Motivational Interfaces, or, Everything I Need to Know about Family Trees I Learned from Angry Birds

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1. INTRODUCTION

According to the market research firm Global Industry Analysts, each year 84 million people spend $1,000 or more on family history research [8]. Ancestry CEO Tim Sullivan reported over two million paying customers at the world's most popular commercial genealogy website [7]. Family Tree Maker, the leading producer of genealogical desktop software has shipped approximately 2 million units since 2004 [1]. According to Businessweek, "genealogy" is the second most researched topic online [5].[1]

Huge numbers, you say. Genealogy has finally hit the mainstream, you say. Let's juxtapose those numbers against another popular recreational activity: computer games. During the week of December 22-29, 2012, iOS and Android device users downloaded 30 million copies of games from the Angry Birds franchise. 30 million. In seven days. During 2012, the total number of Angry Birds downloads passed one billion [11], and software maker Rovio now has nearly 300 million active monthly users for its games [4].

In numerically relative terms, Rovio Entertainment's customer base is two to three orders of magnitude larger than Ancestry's, and more than an order of magnitude larger than the entire worldwide genealogy market. Rather than simply dismissing Angry Birds as a mindless waste of time, or asserting that there's no comparison to the very serious and intellectually taxing task of genealogy research, I assert that several profound lessons can be learned from the comparison. Put simply, the genealogy market would be significantly larger if it were more like playing Angry Birds and less like doing your taxes.[2]

Researchers acknowledge the compelling (and arguably addictive) nature of well-designed games [3]. A significant number of factors have been shown to contribute to the success of certain kinds of video games. In this paper we explore five specific factors that prove compelling to gamers, analyze these with respect to Angry Birds, and then discuss the ways in which genealogy systems have, to this point, almost completely ignored them.[3] We present these five factors in order of perceived importance.

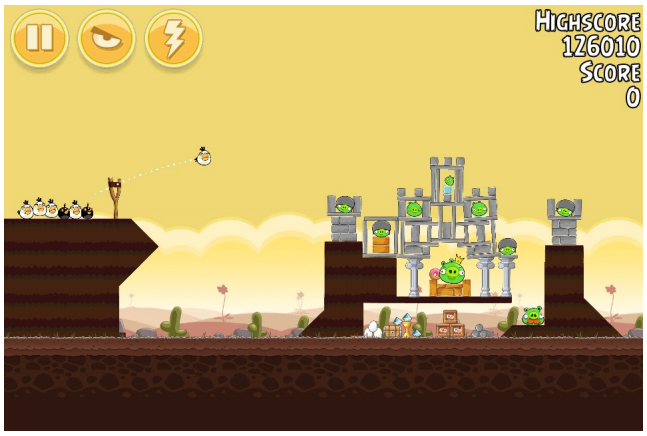

Figure 1: Individual puzzle. Bird launching skill allows me to kill pigs.

2. ANGRY BIRDS PRIMER

In the unlikely event that any readers lack prior exposure to the most popular mobile video game of all time, Figure 1 shows a basic puzzle in which one can clearly see a cadre of evil green pigs. Birds (angry ones) of various types are flung toward the pigs via a slingshot engaged by a very simple finger action. That's it. Kill all the pigs and you clear the level (see Figure 2). Leave any porcine survivors and they smile and snicker at you derisively.

3. COMPELLING ASPECTS

In this section we discuss each of the five success factors: unfinished business, rewards, visual feedback, role-playing game, and social nature.

[1]We leave to the reader's imagination the identity of the *most* popular online search topic.

[2]The notion of genealogy needing to be less like taxes and more like gaming is not a unique concept per se [2].

[3]Inspiration for some of this analysis comes from an article by Jared Newman in which he asserts (in my opinion incorrectly) that Angry Birds is *not* compelling despite its popularity, and then specifically addresses these factors (among others) [12].

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Figure 2: Puzzle solved. If one's goal is a minimal solution, then this level is complete. If one's goal is three stars on every puzzle, then this level is not yet complete.

Figure 3: First set of 21 puzzles. Every puzzle has been solved with three stars.

