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GAME FEEL

A GAME DESIGNER'S GUIDE TO VIRTUAL SENSATION

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INTRODUCTION

Close your eyes for a few seconds and imagine yourself playing Super Mario Brothers.

What did you imagine? The visuals? The colors? The iconic sounds of coin collecting and the Mario theme music? How about the *sensation* of moving Mario left and right, of jumping, colliding with blocks, stomping Goombas? What does it *feel* like to control Mario? Go watch someone unfamiliar with games—your mom, perhaps—try to play a game like *Rad Racer*. If it's a game which requires real-time control, she'll be leaning left and right in her chair, pulling the controller, trying to get the car to move just a bit farther, a bit faster. Ever seen someone do this? Done it yourself? This feeling of steering—this tactile, visceral sensation—is game feel.

For the purposes of this book, "feel" is meant in a very specific sense relevant to the experience of playing video games. Feel is not meant in the thematic sense (a Western feel, a Baroque feel) or in the expressive, emotional or physical sense (I feel sad, I feel pain, this place feels creepy). Specifically, game feel is the tactile, kinesthetic sense of manipulating a virtual object. It's the sensation of control in a game.

In digital game design, feel is the elephant in the room. Players know it. Designers know *of* it. Nobody talks about it, and everybody takes it for granted. It's not hard to understand why; if a game designer's done his or her job correctly, the player will never notice the feel of a game. It will just seem right. In this sense, game feel is an "invisible art," like cinematography. Feel is the most overlooked aspect of game creation; a powerful, gripping, tactile sensation that exists somewhere in the space between player and game. It is a kind of "virtual sensation," a blending of the visual, aural and tactile. In short, it is one of the most powerful properties of human-computer interaction.

Recently, I had the opportunity to play Spacewar!, the world's first video game[1] at the "Game On!" exhibit at the Tech Museum, in San Jose, California. What struck me is just how compelling the game still is. It's easy to imagine the breathless enthusiasm of the young technicians crowding around their PDP-1 supercomputer, exhausting hours of valuable computing time on endless rounds of Steve Russell's creation. Even today, as a product of a video game culture, having played hundreds of games, it feels great to me to steer the little rockets, fire off missiles and avoid black holes. Game feel has been with us since the beginning.

[1]William Higinbotham's Tennis (1958) is also a contender, but Spacewar! was the first to have something approximating modern game structure—rounds, scoring and so on.

It may be easy to bring to mind, but game feel is difficult to understand. Games are a nascent and complex medium, one which incorporates many previous forms. A single game might include painting, music, cinematography, writing and animation.

If that weren't enough, video games represent an unprecedented collaboration between creator and consumer. We abdicate authorial control to our players and get … something. We're not quite sure what yet, but we know that it has potential. To many, interactivity seems to be the most important medium of the 21st century.

It's surprising, then, that the luminaries of digital game design have devoted little ink to the phenomenon of feel. In Rollings and Morris, any mention of feel is conspicuously absent. Salen and Zimmerman dance tantalizingly close to discussing feel, but take a more holistic approach, focusing on game state at the higher intervals where scoring and more traditional strategic considerations occur. Chris Crawford's revered work, *The Art of Computer Game Design,* devotes only a sentence to game feel, saying "The input structure is the player's tactile contact with the game; people attach deep significance to touch, so touch must be a rewarding experience for them."

With due respect to these authors and all the great stuff they have taught us, what's missing is an appreciation of just how unique and beautiful an aesthetic game feel truly is. It exists outside of video games—driving cars, riding bikes and so on—but nowhere is it so refined, pure and malleable.

In addition, game feel is moment-to-moment interaction. If we examine the functional underpinnings of most video games, there is usually game feel at the most basic level. It has greater importance in certain games but it's always there. As a percentage of activities in the game, it's what you spend most of your time experiencing. If you break down all the activities of a game, it's the biggest slice of the pie.

