CHAPTER THREE: WHAT GAMES ARE

Which brings us, finally, to games.

If you review those definitions of "game" I presented earlier, you'll see that they have some elements in common. They all present games as if they exist within a world of their own. They describe games as a simulation, a formal system, or as Huizinga put it, a "magic circle" that is disconnected from reality. They all talk about how choices or rules are important, as well as conflict. Finally, a lot of them define games as objects that aren't real, things for pretending with.

But games are very real to me. Games might seem abstracted from reality because they are iconic depictions of patterns in the world. They have more in common with how our brain visualizes things than they do with how reality is actually formed. Since our perception of reality is basically abstractions anyway, I call it a wash.

The pattern depicted may or may not exist in reality. Nobody is claiming that tic-tac-toe is a decent mimicry of warfare, for example. But the rules we perceive—what I'll call the pattern—get processed exactly the same way we process very real things like "fire burns" and "how cars move forward."

Games are puzzles to solve, just like everything else we encounter in life. They are on the same order as learning to drive a car, or picking up the mandolin, or learning your multiplication tables. We learn the underlying patterns, grok them fully, and file them away so that they can be rerun as needed. The only real difference between games and reality is that the stakes are lower with games.

Games are puzzles

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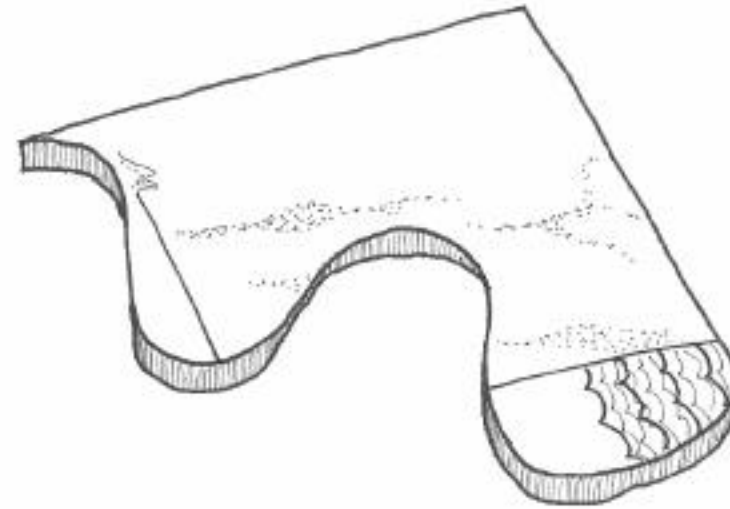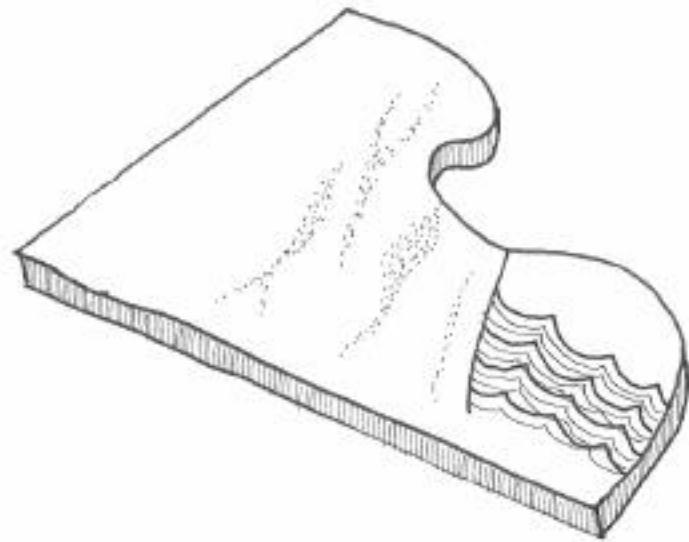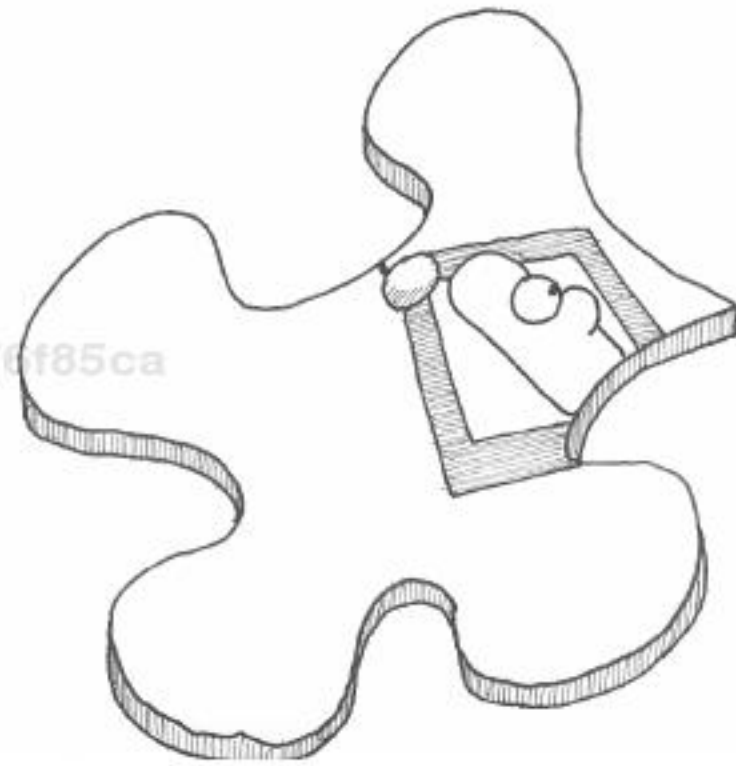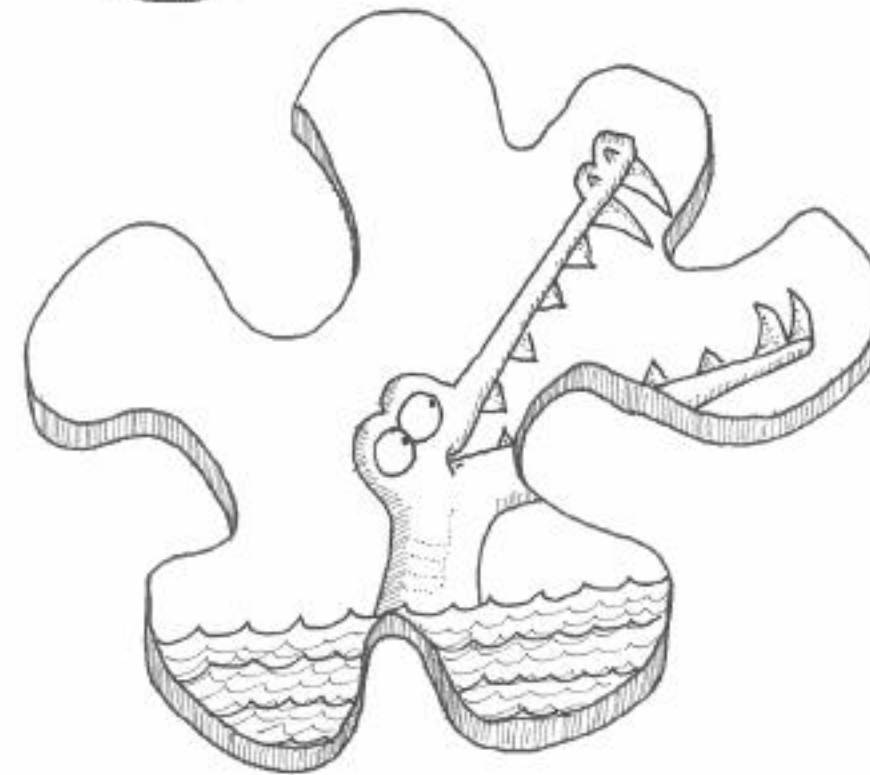
Games are something special and unique. They are concentrated chunks ready for our brains to chew on. Since they are abstracted and iconic, they are readily absorbed. Since they are formal systems, they exclude distracting extra details. Usually, our brains have to do hard work to turn messy reality into something as clear as a game is.

In other words, games serve as very fundamental and powerful learning tools. It's one thing to read in a book that "the map is not the territory" and another to have your armies rolled over by your opponent in a game. When the latter happens, you're *gonna get the point* even if the actual armies aren't marching into your suburban home.

The distinctions between toys and games, or between play and sport, start to seem a bit picky and irrelevant when you look at them in this light. There's been a lot of hay made over how play is non-goal-oriented and games tend to have goals; over how toys are aimed at pointless play rather than being games; about how make-believe is a form of play and not a game.

A game designer might find those distinctions useful because they provide helpful guide-posts. But all these things are the same at their most fundamental level. Perhaps this is the reason why language hasn't done a very good job of making distinctions between "play," "game," and "sport." Playing a goal-oriented game involves simply recognizing a particular sort of pattern; playing make-believe is recognizing another one. Both deservedly belong in the same category of "iconified representations of human experience that we can practice with and learn patterns from."