3.1 Unfinished Business

3.1.1 Angry Birds

In my view, the notion of unfinished business, or uncompleted quests, is the single most significant draw of Angry Birds. My personal quest is to solve every puzzle in the game with a maximal efficiency for each one, earning me three stars per puzzle. I can graphically see exactly where I've been and what I've done, and I can immediately see what lies ahead. When I look at a set of puzzles, and all of them have three stars, I gain a sense of satisfaction and completion (see Figure 3). Conversely, when I look at a set of puzzles and see padlocks, I have a desire to unlock them – the locks represent a barrier that I need to overcome. When I look at a set of puzzles and see all of them solved, I quickly discern which ones lack three stars, and I can pick any of those that I want to go after next (see Figure 4). I can pursue unsolved puzzles linearly (left to right, top to bottom), or I can move around the puzzles trying them in random order, depending on my mood.

3.1.2 Genealogy Software

Figure 4: Third set of 21 puzzles. All puzzles have been solved, but most with only one or two stars. Completion is obvious, as is uncompleted goals.

Almost no genealogy software provides a user with an overarching sense of quest. All of them give me a pedigree chart – a data structure known to computer scientists as a "binary tree." In some cases they may provide some hint of promising exploration (like Ancestry's popular and effective Shaky Leaf). But I need to be able to communicate to the system my motivations for family history research.

Most people want to move toward completion of their tree in some manner, perhaps breadth-first (2nd generation, then 3rd generation, etc.), or perhaps depth-first (find the deepest line and take it deeper). But I may be motivated in other ways. Perhaps I want all names that are closest to completion according to my criteria. Perhaps I want to find my German ancestors between 1700 and 1890. Perhaps I want to attach stories to the individuals in my tree or assure that I have images of documentation for each piece of information in my tree.

Some of these quests are about extending my known tree in various ways; some of them are about enhancing my tree where there are already people. Rather than giving the user a data structure like the traditional pedigree chart, that he or she is then forced to navigate and traverse, the user must be enabled to easily perceive a personal quest of his or her own design.

3.2 Rewards

3.2.1 Angry Birds

The reward structure in Angry Birds is multi-faceted. First of all, clearing a level with even one star is satisfying and provides a sense of completion. The original game had four major quests (now eight), each comprising between 42 and 63 puzzles. Each puzzle can be cleared with one, two, or three stars, depending on performance. Each of the major quests is broken down into two or three sets of 21 individual puzzles.

Clearing a puzzle provides one level of reward; clearing all 21 puzzles in one portion of a quest provides another level of reward; clearing all 21 puzzles with three stars is yet another level of reward; clearing the two or three sets of 21 puzzles in order to complete an entire quest provides yet another level of reward. Ultimately, clearing every single

Figure 5: Quest 1: Poached Eggs. Total points score and total stars achieved.

puzzle with three stars across every set of puzzles in every quest leads to a completion of the entire game. Certain players are incentivized by the overarching goal of winning the game.

3.2.2 Genealogy Software

The rewards of doing genealogy research are largely intrinsic, but such rewards are typically repressed by repeated failed experiences [9]. When an overarching sense of quest is facilitated and users stop fighting against arcane and non-intuitive interfaces, the rewards become overpowering. For example, if I'm trying to extend my tree in a breadth-first manner, and my next quest is to find my maternal great-grandfather, finding that person and/or solving that puzzle brings a tremendous sense of accomplishment and reward. Repeated failure becomes demoralizing and leads directly to the high abandonment rate that we see among former neophyte genealogy hobbyists.

3.3 Visual Feedback

3.3.1 Angry Birds

Angry Birds provides visual feedback at multiple levels. Looking at each screen, the player immediately sees progress toward their ultimate goal. For example, Figure 5 shows the quest "1. Poached Eggs" with a Score (3691290) and a star count (168/189). The Score doesn't mean much since I don't know what to compare it to. But the star count means a great deal, because when it reads 189/189, I will have completed that quest with every level cleared with three stars. When I tap on that quest, I see three screens with 21 puzzles each. The first one shows squares, numbered 1 through 21, and each one has three stars (see Figure 3). I see at a glance that I have accomplished this level, and I can feel good about that. I slide this screen to the left, and see the second screen of 21 puzzles, each with three stars. Success! One more slide to the left, and the third screen shows me a more mixed bag. On this screen, all 21 puzzles have been solved, but not all puzzles have three stars (see Figure 4). In situations where not all puzzles have been solved, all but the current unsolved puzzle are locked. Solving the current puzzle unlocks the next, etc.