This book is about examining feel in greater detail. Where does it come from? How is it created? Does it exist in the computer, the player's mind or somewhere in between? What are the different kinds of feel and why do they feel the way they do? In a clear, non-technical style intended to be accessible to professionals, players and aspiring designers alike, we will investigate feel as experienced by players, created by designers and measured by psychologists. The goal is to create a comprehensive guide to game feel: deconstructing it, classifying it, measuring it and creating it. By book's end you will have the tools to measure, master and create exemplary game feel.

About This Book

This book is about how to make good-feeling games. In many ways, it's the book I wanted when I first started designing games. So many creative ideas rely on a foundation of good-feeling controls. It should be a given that we can always create controls that feel good. We shouldn't have to start from scratch every time.

This book constructs a foundation of understanding and then builds on it, addressing at each step a particular gap in the knowledge base about game design. Figure I.1 shows the structure and flow of the book's topics.

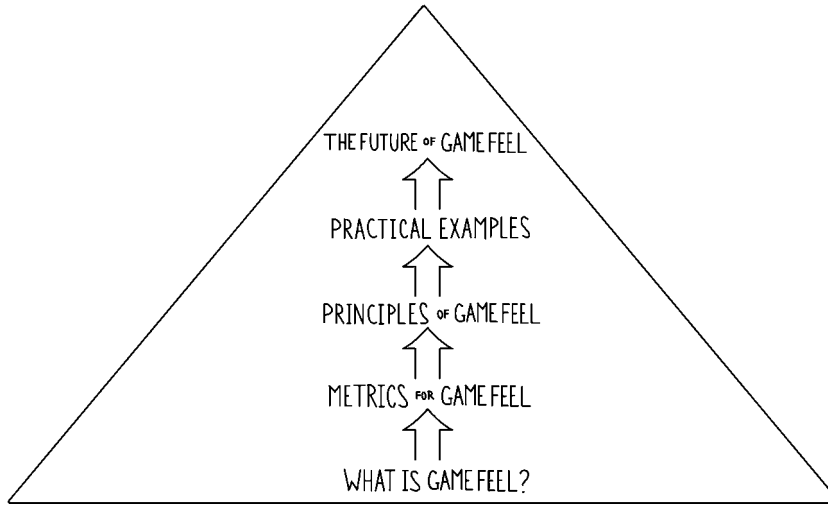

FIGURE **I.1 The structure and flow of the book.**

www.game-feel.com

To get the most out of reading Game Feel, I recommend going to www.game-feel.com, the companion website to this book. For many of the chapters, I've provided playable examples that will allow you to experience first-hand the ideas being discussed. In addition, the website contains interviews on the subject of game feel with folks like Kellee Santiago and Jenova Chen of thatgamecompany, Kyle Gabler of 2dBoy, and Johnathan Blow and Chaim Gingold of Number-None and Maxis, respectively.

If you're a student, the definition at the beginning will be interesting and relevant, but the real meat will be the examples. In the examples you can see all the tiny decisions and particulars of implementation that go into making games feel the way they do. This is the palette of game feel; if you want to make good-feeling games, these are the details you need to understand.

If you're a game designer, the definition stuff will not be news to you. But some of the theory bits may be useful and applicable, if only to better understand the deeper physiological phenomena. The examples will be useful because of the legwork I've already done—you can reverse engineer games yourself, probably, but it takes a lot of time. The principles of game feel may also be a useful way to think about building games. It's one way, at any rate, to which you can compare your own methods.[2]

If you're an educator, the theory and definition pieces form a solid basis for understanding game feel at a conceptual level. In addition, the examples provide a great way to illustrate the complexities of making good-feeling games without forcing students to program the games themselves from scratch. The most useful part,

[2]Which, by the way, I'd love to hear about. Email me at sswink@flashbangstudios.com.

however, will probably be the principles of game feel chapter, which lays out some guidelines for creating good-feeling games.