Consider the key difference between something like a book and different kinds of games. A book can do the logical conscious part of the brain pretty well. And really good readers have an ability to slurp that info directly into the subconscious, intuitive mind. But what a book will never be able to do is accelerate the grokking process to the degree that games do, because you cannot practice a pattern and run permutations on it with a book.
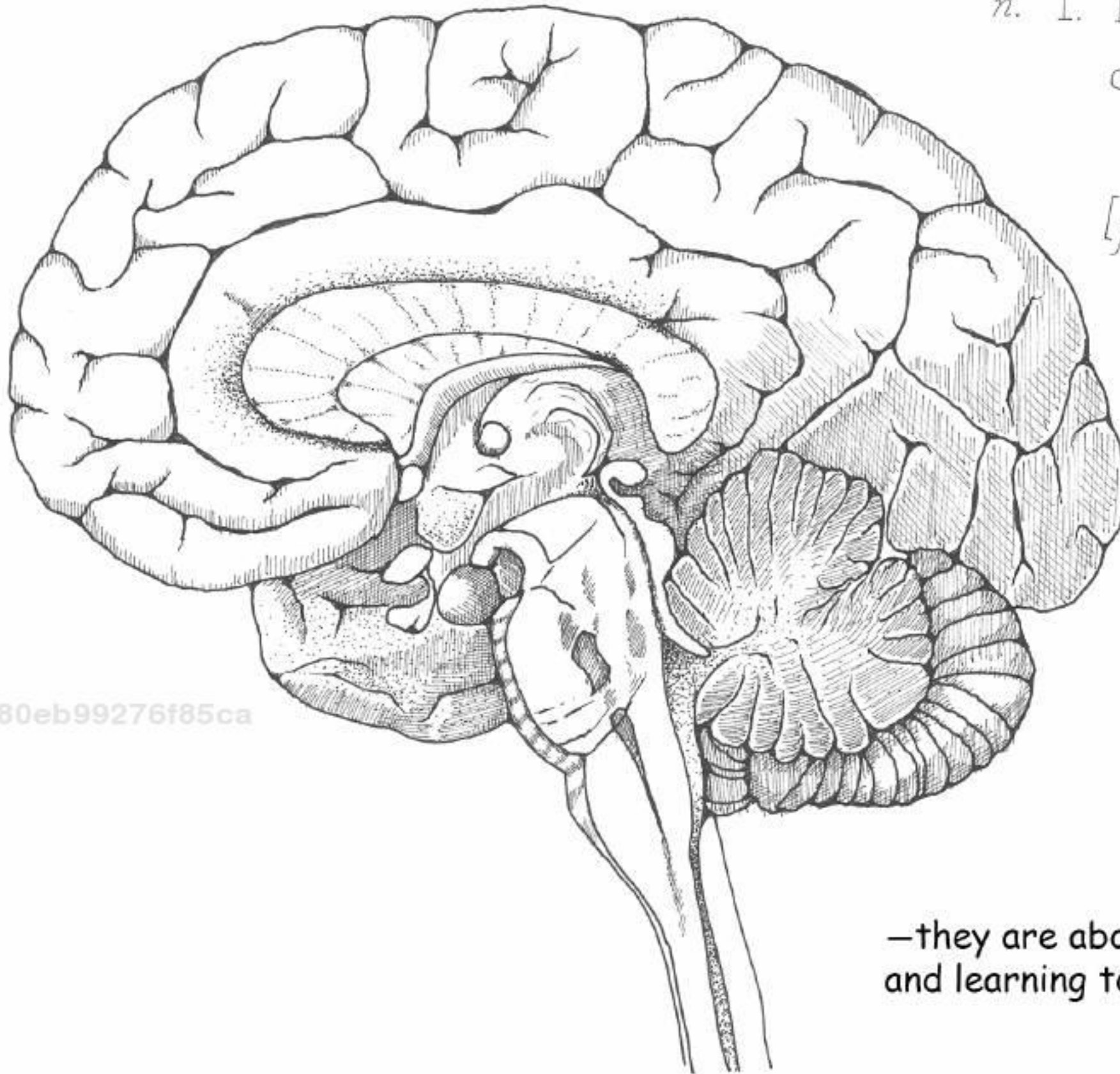
cog·ni·tion

n. 1. The mental process
of knowing.

[from Latin *cognitio.*]

—they are about cognition,
and learning to analyze patterns.

Linguists have noticed that language obeys fairly strict mathematical rules. For example, humans cannot understand a sentence that is too deeply nested. "The bishop the fireman the mother the football player kicked the baby tossed the baby asked the mother to toss the baby called in the fire to the fire department" is a bad sentence because it violates this rule. The clauses are too deeply nested. We can puzzle it out with our slow logical conscious brain, but we work against our own natures when we do so.

Games run into similar limitations. The biggest of them is their very nature. They are exercises for our brains. Games that fail to exercise the brain become boring. This is why tic-tac-toe ends up falling down—it's exercise, but so limited we don't need to spend much time on it. As we learn more patterns, more novelty is needed to make a game attractive. Practicing can keep a game fresh for a while, but in many cases we'll say, "Enh, I get it, I don't need to practice this task," and we'll move on.

Almost all games fall prey to this. They are limited formal systems. If you keep playing them, you'll eventually grok them. In that sense, games are disposable, and boredom is inevitable.

Extremely formal games are more susceptible to mathematical analysis, which is a limitation in itself. We don't think that we can drive just because we know the rules of the road and the controls of a car, but extremely formal games (such as most board games) have fairly few variables, and so you can often extrapolate out from the known rule set. This is an important insight for game designers: *the more formally constructed your game is, the more limited it will be.* To make games more long-lasting, they need to integrate more variables (and less predictable ones) such as human psychology, physics, and so on. These are elements that arise from outside the game's rules and from outside the "magic circle."

(If it's any consolation to games, that's where game theory tends to fall down too—psych tends not to be that amenable to math.)

Constant motion @
3 pixels/second.

When you're
playing a game,
it exercises
your brain,
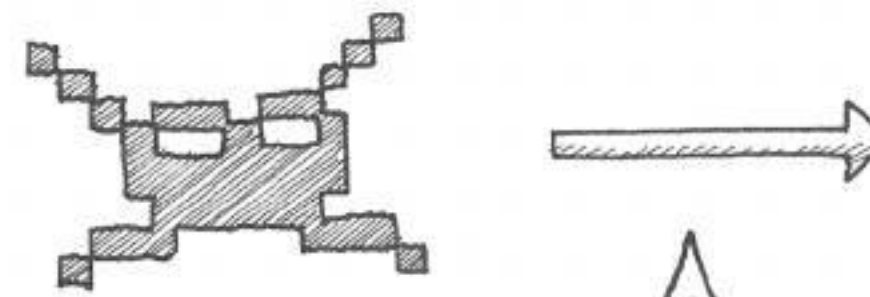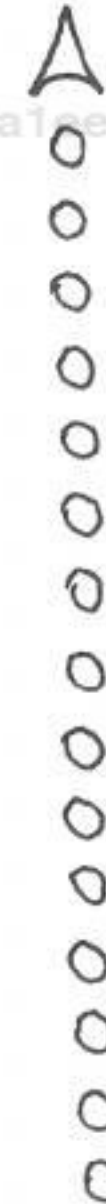
Bullet vertical
vector @ 20 pixels
per second.

Ideal firing trajectory
for interception.

Max acceleration
5 pixels/sec.

39

This finally brings us to the title of the book and the fundamental question: What is fun?

If you dig into the origins of the word, it comes either from *"fonne,"* which is "fool" in Middle English, or from *"fonn,"* which means "pleasure" in Gaelic. Either way, fun is defined as "a source of enjoyment." This can happen via physical stimuli, aesthetic appreciation, or direct chemical manipulation.

Fun is all about our brains feeling good—the release of endorphins into our system. The various cocktails of chemicals released in different ways are basically all the same. Science has shown that the pleasurable chills that we get down the spine after exceptionally powerful music or a really great book are caused by the same sorts of chemicals we get when we have cocaine, an orgasm, or chocolate. Basically, our brains are on drugs pretty much all the time.

One of the subtlest releases of chemicals is at that moment of triumph when we learn something or master a task. This almost always causes us to break out into a smile. After all, it is important to the survival of the species that we learn—therefore our bodies reward us for it with moments of pleasure. There are many ways we find fun in games, and I will talk about the others. But this is the most important.

Fun from games arises out of mastery. It arises out of comprehension. It is the act of solving puzzles that makes games fun.

In other words, with games, learning is the drug.

but you'll only play it until you master the pattern.

HI SCORES

RAF   999,999,999

RAF   999,999,998

41
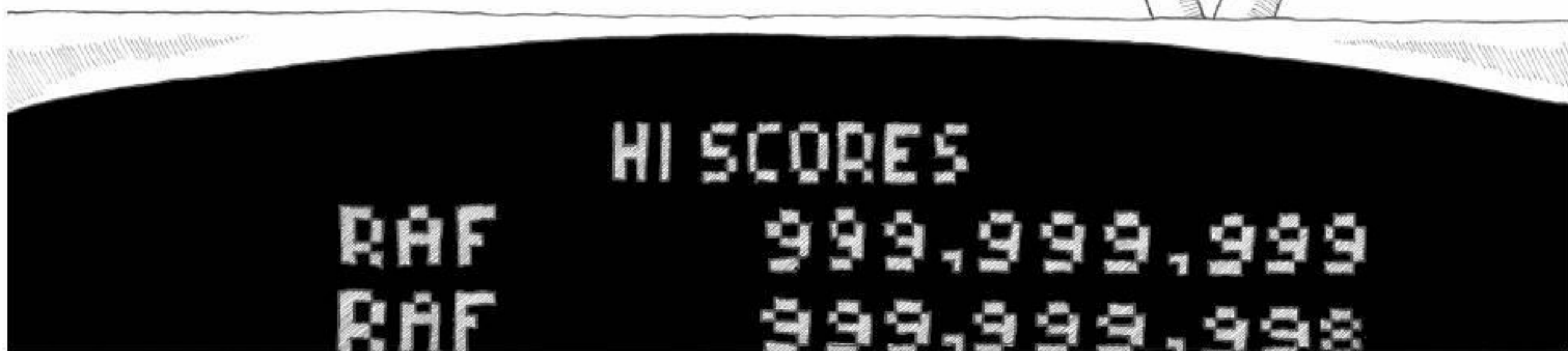
Boredom is the opposite. When a game stops teaching us, we feel bored. Boredom is the brain casting about for new information. It is the feeling you get when there are no new patterns to absorb. When a book is dull and fails to lead you on to the next chapter, it is failing to exhibit a captivating pattern. When you feel a piece of music is repetitive or derivative, it grows boring because it presents no cognitive challenge.

We shouldn't underestimate the brain's desire to learn. If you put a person in a sensory deprivation chamber, they will get very unhappy very quickly. The brain craves stimuli. At all times, the brain is casting about trying to learn something, trying to integrate information into its worldview. It is insatiable in that way.

This *doesn't* mean it necessarily craves new *experiences*—mostly, it just craves new *data*. New data is all it needs to flesh out a pattern. A new experience might force a whole new system on the brain, and often the brain doesn't *like* that. It's disruptive. The brain doesn't like to do more work than it has to. That's why it chunks in the first place. That's why we have the opposite term, "sensory overload."

Games grow boring when they fail to unfold new niceties in the puzzles they present. But they have to navigate between the Scylla and Charybdis of deprivation and overload, of excessive order and excessive chaos, of silence and noise.