3.3.2 Genealogy Software

Once a user solves a genealogical puzzle and feels that sense of accomplishment, the software needs to quickly and readily present that user with the next puzzle in the chain that leads to the completion of the user's overarching quest. Users don't want to lose productive puzzle-solving steam by being forced to manage the flow of puzzles. The system needs to manage that.

My overall quest should be visually obvious, as should my past progress, my current state of completion, and the parts of my quest that are not yet completed to my satisfaction. The locks on the Angry Bird puzzles work well as a metaphor for the next undiscovered person in my tree. Having unlocked that puzzle (in other words, having found that person), I'm enabled to see subsequent dependent puzzles (for example, that individual's parents or other information).

3.4 Role-Playing Game (RPG)

3.4.1 Angry Birds

Angry Birds isn't an MMORPG (Massive Multiplayer Online Role-Playing Game), but it is a Role Playing Game (RPG). You are the birds, the pigs are the enemy. As the game progresses, you begin to sympathetically relate to the birds. As an example, one of the goals of Angry Birds is to clear a level with three stars, signifying a highly efficient clearing of the level. Sometimes while attempting to achieve three stars, having failed, but with a bird or two still in hand, I've been known to fire them off, just to kill the pigs who otherwise smile tauntingly when you fail to clear. I only do that because I am in a role-playing mindset at that point, sympathizing with the birds, and despising the pigs who must die. It's not even about the goal at that point. It's about sticking with the flock.

3.4.2 Genealogy Software

Researching one's own family is very much a role-playing activity, except that the role is real and trans-generational. Your motivation is to find your ancestors, get to know them, connect to them, and find out who you are and where you came from. Your motivation is to find these people, but your role is actually a by-product of the factors we've discussed. Once you have a quest, apply yourself, experience rewards, and painlessly sense your progress, you get more and more into it. That's when genealogy work becomes addictive.

3.5 Social Nature

3.5.1 Angry Birds

Angry Birds has social plug-ins so that one's scores and achievements can be shared with the world (for example via Facebook). Independent of built-in functions that permit the use of existing networks like Facebook, I've found face-to-face social networking in playing Angry Birds by having a small group of people (typically my kids) surrounding my iPhone while I attempt to solve some level. There is an element of satisfaction that accompanies collaboration. Obviously this informal form of social networking isn't central to gameplay, and in fact the vast majority of gameplay in Angry Birds happens in isolation. Of course, the same can be said of genealogy.

3.5.2 *Genealogy Software*

We talk a lot about wanting genealogy to be a social activity, and indeed it can and should be. There is huge untapped power in social networking aspects of family history research. For example when an extended family works together on a quest and can divide and conquer, what they can accomplish together is huge. However, if managing the quest for a single individual is daunting (and to this point essentially unachieved in software), achieving it on a massively distributed scale is even more difficult. Still, it's a place where we naturally need to go. In my opinion it comes after all of the other factors have been achieved. Once we have people productively pursuing their own lines and diving in with gusto, then the notion of networking them for greater efficiency and satisfaction becomes a natural extension to an otherwise successful activity.

4. THE TWENTY MINUTE METAPHOR

An important and compelling characteristic of Angry Birds that I have never seen addressed by any author is the simple fact that the game can be played in chunks of time as small as one minute. One minute! I open my iPhone app, and even if I'm starting from the top menu and tapping "Play," I can get my context established in around 10 seconds. At that point I descend into the context of a single puzzle. Even if I have to think about it first, I can launch my first bird within 30 seconds of picking up my iPhone. I seldom play Angry Birds for more than 20 minutes at a time, and most gaming sessions last less than five minutes. The same cannot generally be said of MMORPGs like World of Warcraft, although it can probably be said of standalone games such as Tetris or Solitaire. It cannot remotely be said of genealogy.

The ease of descent into gameplay in Angry Birds is a model that genealogy software should strive to emulate. Consider a common experience for many genealogical newcomers: you're a smart enough individual, maybe even computer savvy, and on top of that you're motivated to begin a new hobby as a genealogist. You soon find yourself facing an interface that looks and feels a great deal like tax forms. Your navigational metaphor is a graph data structure that grows exponentially until it runs off the computer screen. Your visualization experience and sense of overall quest is much like admiring the Grand Canyon by looking through a straw. No sense of quest, no sense of recent accomplishment and no sense of immediate descent into your research. In contrast, hand an iPhone to a 5-year-old and touch the Angry Birds icon. In less than one minute, a pre-schooler is flinging birds and working through the levels. What's wrong with this picture?