If you're someone interested in the medium of games, such as a journalist, the definition parts may provide a new perspective on genres. In addition, understanding the physiological thresholds that cause game feel to be sustained or break down may help explain why frame rate drops and other technical disturbances make games feel so much worse. But my hope is that in understanding and being able to measure things like frame rate and response time, you will be able to do a better job of separating medium from message. Yes, a developer is to blame if a game runs poorly. But I think this consideration is given too superlative an emphasis when games are critiqued. The experience of playing a game may still have some things to offer from a critical standpoint—as Jurassic Park: Trespasser did—even if they are technically incompetent.

What Is Game Feel?

One obstacle to understanding game feel at a deeper level is definition. This section offers a simple three-part definition of game feel based on the ways players experience it and game designers design it.

Each of the three parts of the definition is expanded to make it useful for classifying games as well as understanding what game feel is. Expanding the definition requires an exploration of some of the ways people perceive things, including measures for frame rate, response time and other conditions necessary for game feel to occur. These physiological thresholds and concepts of perception combine to form the "game feel model for interactivity"—a complete picture of the ongoing process of game feel.

The section ends by applying the definition to some games specifically chosen because they are on the fringes of game feel.

Metrics for Game Feel

Another problem facing game designers is meaningful comparison. How does the feel of Halo compare to the feel of Ikaruga? From a designer's perspective, this is tied to tuning. Why is one game "floaty" while another is "tight and responsive"? If a player tells me that my game is floaty, what should I do? How should I change the variables of my complex system? Is floaty bad? Is it good? What does it mean?

This section is about measuring the pieces of the game feel process that a designer can change. By measuring each piece—input, response, context, polish, metaphor and rules—we can make generalizations about what terms like floaty, tight, smooth, responsive and loose mean. Not only in a particular game, but across different games. Once we can measure game feel, we can master it.

Practical Examples

The metrics we developed in Section II are applied to specific games, providing comprehensive analysis of how the feel of these games function and providing a template for creating games with similar feel. This section will give you clear, practical steps for creating a game that feels a particular way. In addition, I have constructed playable and editable examples for each game (find them at www.game-feel.com) so you can follow along and experience how the feel of each game changes and grows.

Principles of Game Feel

What principles, if followed, will make all games feel better? This section generalizes the lessons of the good-feeling examples and measurable pieces of game feel into a set of best practices for game feel.

The Future of Game Feel

This section uses the lessons and definitions of the previous chapters to examine the input devices, rendering technology and thought problems that will define how game feel will be used in the future. With deep, expressive interactivity, can we provide experiences which don't require the backdrop of skill and challenge? Is it possible to express things spatially without competition? Could game feel be a form of deeply personal expression like dance or martial arts?

CHAPTER ONE

Defining Game Feel

There is no standard definition of game feel. As players and game designers, we have some beginnings of common language, but we have never collectively defined game feel above what's necessary for discussing a specific game. We can talk about the feel of a game as being "floaty" or "responsive" or "loose," and these descriptions may even have meaning across games, as in "We need to make our game feel more responsive, like Asteroids." But if I ask 10 working game designers what game feel is—as I did in preparation for writing this book—I get 10 different answers. And here's the thing: each of these answers is correct. Each answer describes a different facet, a different area, which is crucial to game feel.

To many designers, game feel is about intuitive controls. A good-feeling game is one that lets players do what they want when they want, without having to think too much about it. Good game feel is about making a game easy to learn but difficult to master. The enjoyment is in the learning, in the perfect balance between player skill and the challenge presented. Feelings of mastery bring their own intrinsic rewards.

Another camp focuses on physical interactions with virtual objects. It's all about timing, about making players really feel the impact, about the number of frames each move takes, or about how polished the interactions are.

Other designers insist that game feel is all about making the players feel as though they're really there, as though they're in the game. All their efforts go into creating a feel that seems more "realistic" to players, which somehow increases this sense of immersion, a term that is also loosely defined.

Finally, to some designers, game feel is all about appeal. It's all about layering on effect after careful effect, polishing every interaction—no matter how trivial—until interacting with the game has a foundation of aesthetic pleasure.

