let you better attend to your players. If you make the game better for your players, your KPIs (Key Performance Indicators) will increase; players will stay longer and spend more. They will become fans. You never finish making your game.

THE ETERNAL BETA

An advantage of F2P is having your game remain in *eternal beta*. Beta is a stage of traditional development where much of the functionality of a game is decided upon, yet many small improvements continue to shape it. This critical period can result in a quality title or, if stunted, a premature mess.

In physical distribution the final version of a game is called a *Gold Master*—the version from which the manufacturer makes all other copies. Once a game goes "gold," which it often has to by a set date, it is locked in and no further changes can be made. The gold version is what is sold over and over for years. This can result in small snags—bad controls, confusing menus, bugs et al—which can poison an entire game.

In contrast many F2P titles are released as *MVPs* (*Minimum Viable Products*)—a Silicon Valley buzzword popularized by Eric Ries in his book *Lean Startup* (Crown Business, 2011), which describes the release of the quickest and cheapest product that can prove or otherwise market feasibility of a product. An MVP game might have a very

limited release in a single region with little or no marketing support: This is known as a *soft launch*.

The goal of a soft launch is to discover how the world interacts with the game: how much players like it; which bits work and which don't; how much the game costs to run (servers and bandwidth are overheads); and anything else that indicates possible areas for improvement and the game's chances of success. A soft launch occurs before the full development and marketing budget is spent.

After a soft launch, the MVP is in an indefinite period of rapid *iteration*—the process of making versions repeatedly with sequential improvement from the previous version. Hence, an F2P game continuously refines with age.

However, for your game to be improved, a yardstick of comparison is needed. First, you need to determine where alterations are required; second, you need clarity on if the changes you make are the correct ones. Without a comparison there is no understanding of whether the game is in fact getting better or worse.

DON'T LISTEN TO WHAT PEOPLE SAY, LOOK AT WHAT THEY DO

Whether or not Henry Ford actually said, "If I asked my customers what they wanted, they'd have said a faster horse," what has been proven is that the opinions of your customers aren't always the best indicator of what they want or are willing to do.

Imagine if you asked your players: "Would you buy fewer IAPs if the price went up?" The majority of your players would say "yes." They have a bias; they don't want you to increase prices. However, in reality their actions may not change in the event of a small increase in IAP prices. The reason is that humans are complex, and the choices they

make are based on the situation. What people believe they will do isn't what they'll actually do.

Think about when you signed up for that gym membership but didn't go and instead ate burgers while sitting on your couch. You, like your players, have difficulty predicting your behavior.

That's not to say that speaking with your players is a waste of time; indeed, you should ensure that you communicate with them as much as possible. It helps you understand how they think, plus by making them feel heard and showing they're appreciated your players feel valued.

However, to really understand their behavior and their actions, you must instead place the emphasis on what they do rather than what they say.

The application of analytics to the iterative design of your game is the same as the application of the *scientific method*. The scientific method relies on observable evidence to form and give credibility to a hypothesis (**Figure 4.1**). The process is as follows:

1. **Form a hypothesis.** Develop an idea or concept, such as increasing the price of a certain IAP by $1 will in turn increase monthly revenue by $100,000.

2. **Test the hypothesis.** Create an environment where the hypothesis should occur, such as increasing the price of the identified IAP by $1 in a live game.

3. **Gather data.** Gather empirical evidence relevant to the hypothesis, such as sales and revenue figures before and after the price hike.

4. **Interpret the data.** Build an understanding of what happened in the test using the collected data. Then use this understanding to strengthen the hypothesis or to undermine it and form a new hypothesis. If a new hypothesis is formed, repeat the process.
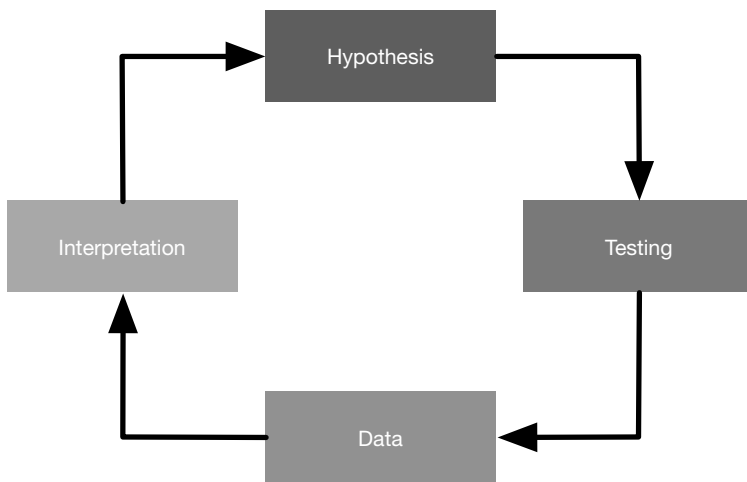
Figure 4.1 *The scientific method.*

Constant theorizing and testing creates an ever-increasing framework of understanding around your players and helps you build a better game for them.