This means that boredom might not wait until the end of the game. After all, brains are *really* good at pattern-matching and dismissing noise and silence.
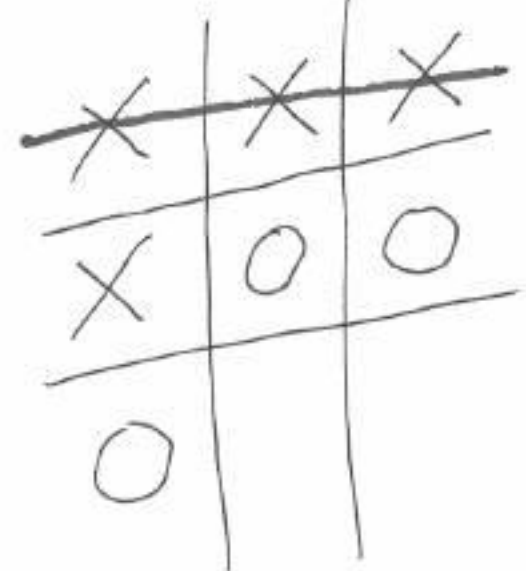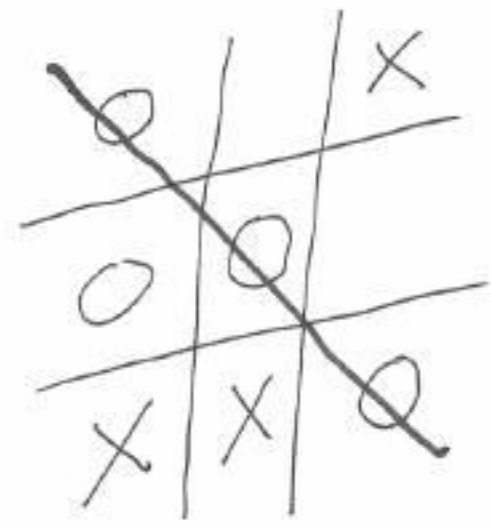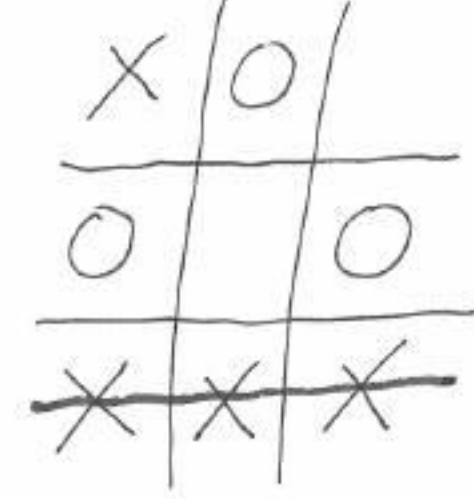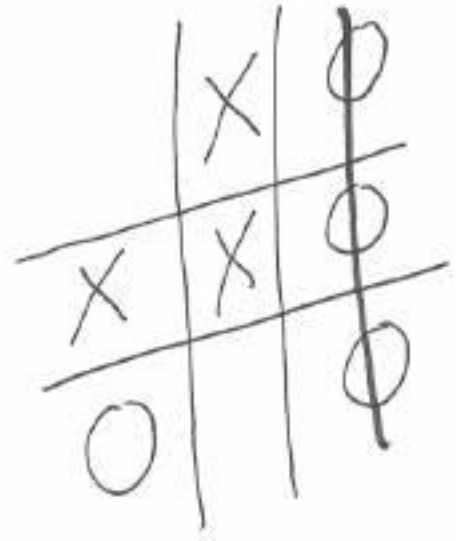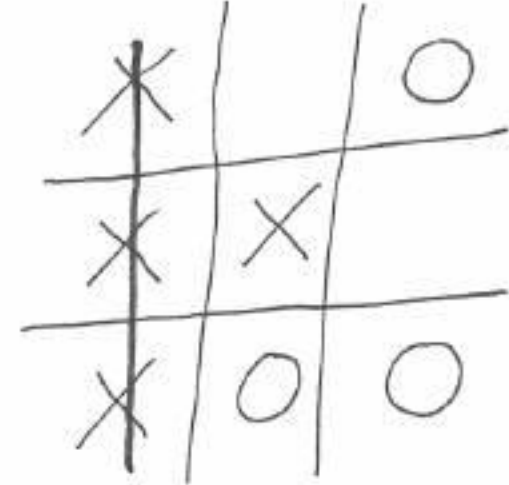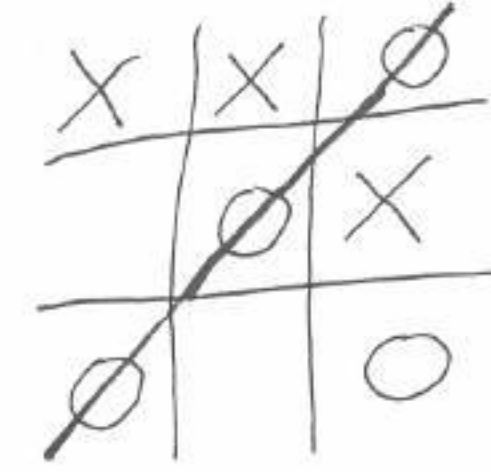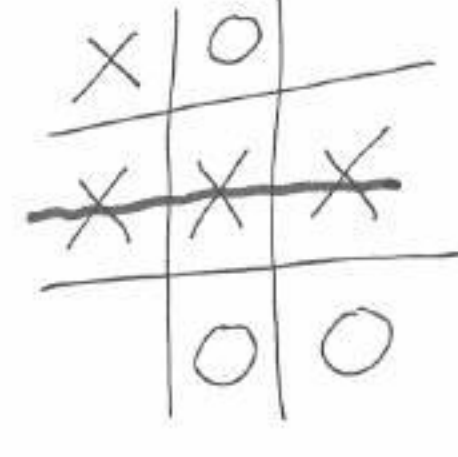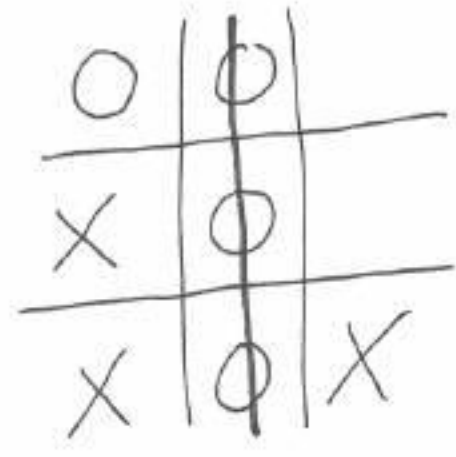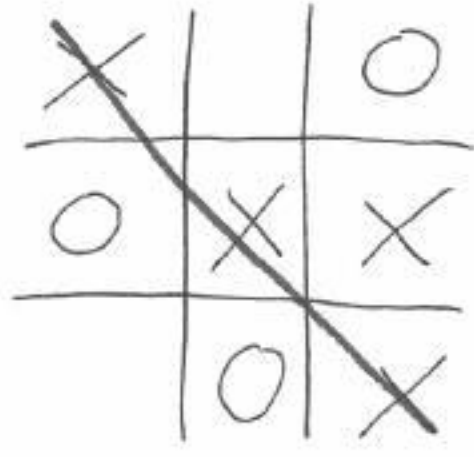
Once you've
mastered it—
or realized you
can't get any
better—

Here are some ways in which boredom might strike, killing the pleasurable learning experience that games are supposed to provide:

- The player might grok how the game works from just the first five minutes, and then the game will be dismissed as trivial, just as an adult dismisses tic-tac-toe. "Too easy," might be the remark the player makes.

- The player might grok that there's a ton of depth to the possible permutations in a game but conclude that these permutations are below their level of interest—sort of like saying, "Yeah, there's a ton of depth in baseball, but memorizing the RBI stats for the past 20 years is not all that useful to me."

- The player might fail to see any patterns whatsoever, and nothing is more boring than noise. "This is too hard."

- The pacing of the unveiling of variations in the pattern might be too slow, in which case the game may be dismissed as trivial too early. "This is too easy now—it's repetitive."

- The game might also unveil the variations too quickly, which then leads to players losing control of the pattern and giving up because it looks like noise again. "This got too hard too fast," they'll say.

- The player might master everything in the pattern. They have exhausted the fun, consumed it all. "I beat it."

the game becomes boring.

Any of these will result in the player stating that they are bored. In reality, some of these are boredom+frustration, and some are boredom+triumph, and so on. If your goal is to keep things fun (read as "keep the player learning"), boredom is always the signal to let you know you have failed.

The definition of a good game is therefore "one that teaches everything it has to offer before the player stops playing."

That's what games are, in the end. Teachers. Fun is just another word for learning.

One wonders, then, why learning is so damn boring to so many people. It's almost certainly because the method of transmission is wrong. We praise good teachers by saying that they "make learning fun." Games are very good teachers… of something. The question is, what do they teach?

Either way, I have an answer for my late grandfather, and it looks like what I do fits right alongside the upstanding professions of my various aunts and uncles. Fireman, carpenter, and… teacher.

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Basically, all games are edutainment.

CHAPTER FOUR: WHAT GAMES TEACH US

Formal training isn't really required to become a game designer. Most of the game designers working professionally today are self-taught. That is changing rapidly as university programs for game designers crop up all around the country and the world.

I went to school to be a writer, mostly. I believe really passionately in the importance of writing and the incredible power of fiction. We learn through stories; we become who we are through stories.

My thinking about what fun is led me to similar conclusions about games. I can't deny, however, that stories and games teach really different things. Games don't usually have a moral. They don't have a theme in the sense that a novel has a theme.

The population that uses games most effectively is the young. Certainly folks in every generation keep playing games into old age (pinochle, anyone?), but as we get older we view them more as the exception. Games are viewed as frivolity. In the Bible in 1 Corinthians, we are told, "When I was a child, I spoke like a child, I thought like a child, I reasoned like a child; when I became a man, I gave up childish ways." But children speak honestly—sometimes too much so. Their reasoning is far from impaired—it is simply inexperienced. We assume that games are childish ways, but is that really so?
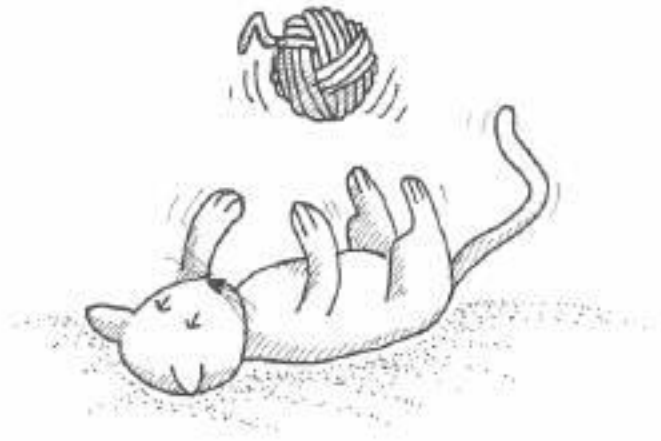
This shouldn't surprise us—after all,

the young of all species play.