The problem is unity. How do these experiences become a cohesive whole? They all tell us something about game feel, but they do not help us define it. St. Augustine's comment about defining time comes to mind: "What then is time? If no one asks me, I know what it is. If I wish to explain it to him who asks, I do not know."

Game feel is the same way. Without close examination, we know what it is. Try to define it and the explanation quickly unravels into best practices and personal experiences.

This book is about how to make good-feeling games. But first we need to be clear about what game feel is. We need to separate medium from content. We need a definition that enables us to separate the conditions that are necessary for game feel from the judgments that make a game feel a certain way.

What is the underlying phenomenon, apart from our own experiences and the craft knowledge of building games? What are the building blocks? Just what is game feel?

The Three Building Blocks of Game Feel

Game feel, as experienced by players, is built from three parts: real-time control, simulated space and polish.

Real-Time Control

Real-time control is a specific form of interactivity. Like all interactivity, it includes at least two participants—in this case the computer and the user—who come together to form a closed loop, as illustrated in Figure 1.1, the concept couldn't be simpler.

The user has some intent, which is expressed to the computer in the form of the user's input. The computer reconciles this input with its own internal model and outputs the results. The user then perceives the changes, thinks about how they compare to the original intent, and formulates a new action, which is expressed to the computer through another input.

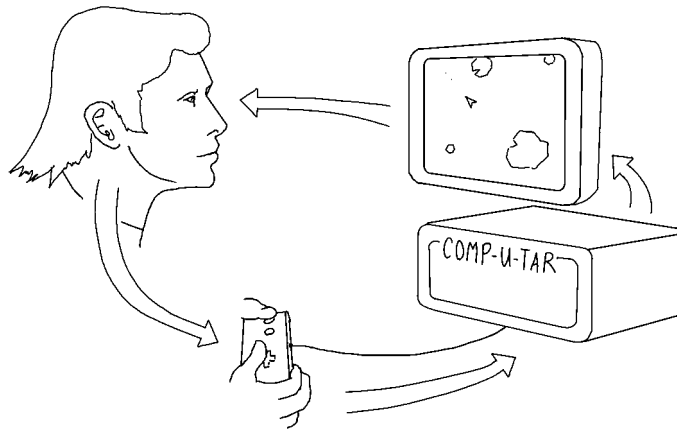

FIGURE **1.1 Interactivity involves the exchange of information and action between at least two participants.**

In his book, *Chris Crawford on Game Design*, game designer Chris Crawford likens this process to a conversation, a "cyclic process in which two active agents alternately (and metaphorically) listen, think and speak."

The conversation in Figure 1.2 begins when one participant, Bob, speaks. The other participant, Bill, listens to what was said, thinks about it, formulates a response and speaks in return. Now it's Bob's turn to listen, think and speak, and so on. In Crawford's model, a computer replaces one of the participants, "listening" to the player's input via the input device, thinking by processing that input and changing system state and "speaking" via the screen and speakers (Figure 1.3).