To gather the vital metrics needed for your analysis, you need an analytics package.

COLLECTING DATA

A number of analytic software packages are available with varying prices (from free to thousands of dollars a month) that offer different functionality, and some F2P companies choose to build their own. The aim of all of them is the same: To record metrics from the actions of the players in your game.

The software consists of two parts: an *API* (*Application Programming Interface)*—a protocol that allows two pieces of software to communicate—that sits in the game's code and tracks the player, sending data to a server for collation; and a *dashboard*, usually web-based, that displays the data.

"WE ASK, 'WHAT ARE THE KINDS OF QUESTIONS WE NEED TO BE ABLE TO ANSWER?' AND WE MAKE SURE WE HAVE THE DATA TO ANSWER THOSE QUESTIONS."

—ROBIN WALKER, PROGRAMMER/DESIGNER, VALVE

Whenever a trigger within the game's code is activated, the game notifies the API to record that event. This is known as an *event trigger*, which allows for unique metrics specific to your game to be collected. These triggers may also pass *variables*—specifics relating to the triggers, such as which color was chosen during the purchase of a hat—allowing for further breakdown of a metric.

In addition, most packages also track some metrics by default, such as the length of the session and how often a player has played in a day or a month. These metrics give you industry recognized KPIs, such as DAU, MAU and average session length. Other packages might provide APRDAU or deeper usage data, such as common paths of usage.

Packages vary greatly as to what functionality they provide. Therefore, it is important to know from the outset the data you should be tracking. While knowing every metric you'll need requires an inhuman level of foresight, there are some clear must-have metrics that will provide you with a solid base to build upon.

THE METRICS YOU NEED

Designing analytics—what you track and how—is an often-overlooked element of building an F2P game. Obtaining the right data gives you the best insight and let's you make the most informed decisions. It also leads to more hypotheses and therefore the requirement for more metrics, meaning your analytics will iterate with your game design.

For example, if you see the majority of players abandoning their avatars at level 12, you might speculate that it is due to too few exciting customization options available at that level. As a result, you might require data on the customization purchases at each level, which you then place in a game update.

You can plan for future metric requirements to a degree: Whenever you make a contentious or difficult decision during your game's development, note it, and then collate those notes and determine what data you need to define whether the decision was right or wrong. However, you should record a number analytics, if you can, as a minimum base.

KPIs

KPIs are the most important metrics to improve. They are indicative of the financial success of your game and also highlight how your players feel about and play your game. Critical KPIs to track include:

- **Revenue.** The most imperative metric to track is the money you make. Without it you won't know if your game can sustain itself, you and your company. However, you should track more than just a single revenue metric: You need details on which IAPs your players are buying and the amount of revenue you're making from alternative sources, such as advertising or offer walls.

- **Active users.** DAU and MAU metrics will give you insight on the popularity of the game, including likely server loads and growth.

- **Revenue per user.** This metric provides the average revenue that you can expect from each player in a day (ARPDAU) or month (ARPMAU), which in turn you can use to calculate LTV (Lifetime Value) and the profit and loss of running your game.

- **Conversion.** This percentage (or occasionally decimal) of players who make an IAP in their lifetime provides a good indication of how effective your game is at getting players to break through the spend barrier, allowing you to monitor changes to conversion in response to IAP pricing or other factors.

- **New users.** This metric records each first-time player in your game. It describes how many new players a game is gaining on a daily or monthly basis and indicates the effectiveness of marketing, whether it's viral, organic or paid. In the latter case it helps you to calculate a rough CPA (Cost Per Acquisition).

- **Retention.** The number of your users who are retained over a given time period indicates how sticky your game is, or how effective it is at keeping players playing. The longer they are engaged and playing the game, the happier they are and more likely they are to spend. Low retention might indicate poor goal systems or not serving Bartle types fully.