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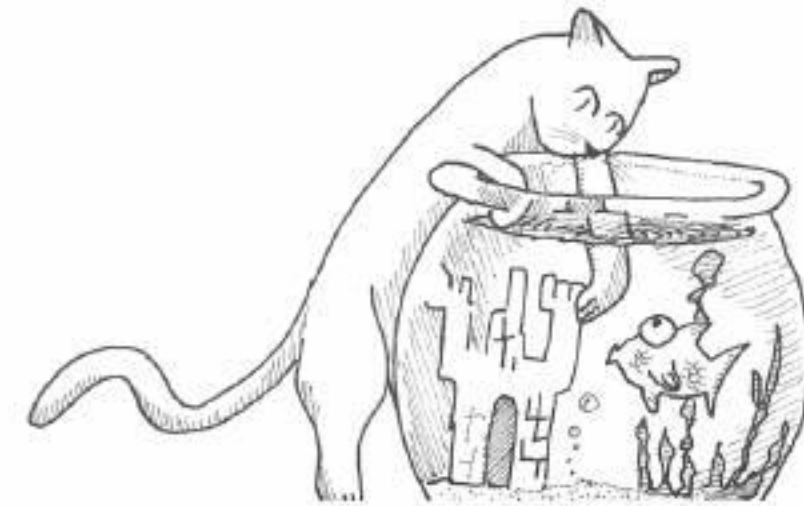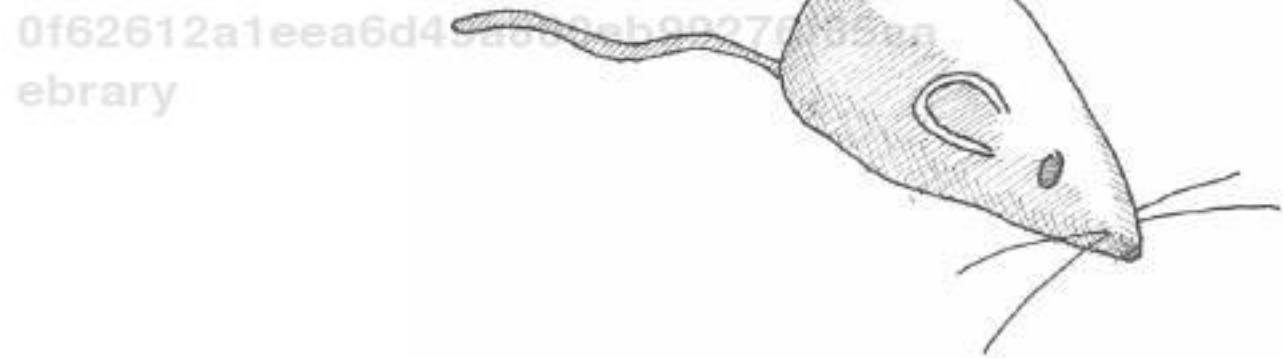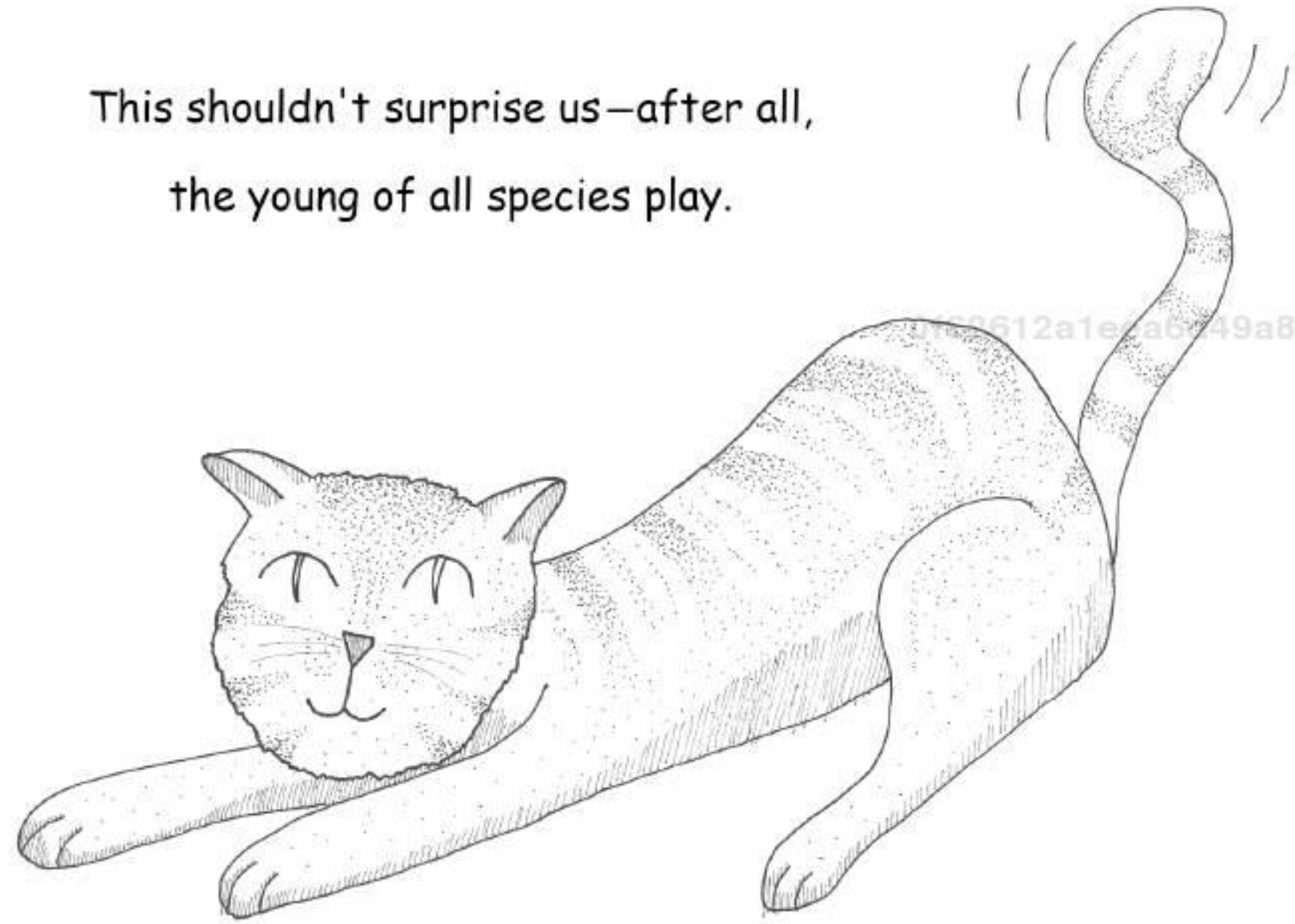
We don't actually put away the notion of "having fun," near as I can tell. We migrate it into other contexts. Many claim that work is fun, for example (me included). Just getting together with friends can be enough to give us the little burst of endorphins we crave.

We also don't put aside the notion of constructing abstract models of reality in order to practice with them. We practice our speeches in front of mirrors, run fire drills, go through training programs, and role-play in therapy sessions. There are games all around us. We just don't call them that.

As we age, we think that things are more serious and that we must leave frivolous things behind. Is that a value judgment on games or is it a value judgment on the content of a given game? Do we avoid the notion of fun because we view the content of the fire drill as being of greater import?

Most importantly—would fire drills be more effective if they were fun activities?

50

With age, some games turn serious.
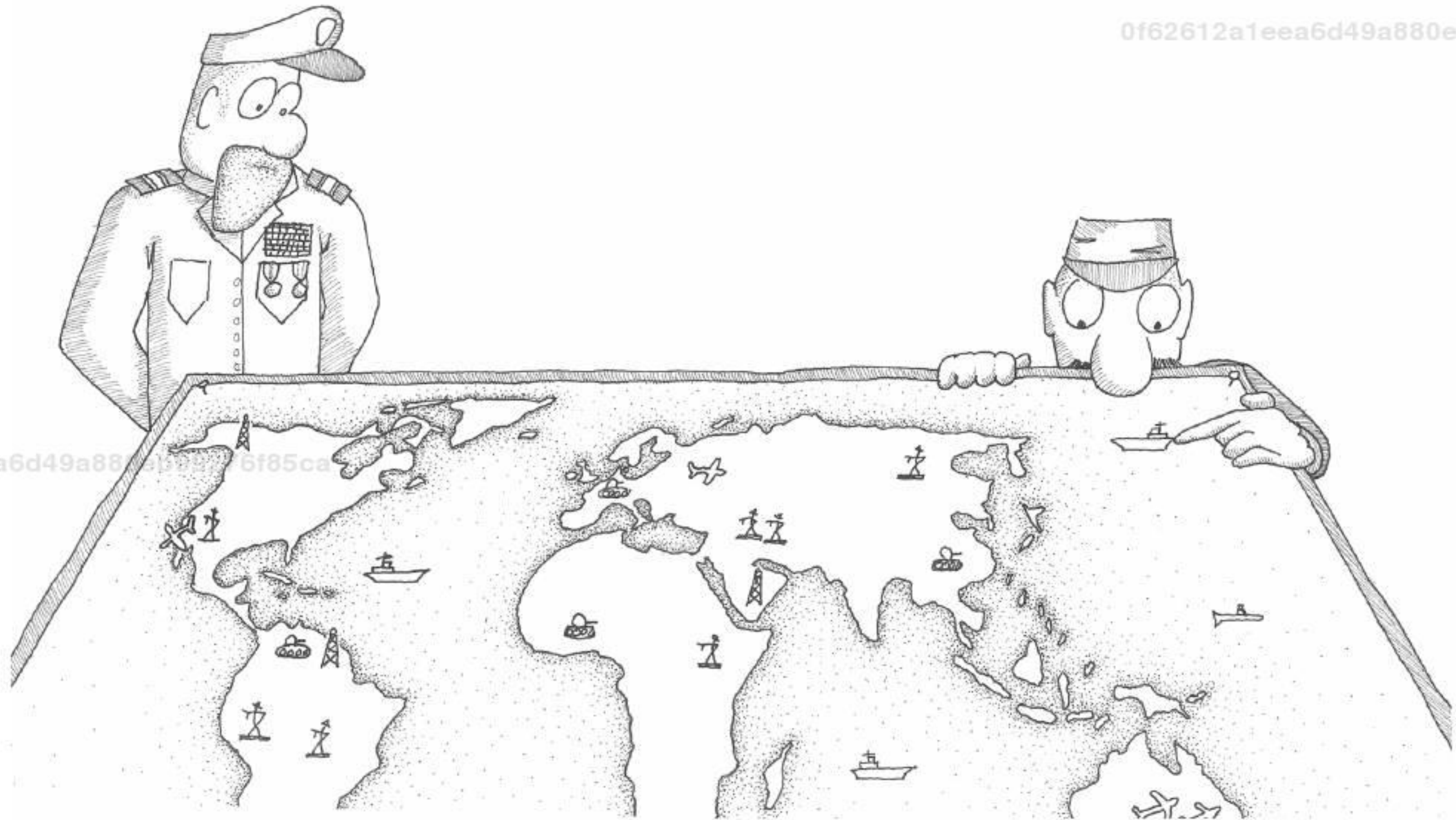
If games are essentially models of reality, then the things that games teach us must reflect on reality.