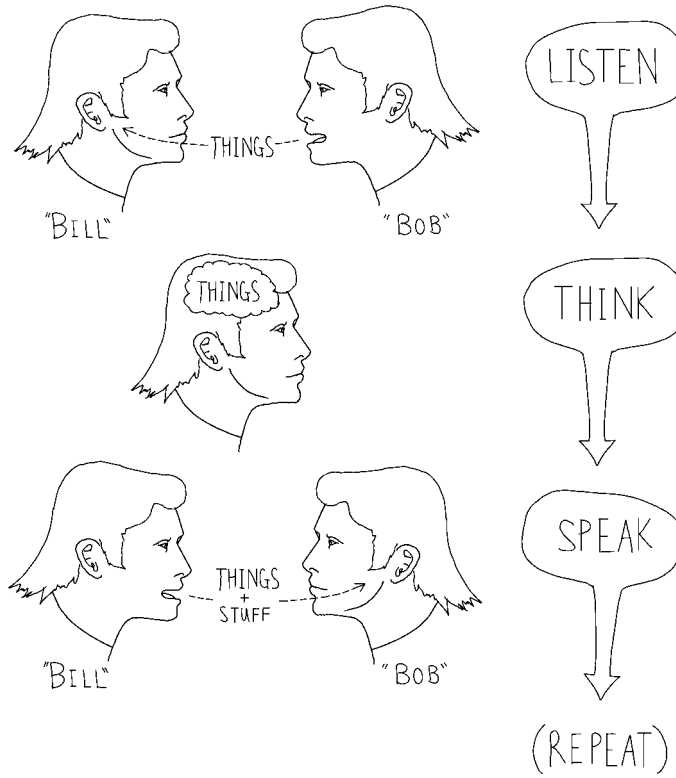

FIGURE **1.2 Interactivity as a conversation.**

However, the metaphor of a conversation between human and computer doesn't fit all situations. Real-time control is not like a conversation. It's more like driving a car. If a driver wants to turn left, it's more action than thought. He turns the wheel in the corresponding direction, using what he sees, hears and feels to make small corrections until the turn is complete. The process is nearly instantaneous. The "conversation" takes place in minute increments, below the level of consciousness, in an uninterrupted flow of command. The result of input feels as though it is

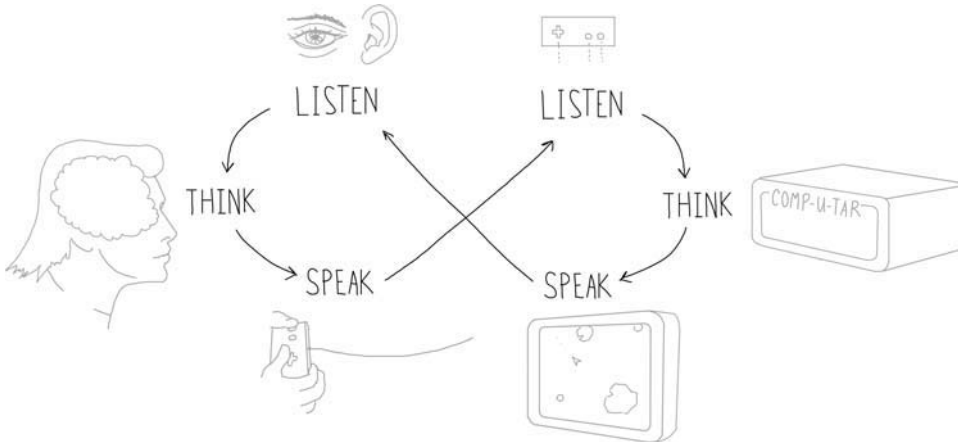

FIGURE **1.3 The conversation between human and computer.**

perceived in the same moment it's expressed. This is the basis of game feel: precise, continuous control over a moving avatar.

This is a starting point for our definition of game feel:

Real-time control of virtual objects.

The problem with this definition is context. Imagine a ball suspended in a field of blank whiteness. How would you be able to tell if it were moving? Without the backdrop of space to move through, there can be no motion. More importantly, there can be no physical interaction between objects. For the sense of interacting physically with the game world, there needs to be some kind of simulated space.

Playable Example

If you're near a computer, open game feel example CH01-1 to experience the necessity of context. This is a first-person shooter game. Use the WASD keys to move around and the mouse to aim. Can you feel the motion? No? Now press the "1" key. With a simulated space, there is feel.

Simulated Space

Simulated space refers to simulated physical interactions in virtual space, perceived actively by the player. This means collision detection and response between a real-time controlled avatar and objects in a game world. It also means level design—the construction and spacing of objects relative to the speed of the avatar's movements. These interactions give meaning to the motion of an avatar by providing objects

to move around and between, to bump into, and to use as a frame of reference for the impression of speed. This gives us the tactile, physical sense of interacting with virtual environments the same way we interact with our everyday physical spaces. Using the avatar as a channel for expression *and* perception, we experience game worlds at the tactile, physical level of the world around us.

Playable Example

Open example CH01-2 to experience the difference. Move around and feel the sensation of control. Now press the "1" key to enable collisions. Feel how different that is?