DEMOGRAPHIC METRICS

Demographic metrics allow you to know who your players are and get a deeper understanding of their likely habits and preferences, aiding in where to advertise and how to tailor content. These metrics also help you in selling advertising and product placement deals. The most important demographics to track include:

- **Age.** Age metrics provide a great deal of insight, from likely disposable income to the ability to grasp complex game mechanics. However, it can be ascertained only on specific platforms unless players opt in to be polled.

- **Language and region.** Language and region metrics indicate how content should be customized—from which language translations are most cost-effective to which virtual goods you should provide.

- **Device.** Knowing which devices, operating system, spec and the like are popular among your players informs you of how to test and optimize your game.

PLAY TRACKING

Play tracking provides insight into how players play; for example, how far they get through a tutorial, when they leave or when they make their first purchase. It enables you to improve the game with the intention of increasing retention and revenue. These vital metrics include:

- **New user flow.** What a new user does, such as dropping out of a tutorial or completing a certain mission first, provides data on how to tailor the game experience to new players, which can vastly improve retention.

- **Drop out.** A player's status, such as level, limited resources or missions completed, at the point that player has churned (leaves the game permanently) provides awareness of what is causing the attrition.

- **First purchase.** When players make their first IAP, along with identifying which IAP it is, this helps you understand what causes your players to start to spend, allowing for better first-purchase deals.

- **Missions and achievements.** Which mission and achievements are completed informs you of what players enjoy and which things they choose to do when they are given options.

- **Level.** Knowing how many of your players are how far into the game will help to ensure that you deliver subsequent content at the right time and at the right point.

- **Session length.** This metric tracks when a player first starts the game until that player leaves. The average provides a good base for understanding the mode of play; that is, if players dip in while doing other things or if they play for extended periods. This insight allows you to build an experience that matches this type of play and helps balance sessioning. It is also handy for estimating advertising revenues or selling product placement.

- **Sessions.** The number of sessions in a given period (usually a day or month) indicates a game's stickiness and can help you plan and improve return triggers. When used with session length, this metric defines what level of exposure players have to your game, which helps in forecasting ad revenue or selling product placement.

- **Peak usage.** When your players play, in addition to how often and for how long, helps to build a picture of play habits. It also allows for server load planning.

"FIRST YOU BUILD SOMETHING THAT YOU THINK IS GOING TO WORK, AND THEN IT'S UP TO THE ANALYTICS TO SMOOTH OUT THE GAME EXPERIENCE."

—*OSKAR BURMAN, GENERAL MANAGER, ROVIO ENTERTAINMENT STOCKHOLM*

RESOURCES AND ITEMS

Tracking supply and demand is essential in understanding how to balance your game's economy. These crucial metrics include:

- **Limited resource creation and spend.** Tracking how much of a limited resource, such as a virtual currency or energy, is created per player over a session, day or month and how much is spent helps you find pinch points.

- **Item creation, purchase and usage.** As with limited resources, the creation and purchase of items is essential for balancing your game. However, also tracking which items are purchased and used gives you insight into what attracts players to use their limited resources. This aids in the planning of new content and ensures that your items are appealing to your players, especially when the data show the preferences of paying players.

CUSTOM METRICS

There will be unique aspects of your game that will require custom analytics; for example, whether your players choose male or female avatars; if your players read help pages; or if your players find a hidden object. These features are integral to your design, so you need to spend time thinking about them throughout production to ensure that you're collecting the data you need to understand how successful these elements are.

However, this kind of data only tells you a player's response to the game as it stands, requiring you to make a change and retest before understanding if you've made an improvement. Fortunately, there is a method of testing a range of options *in situ*: It's called *AB testing*.

AB TESTING

AB Testing (sometimes referred to as *Split Testing*) is a method of ascertaining the better of two options by assigning each player to one of two groups and then serving each group only one of the options during the testing period while measuring the outcome. It is a very powerful tool for ensuring that the user experience (UX) of your game is optimum. Small tweaks can have a big impact on a player's behavior, especially when the most effective design choices are often counterintuitive.

Let's say you have a "Buy Space Milk" button in your game, but you're unsure whether black with white text or white with black text will create the most response (**Figure 4.2**). To AB test the options, you first equally assign your users to one of two groups. You decide that odd user IDs used to track players will be in group A and those with even IDs will be in group B. You then serve group A the black button and serve group B the white button. The next day you look at the metrics and find that group A clicked or tapped the button 25 percent more than group B, so you subsequently set the button to black, increasing revenue by the same amount.