My first thought was that games are models of hypothetical realities since they often bear no resemblance to any reality I know.

As I looked deeper, though, I found that even whacked-out abstract games do reflect underlying reality. The guys who told me these games were all about vertices were correct. Since formal rule sets are basically mathematical constructs, they always end up reflecting forms of mathematical truth, at the very least. (Formal rule sets are the basis for most games, but not all—there are classes of games with informal rule sets, but you can bet that the little girls will cry "no fair" when someone violates an unstated assumption in their tea party.)

Sadly, reflecting mathematical structures is also the only thing many games do.

The real-life challenges that games prepare us for are almost exclusively ones based on the calculation of odds. They teach us how to predict events. A huge number of games simulate forms of combat. Even games ostensibly about building are usually framed competitively.

Given that we're basically hierarchical and strongly tribal primates, it's not surprising that most of the basic lessons we are taught by our early childhood play are about power and status. Think about how important these lessons still are within society, regardless of your particular culture. Games almost always teach us tools for being the top monkey.
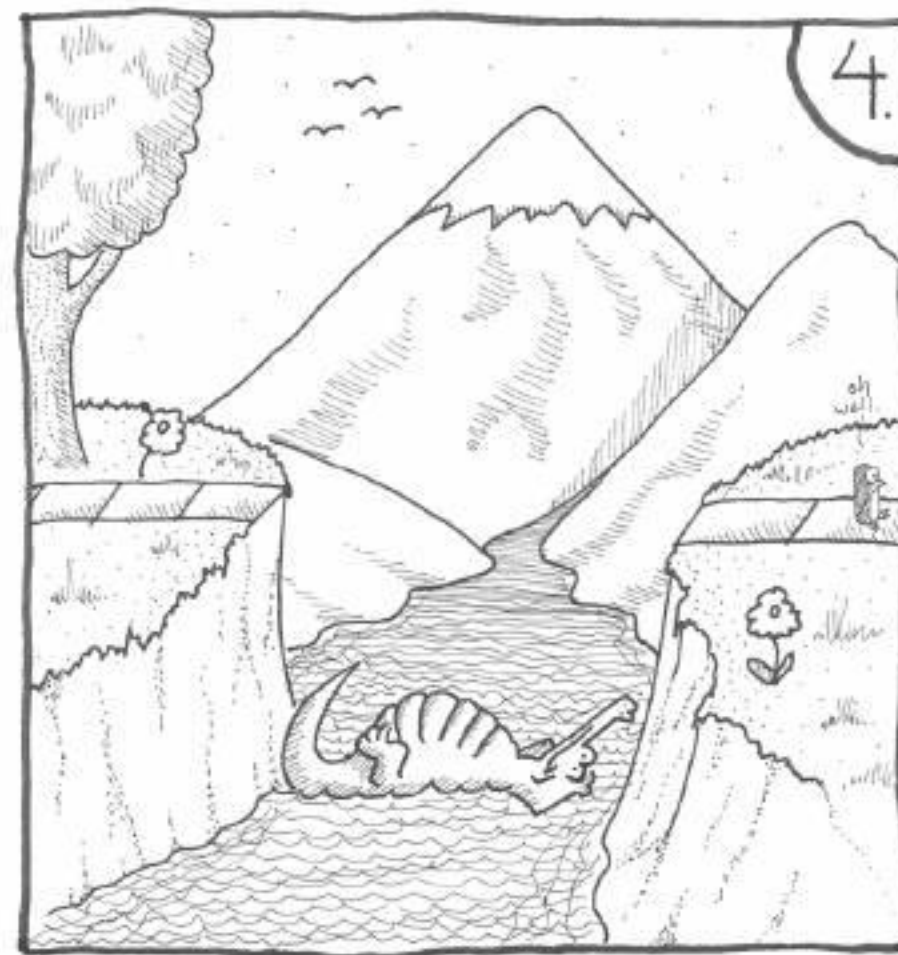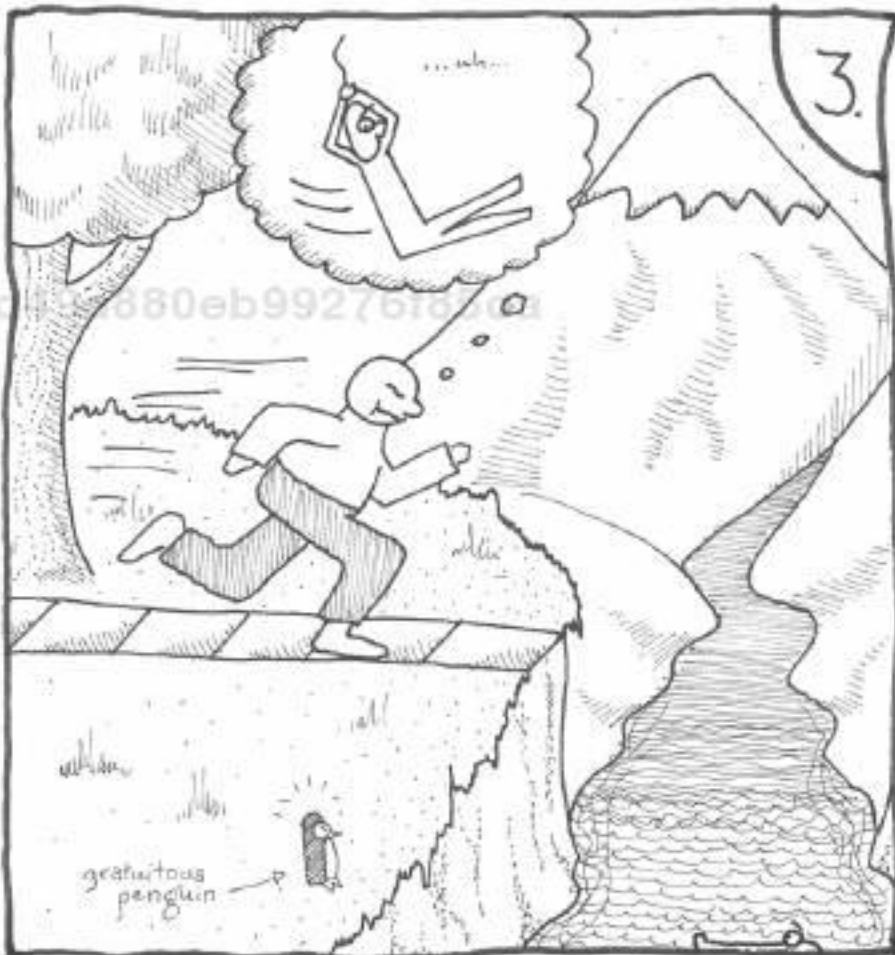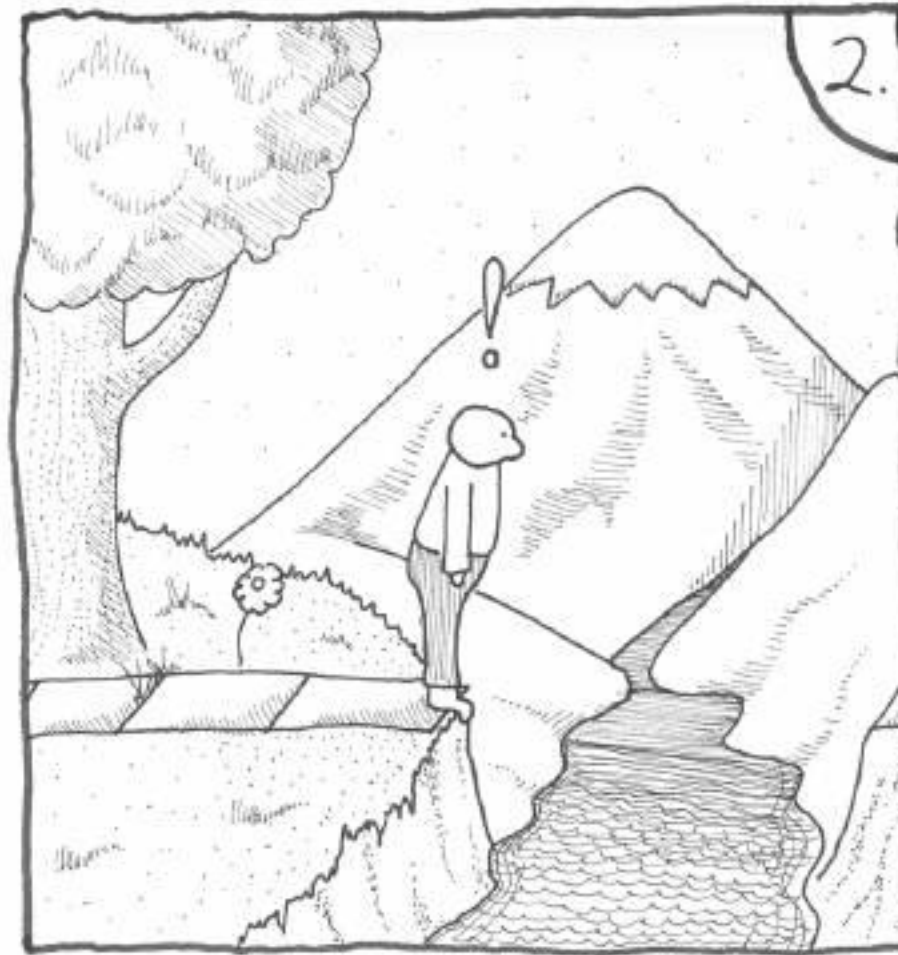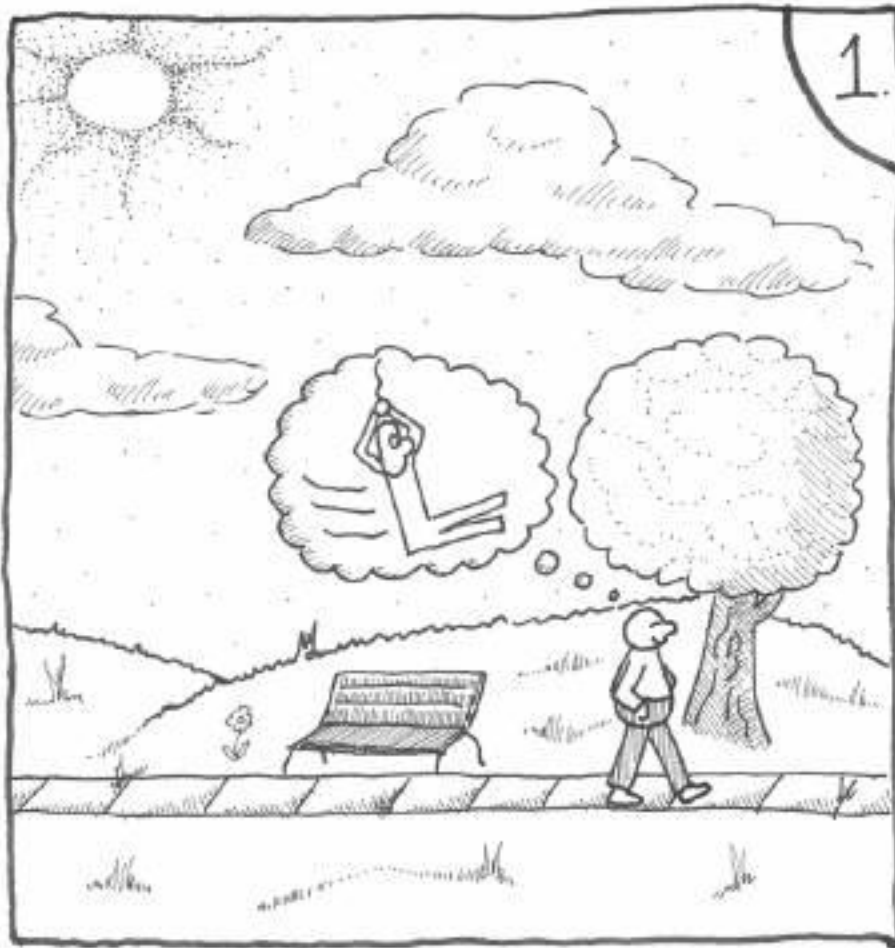
The very phrase "it's just a game" implies that playing a game is a form of PRACTICE for a real-life challenge.