Consider the complexity of the navigational metaphor inherent in each activity. Genealogy in its simplest form involves finding one's ancestors, which comprises traversing backward along an exponential data structure that computer scientists called a binary tree (each generation is double the size of the previous generation). My informal survey of trained software engineers with Computer Science degrees suggests that this simple navigational task is non-trivial beyond the second generation, even for individuals trained to understand the nature of such data structures. For a random genealogical hobbyist the task is essentially hopeless.

In contrast, let's examine the complexity of the navigational tree for Angry Birds. Rather than a tree structure that grows by a power of two at each level, the Angry Birds navigation in the examples we've shown in Figures 3 and 4 grows by powers of 4, 3, 21, and 3 – far more complex a navigational tree than a simple ancestral pedigree, and yet software engineers struggle with navigating pedigree charts while pre-schoolers breeze through Angry Birds.

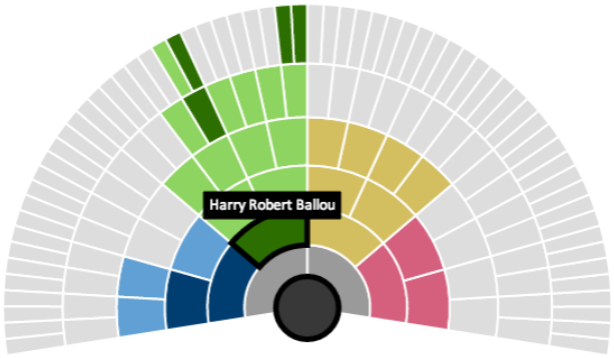

Figure 6: Interactive fan chart created by Prof. Daniel Zappala at BYU as an extension to the original 20-Minute Genealogist project, now a part of the interactive system produced by Kinpoint, Inc.

The Twenty Minute Genealogist project at BYU (now part of Kinpoint, Inc.) has strived since its inception as a student project in 2007 to address these critical factors in such a way that the cognitive load placed on users approaches zero, in the same way that Angry Birds can be easily navigated by a pre-schooler [9] [10]. Figure 6 shows a recent incarnation of an evolving interactive fan chart created by Prof. Daniel Zappala at BYU [13]. Note how readily the gaps in one's overall quest are manifest, not unlike a map that one might see while playing an interactive quest-based computer game. A glance at such an interactive chart reveals undiscovered sections of the user's family tree as well as areas that need improvement, and it provides this insight to the user literally in seconds. By utilizing completion criteria provided by the user, the chart represents a status at a glance for the user's own personal genealogy quest.

5. CONCLUSION

Genealogy research suffers from a "threshold of thrashing" – a minimum level of time investment each week below which no productive genealogy work gets done [9]. The threshold represents the time required to context switch and get one's head wrapped around the genealogical task at hand, including refreshing ones's sense of the overall quest, retracing recent progress, and reconstructing motivation for a given puzzle. The threshold of thrashing is exacerbated by the failure of software to address the factors discussed in this paper. Facilitating these factors effectively lowers the threshold of thrashing, enabling a rapid descent into the context of a specific puzzle that can then be attacked with vigor and effectiveness in a potentially very short time period. Software can and should accomplish this goal. The family history market will not realize its potential as long as traversing a pedigree chart is more difficult than playing a game like Angry Birds.

6. EPILOGUE

A newsletter from FamilySearch, published literally the very week in which this paper appeared, delivered the following news: "Since the launch of FamilySearch indexing in September of 2006, over 984 million records have been indexed and arbitrated! The advances of technology and the dedication of our volunteers have increased the speed with which we can process and deliver records for publication. We are so close to reaching one billion records indexed and arbitrated!" [6]

Let's summarize. The total number of records indexed by FamilySearch volunteers (slightly less than one billion) is barely behind the total number of Angry Birds games downloaded by cell phone users (slightly more than one billion). Put another way, indexing the names of total strangers is orders of magnitude more popular than searching out one's own ancestors. Why is indexing so much more successful and popular than the intrinsically more satisfying act of searching out one's *own* ancestors?!

Quite simply, indexing allows users to feel successful in very short blocks of time, with essentially no externally imposed cognitive burden: download a batch; read the instructions; start indexing; finish a batch; submit it; bask in the afterglow of accomplishment. When genealogy research is as manageable and rewarding as indexing, the market will grow by several orders of magnitude.

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