Figure 4.2 *Buy Space Milk AB button options.*

The usefulness of the AB testing process can also extend outside of the game to its marketing, testing different creative ads or even a game name. In addition, the process can even be used as the simplest form of MVP. Mark Pincus, Zynga's CEO, uses the technique for new game concepts: The company AB tests the marketing proposition, the name and artwork of a game concept in an ad against that of an existing title. This allows Zynga to compare the appeal of the proposed game against that of a known popular title by measuring the CTR

(Clickthrough Rate). The more clicks the ad gets per an amount of impression, the more appealing it is to players and the more likely it is to find success in the market.

When more than two options are available, the same process is known as *multivariate testing*, but often erroneously is still referred to as AB testing. Multivariate testing allows you to go much deeper by comparing a range of options. In fact, the number of options you can test is limited only by the time it takes to get a reasonable number of players to play through each one.

Imagine that same "Buy Space Milk" button, but this time you want to test both black and white plus a gray button in four different designs, giving you a total of 12 options (**Figure 4.3**). You again divide your players into 12 groups using sequential user IDs and serve each group a unique button, observing the results and choosing an option after a week. Why a week? Because the groups are smaller, exposure to each button over the same period is less, so testing requires a longer duration to get a reasonable quality of data.
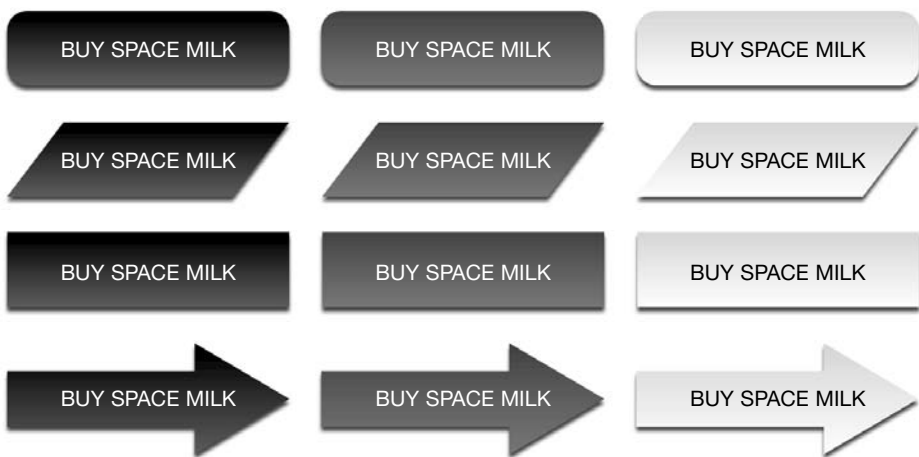
Figure 4.3 *Buy Space Milk multivariate button options.*

DATA QUALITY

As with any scientific experiment, it is important that you yield results you can be confident in. Data that can be used to prove or disprove something with a good certainty is of *high quality*, whereas inaccurate data is of *poor quality*. Therefore, it is essential during an AB or multivariate test that you expose the options to enough players to create a picture of how that user behavior can be used as a good basis for a decision. The more tests you run and the more your average absorbs anomalies, the more you can trust your results. This phenomenon is known as *regression towards the mean*.

Although there's a great deal of math that you can use to calculate the certainty (or significance) of your results, it can be complex. However, if during your tests you see big swings on the average, such as the CTR in the Buy Space Milk button example, you can't be sure your results are accurate. But if you see the CTR vary little over 100,000 impressions, you can be reasonably certain of the results. Additionally, it's important that the sample size for each group be equal (e.g., each button is shown to the same number of players) so confidence can be equal; otherwise, you may be comparing good data against bad.

You must also consider your test groups' histories and how it may impact the data you are hoping to collect. For example, if you want to understand the relationship between price and demand for your IAP, it would be smart to run an AB test. In this case, let's say you split all of your players evenly: The A group gets the current price of $2.99 and the B group gets the new price of $1.99. The results then show that those in the B group bought 50 percent more of the IAP than those in the A group over a week's time and revenue increased; therefore, you set your IAP price to $1.99. However, after a month you find that the number of IAPs purchased is back to pre-change levels and revenue is actually less than before. Why?

In the test, those in the B group had been exposed to the old higher price, so their judgment was influenced by a comparison to it. The

test actually confirmed that a discounted IAP increased uptake, which tells you little about the price/demand relationship.