Games also teach us how to examine the environment, or space, around us. From games where we fit together odd shapes to games where we learn to see the invisible lines of power projection across a grid, much effort is spent in teaching us about territory. That is what tic-tac-toe is essentially all about.

Spatial relationships are, of course, critically important to us. Some animals might be able to navigate the world using the Earth's magnetic field, but not us. Instead, we use maps and we use them to map all sorts of things, not just space. Learning to interpret symbols on a map, assess distance, assess risk, and remember caches must have been a critically important survival skill when we were nomadic tribesmen. But we also map things like temperature. We map social relationships (as graphs of edges and vertices, in fact). We map things over time.

Examining space also fits into our nature as toolmakers. We learn how things fit together. We often abstract this a lot—we play games where things fit together not only physically, but conceptually as well. By playing games of classification and taxonomy, we extend mental maps of relationships between objects. With these maps, we can extrapolate behaviors of these objects.

Most games incorporate some element of spatial reasoning. The space may be a Cartesian coordinate space, or it may be a directed conceptual graph, but it's all the same thing in the end (as a mathematician will tell you). Classifying, collating, and exercising power over the contents of a space is one of the fundamental lessons of all kinds of gameplay.

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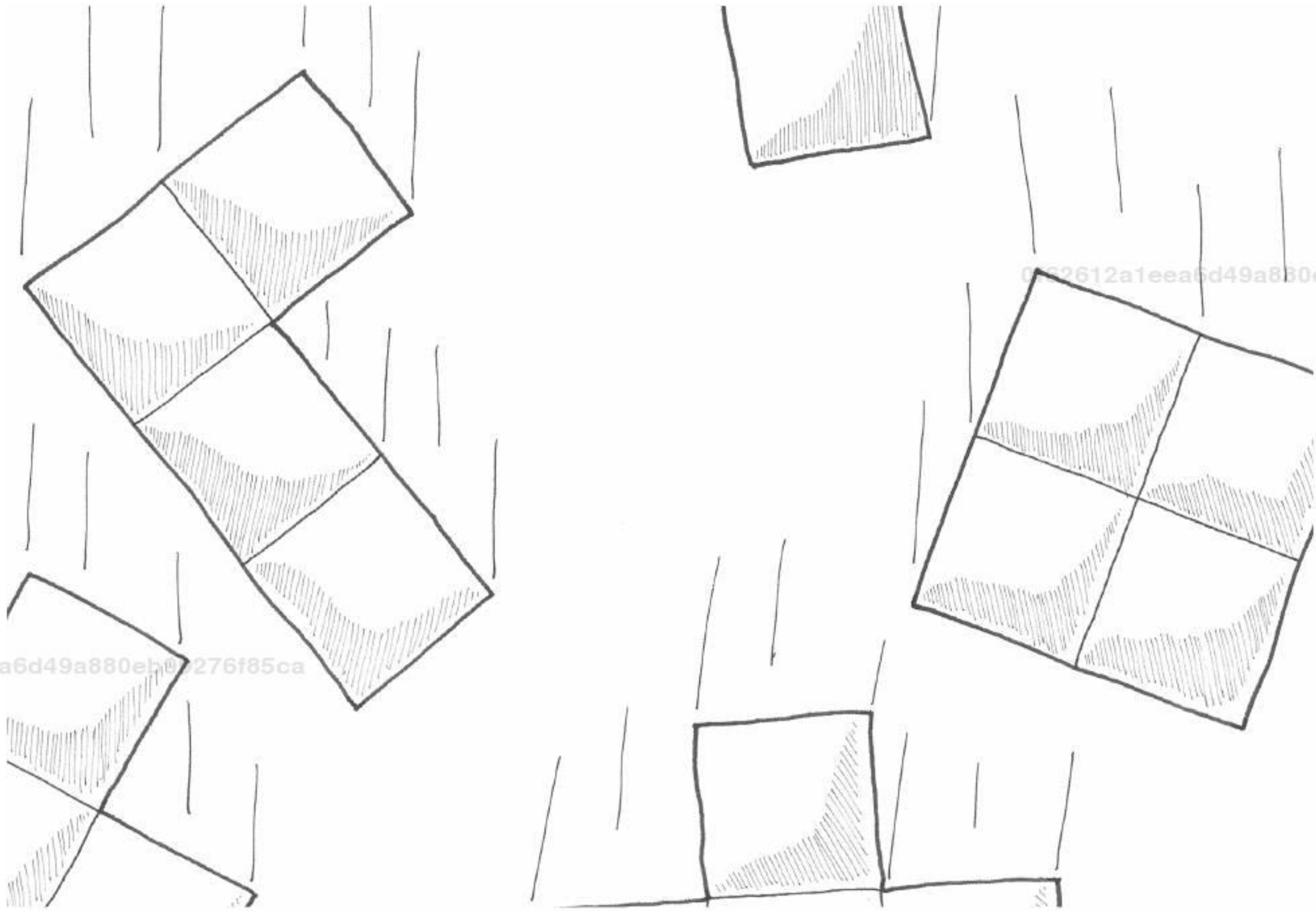
Some games teach spatial relationships.

Exploring conceptual spaces is critical to our success in life. Merely understanding a space and how the rules make it work isn't enough, though. We also need to understand how it will react to change to exercise power over it. This is why games progress over time. There are no games that take just one turn.

Let's consider so-called "games of chance" that use a six-sided die. Here we have a possibility space—values labeled 1 through 6. If you roll dice against someone, the game you are playing might seem to end very quickly. You also might feel you don't have much control over the outcome. You might think an activity like this shouldn't be called a game. It certainly seems like a game you can play in one turn.

But I suggest gambling games like this are actually designed to teach us about odds. You don't just play for one turn, and with each turn you try to learn more about how odds work. (Unfortunately, you prove you didn't learn the lesson—especially if you are gambling for money.) We know from experiments that probability is something our brains have serious trouble grasping.

Exploring a possibility space is the only way to learn about it. Most games repeatedly throw evolving spaces at you so that you can explore the recurrence of symbols within them. A modern video game will give you tools to navigate a complicated space, and when you finish, the game will give you another space, and another, and another.