The other necessary component for simulated space is that it must be actively perceived. Perception happens on a scale of passive to active. The interaction of objects you see on TV and in films is passively perceived. Exploring a simulated space using real-time control is active perception. Game feel is active perception.

The key question is "How does the player interact with the space?" Some games have detailed collision/response systems and level design, but the player does not experience them directly. Starcraft is an example of a game like this, as we'll see in a moment. In other games, space is an abstraction. Games with grids, tiles and hexagonal movement use space abstractly. This is not a simulation of space in the literal sense, which is the sense we're after. Game feel as we're defining it means active perception of literal space.

If we add the concept of context to our definition, it becomes:

Real-time control of virtual objects in simulated space.

This definition is close, but with it we are ignoring the impact of animations, sounds, particles and camera shake. Without these "polish" effects, much of the feel of a game is missing. There are objects interacting with only simulated responses giving clues about whether they're heavy, light, soft, sticky, metallic, rubber and so on. Polish sells interaction by providing these clues.

Polish

Polish refers to any effect that artificially enhances interaction without changing the underlying simulation. This could mean dust particles at a character's feet as it slides, a crashing sound when two cars collide, a "camera shake" to emphasize a weighty impact, or a keyframed animation that makes a character seem to squash and stretch as it moves. Polish effects add appeal and emphasize the physical nature of interactions, helping designers sell those objects to the player as real. This is separate from interactions such as collisions, which feed back into the underlying

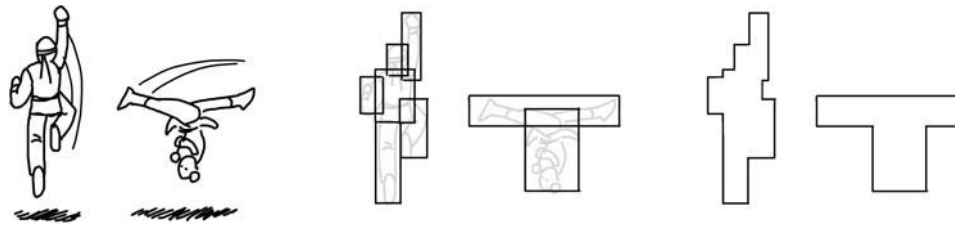

FIGURE **1.4 Street Fighter II without animation: just weird fighting boxes.**

simulation. For example, if you take away the animations from Street Fighter II, you end up with something like Figure 1.4.

If all polish were removed, the essential functionality of the game would be unaltered, but the player would find the experience less perceptually convincing and therefore less appealing. This is because—for players—simulation and polish are indistinguishable. Feel can be just as strongly influenced by polish effects as by a collision system. For example, a simple squash and stretch animation layered on top of a moving avatar can radically change the feel of a game, as the creators of the popular student game De Blob discovered. A post from Joost Van Dongen reported that "When the ball bounces or moves very fast, it slightly deforms, and while rolling it slightly sags. On screenshots this is quite a subtle effect, but when seen in action, it really looks fun. An interesting detail is that it changes the feel of the gameplay entirely. Without the squash-shader, the game feels like playing with a ball made of stone. Then with no changes to the physics at all, the squash-shader makes it feel much more like a ball of paint. Nice to see how the player can be deceived about gameplay using graphics only"[1] (see Figure 1.5).

Assembling these three elements—real-time control, simulated space and polish—into a single experience, we arrive at a basic, workable definition of game feel:

> **Real-time control of virtual objects in a simulated space, with interactions emphasized by polish.**

The player controls the avatar, the avatar interacts with the game environment and polish effects emphasize those interactions and provide additional appeal.

Examples

The question that naturally follows is "Does game X have game feel?" With our basic definition, we can classify most games this way. For example, Sonic the Hedgehog has game feel while Civilization 4 does not. Sonic has real-time control while Civ 4 is turn based, placing it outside our definition. But to say that Civ 4 has

[1]http://www.gamedev.net/community/forums/topic.asp?topic_id=401276