If you run the test again for first-time players only and see that group B players buy more IAPs than group A players but only by 5 percent, you can derive a new hypothesis: At $1.99 there are more purchases of an IAP than when its price is at $2.99, but the price reduction results in overall lower revenue.

The quality of data is integral to analytics. Poor data from small or ill-suited sample groups can, and over time will, lead you to derive a false understanding from them. This false understanding can lead to making poor decisions that will harm your game. Yet with good data you can learn a great deal about your players.

STATISTICS: THE ANALYST'S TOOLBOX

Statistics—the manipulation and interpretation of data—is a large and complex area of mathematics that is the basis for analytics in F2P games. The multitude of tools, such as formulae and methods of data interpretation, is often bewildering to nonmathematicians.

For this reason, many leading F2P companies have extended their recruitment to city traders and other professional statisticians to fill analyst positions—a role previously unheard of in games. The considerable understanding of these experts provides deeper insight into the data of your games, highlighting correlations that might otherwise be missed or misunderstood.

Although a full and complete explanation of all of the tools used by statisticians is outside the scope of this, and almost any book, there are a few terms and techniques you should be aware of.

AVERAGES: MEAN, MODE AND MEDIAN

Averages—the typical amount in a data sample—are one of the most simple but useful tools that an analyst can use. When people talk about an average, they are commonly referring to the mean average: taking the sum of all the data and dividing by the sample size.

For example, if your game had 500,000 players in a given day and it made $25,000 in revenue, the mean average is the sum of the data ($25,000) divided by the sample size (500,000).

$25,000 / 500,000 = $0.05 ARPDAU

Although the actual revenue or other data from a single player in isolation will vary greatly (the amount by which is known as a *range*), the mean average will tell you the outcome you can expect to attribute to each player when considered in a group.

The mode and median averages are a bit less common, however. *Mode* is the most frequently occurring data value in a list and the *median* is the value found in the exact middle of a data set ordered from lowest to highest.

For example, if your $25,000 revenue came from three IAPs—5,000 sales at $1, 4,000 sales at $3 and 1,000 sales at $8—the mode IAP purchase would be $1 because it is the most commonly occurring value at 5,000 units. The mode tells you which option is most popular and therefore is most likely to occur when you consider a single purchase.

To calculate the median, however, you must first ascertain the middle value. You could eliminate the highest and lowest values until you are left with one value, which is the median. But in some cases, as in the preceding example, you will be left with two values. Here's why. There are 10,000 samples, so the median is between sample 5,000 ($1) and 5,001 ($3). In this instance the median value is the mean average of these two samples. Therefore, the median sales price is $2. Knowing the median allows you to understand where a sample sits in a data set.

"DATA IS DANGEROUS. ASK THE WRONG QUESTION AND YOU'LL GET THE WRONG ANSWER, STEERING YOUR GAME DEVELOPMENT INTO TROUBLE."

—*HENRIQUE OLIFIERS,*
GAMER-IN-CHIEF,
BOSSA STUDIOS

CAUSATION AND VARIABLES

Proving *causation*—that one factor has a distinct and provable effect upon another—is the central purpose of analytics. Causation is what makes your hypothesis either fit the behavior of your players or prove to be wildly wrong.

Often, the aim of causation is to find a link between a *dependent variable* and an *independent variable*. For instance, you could consider an output as a dependent variable, such as the number of players buying an IAP, and consider an input as an independent variable, such as an IAP's price. When a dependent variable changes in relation to an independent variable, there is causation and a basis for a hypothesis. This link can be described by using a technique called regression analysis.

REGRESSION ANALYSIS

Regression analysis is a set of statistical techniques that estimates the relationship between variables. Regression analysis can build a model of, for instance, the links between price and sales of an IAP and therefore predict the price point that will return maximum revenue. It is commonly carried out by humans, but in some cases can be somewhat automated in analytics software.