Some of the really important parts of exploration involve memory. A huge number of games involve recalling and managing very long and complex chains of information. (Think about counting cards in blackjack or playing competitive dominoes.) Many games involve thoroughly exploring the possibility space as part of their victory condition.
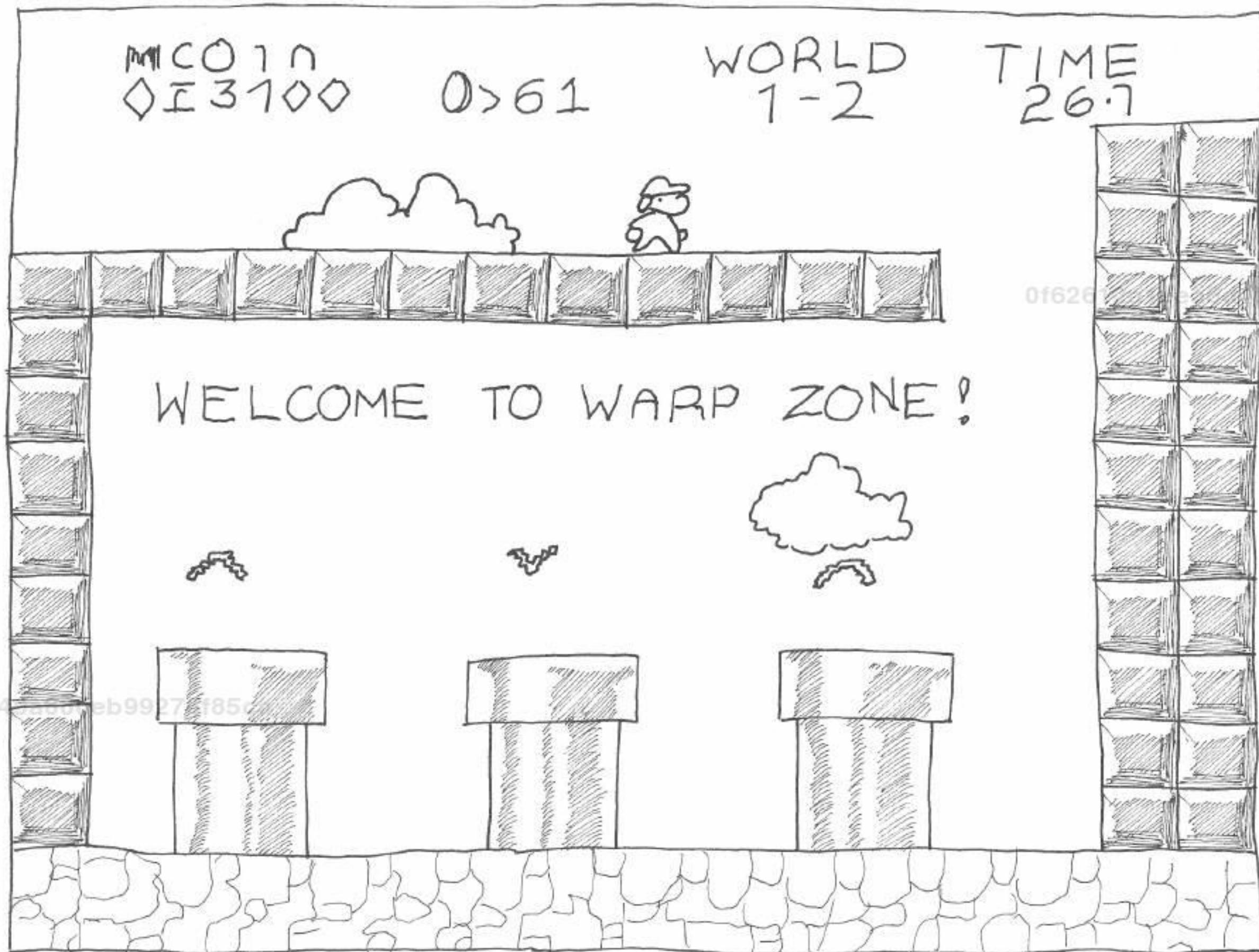
Some games teach you to explore.

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In the end, most games have something to do with power. Even the innocuous games of childhood tend to have violence lurking in their heart of hearts. Playing "house" is about jockeying for social status. It is richly multileveled, as kids position themselves in authority or not over other kids. They play-act at using the authority that their parents exercise over them. (There's this idealized picture of girls as being all sweetness and light, but there are few more viciously status-driven groups on earth.)

Consider the games that get all the attention lately: shooters, fighting games, and war games. They are not subtle about their love of power. The gap between playing these games and cops and robbers is small as far as the players are concerned. They are all about reaction times, tactical awareness, assessing the weaknesses of an opponent, and judging when to strike. Just as my playing guitar was in fact preparing me for playing mandolin by teaching me skills beyond basic guitar fretting, these games teach many skills that are relevant in a corporate setting. We pay attention to the obvious nature of a particular game and we miss the subtler point; be it cops and robbers or *CounterStrike*, the real lessons are about team-work and not about aiming.

Think about it; teamwork is a far deadlier tool than sharpshooting.

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Some games teach you how to aim precisely.
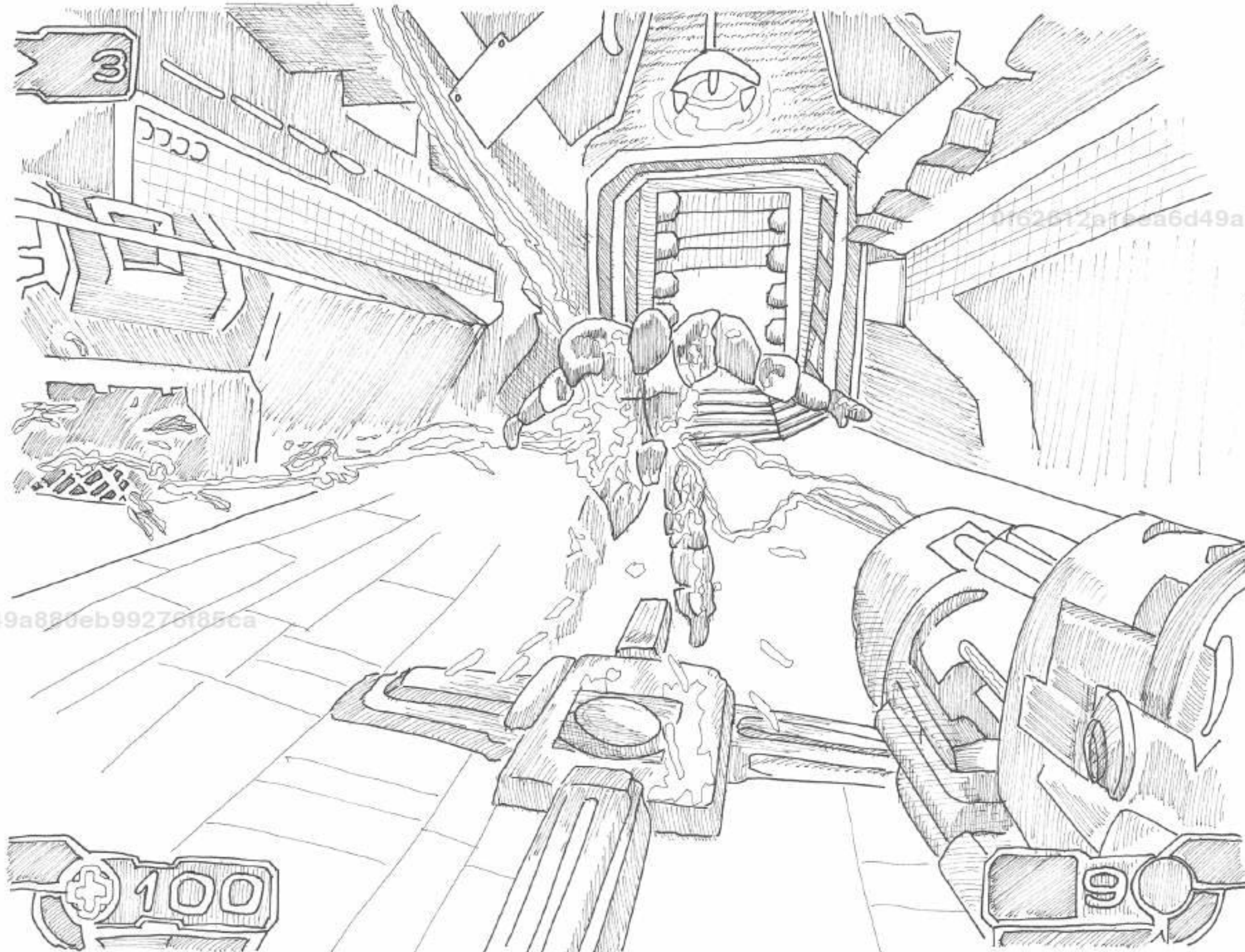
Many games, particularly those that have evolved into the classic Olympian sports, can be directly traced back to the needs of primitive humans to survive under very difficult conditions. Many things we have fun at doing are in fact training us to be better cavemen. We learn skills that are antiquated. Most folks never need to shoot something with an arrow to eat, and we run marathons or other long races mostly to raise funds for charities.

Nonetheless, we have fun mostly to improve our life skills. And while there may be something deep in our reptile brains that wants us to continue practicing aiming or sentry-posting, we do in fact evolve games that are more suited to our modern lives.

From playing
cops and robbers
to
playing house,
play is about
learning life skills.

61
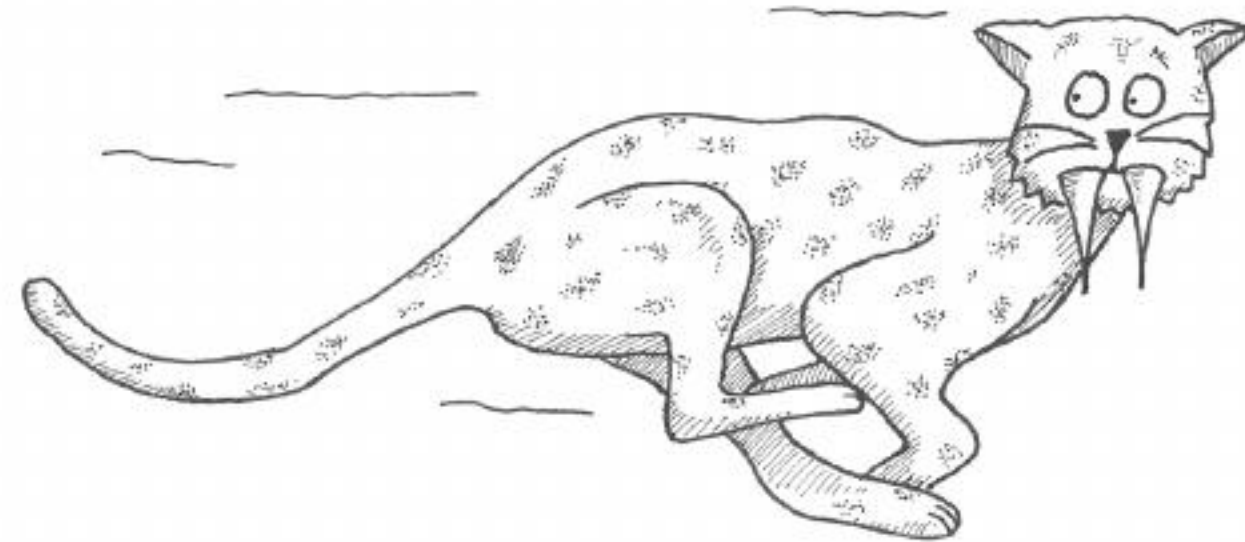
For example, there are many games in my collection that relate to network building. Building railway lines or aqueducts wasn't exactly a caveman activity. As humans have evolved, we've changed around our games. In early versions of chess, queens weren't nearly as powerful a piece as they are today.

Many games have become obsolete and are no longer played. Grain harvesting used to be a really big deal, but it isn't now. You can't find many games about farming on the market as a result. In general, the level of mathematical sophistication required by games has risen dramatically over the course of human history as common people learned how to do sums. Word games were once restricted to the elite, but today they are enjoyed by the masses.

Games do adapt, but perhaps not as fast as we might wish, since almost all of these games are still, at their core, about the same activities even though they may involve different skill sets.

62

Some of which might be useful, and some of which

might not.

...uh...
...mom?...