For example, imagine you have tested price and recorded the subsequent sales of an IAP in a multivariate test at $0.99, $1.99, $2.99, $6.99, $9.99 and $19.99 (**Figure 4.4**).
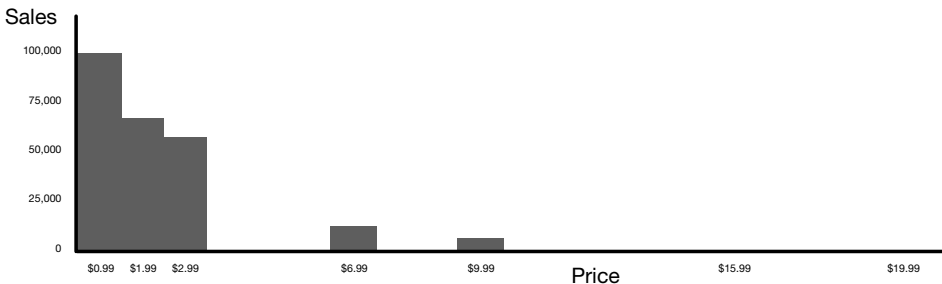
Figure 4.4 *IAP Price-Sales graph.*

From the data, you could suggest that the sales of IAPs (the dependent variable) decrease as price (the independent variable) increases. Specifically, the manner in which the drop occurs is an example of exponential decay. You could then predict and model sales at each dollar increment (**Figure 4.5**) using your own formula.
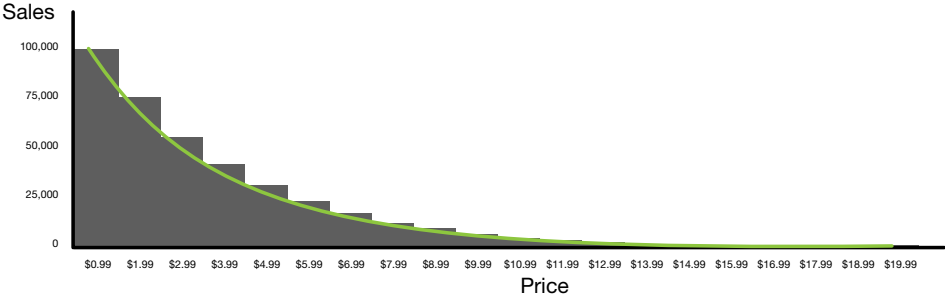
Figure 4.5 *Predicted Price-Sales graph.*

Using that data, you could predict revenue by multiplying sales by price, thereby finding the price that would produce the maximum revenue (**Figure 4.6**).
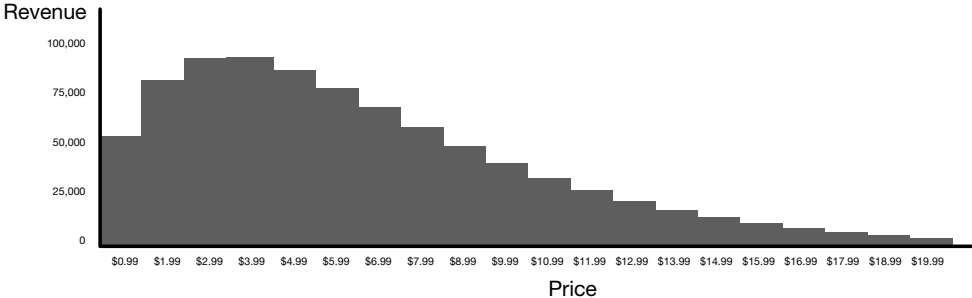
Figure 4.6 *Predicted Price-Revenue graph.*

Although this is a very simple example, it does show that when regression analysis is used well, as with other tools of analytics, it enables you to have a greater understanding of player behavior. In turn, this information can be interpreted to serve your players via better games.

THE ART OF INTERPRETATION

Many foes of F2P bluster that analytics replaces design and leads to heartless and dull games. Those with this mind-set misunderstand the goal of analytics: It is not, and cannot be, a replacement for design. You do not open your analytics package and click File > Export Game.

The purpose of analytics is to give you an understanding of how your players behave; the rest is up to you. You must interpret data and then build the best solutions. Every problem you uncover will have multiple possible answers.

If, for example, retention in your game drops every time you introduce items, you may think that your players dislike new items and stop making them. You could be incorrect. The real cause could be that new items clutter your game's shop, making it harder for your users to find what they want and therefore annoying and frustrating them. Instead, the best solution would be to change the navigation of the shop, making it a better experience and increasing revenues. But by viewing only the number, you will miss the real reason for the drop in retention.

GATHER DATA, TEST, ANALYZE

Continue to play your game; continue to think like your players; continue to love making your game; and continue to be guided by, not enslaved by, your data. But to accumulate essential data to help you improve your game, you'll need to depend on successful marketing to grow your player base.

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