63
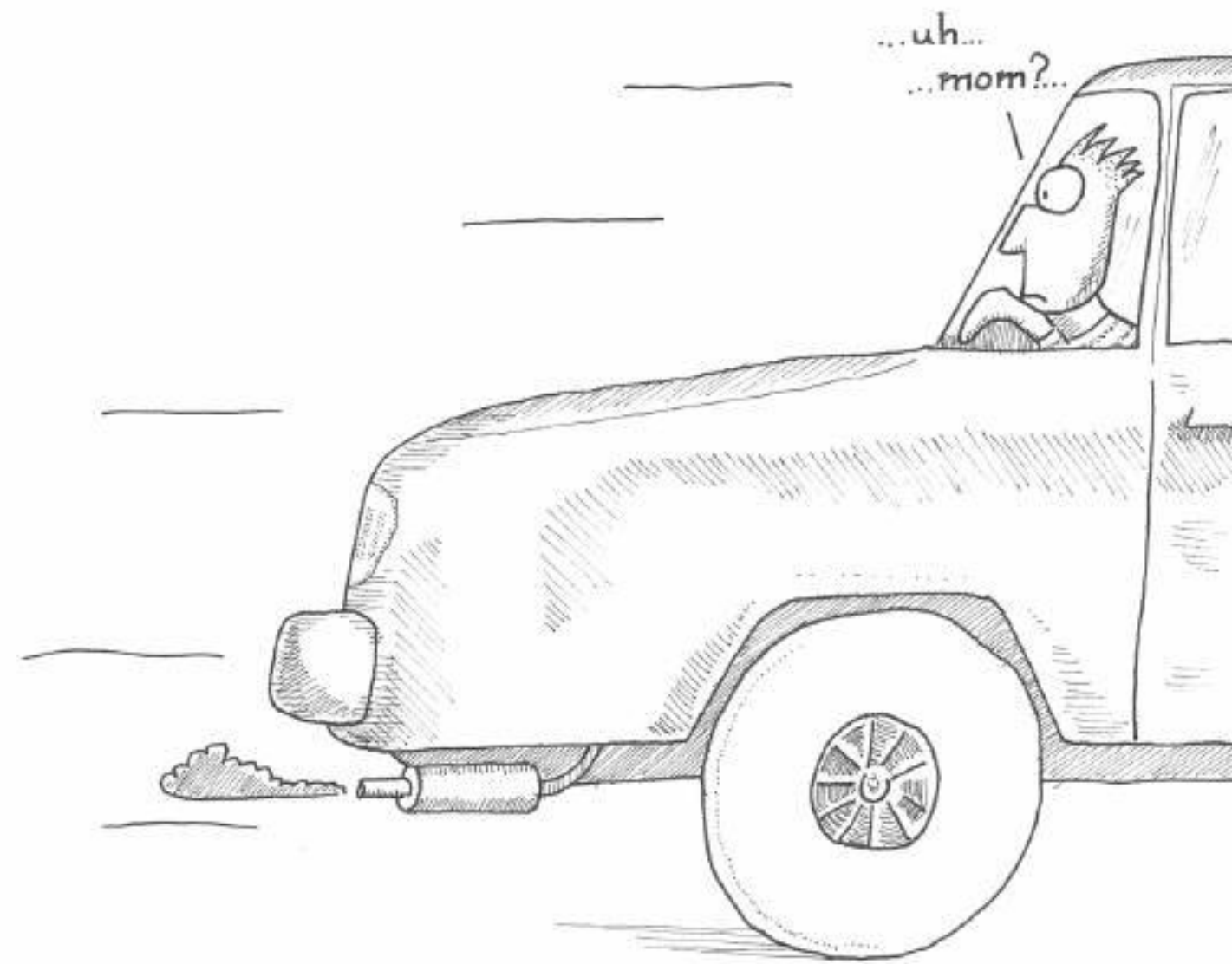
In some ways games can be compared to music (which is even more mathematically driven). Music excels at conveying only a few things—emotion being paramount among them. Games do very well at active verbs: controlling, projecting, surrounding, matching, remembering, counting, and so on. Games are also very good at quantification.

By contrast, literature can tackle all of the above and more. Over time, language-based media have tackled increasingly broader subjects.

Games are also capable of modeling situations of greater richness and complexity. Games like *Diplomacy* are evidence that remarkably subtle interactions can be modeled within the confines of a rule set, and traditional role-playing can reach the same heights as literature in the right hands. But it is an uphill battle nonetheless, simply because games are at their core about teaching us survival skills. As we all know, when you're worried about subsistence and survival, more refined things tend to fall by the wayside.

aiming

timing

hunting

3...
2...
1...

ollie
ollie
oxen
free!

...or
whatever...

territory

projecting
power

atari!
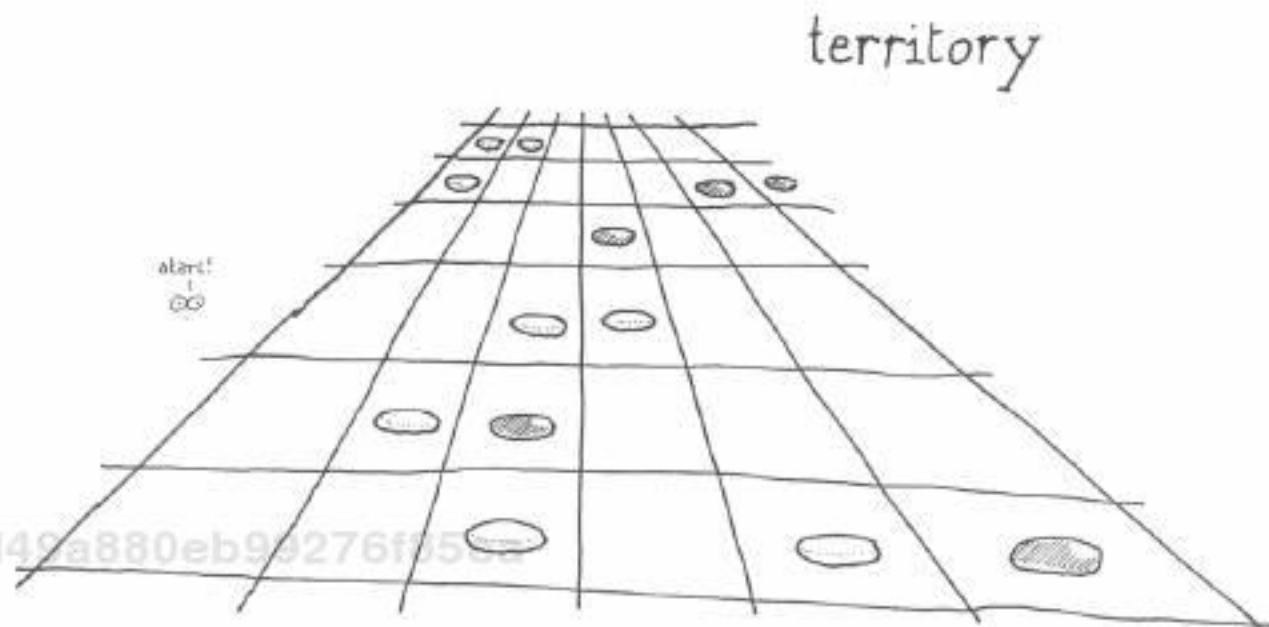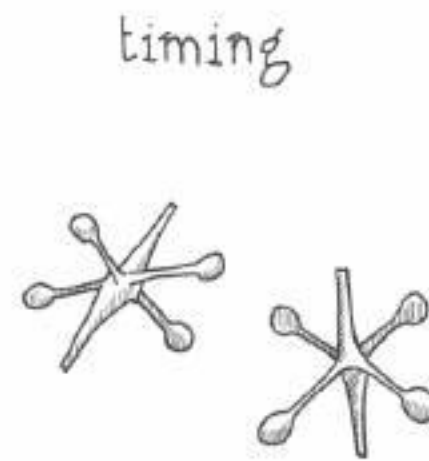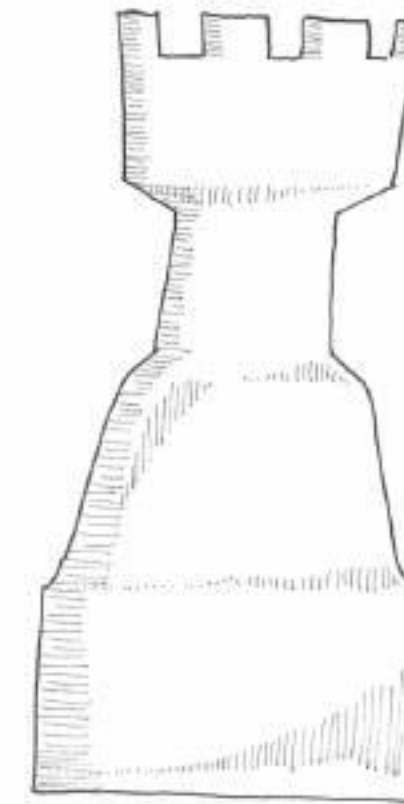
When you get right down to it,
most games are teaching us
about only a few things,

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It's worth asking ourselves what skills are more commonly needed today. Games should be evolving toward teaching us those skills.

The entire spread of games for children is fairly limited and hasn't changed much. The basic skills needed by children are the same. Perhaps we need a few more games about changing TV channels, but that's about it. Adults, on the other hand, could use new games that teach more relevant skills. Most of us no longer hunt our own food and we no longer live in danger every moment of our lives. It's still valuable to train ourselves in some of the caveman traits, but we need to adapt.

Some traits are relevant but need to change because conditions have changed. Interesting research has been done into what people find disgusting, for example. Disgust is a survival trait that points us away from grayish-green, mucousy, slimy things. It does so because that was the most likely vector for illness.

Today it might be the electric blue fluid that is the real risk—don't drink any drain cleaner— and we have no inborn revulsion toward it. In fact, it's made electric blue to make it seem aseptic and clean. That's a case where we should supplement our instincts with training, since I doubt there's anything I can drink under my kitchen sink.

and mostly,
they are things
that were useful to us
when our species
was first evolving.

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Some of the new patterns we need to learn in our brave new world run contrary to our instinctive behaviors. For example, humans are tribal creatures. We not only fall readily into groups run by outsize personalities, but we'll often subsume our better judgment in doing so. We also seem to have an inbred dislike of groups not our own. It is very easy to get humans to regard a different tribe as less than human, particularly if they look or act differently in some way.

Maybe this was a survival trait at one time, but it's not now. Our world grows ever more interdependent; if a currency collapse occurs on the other side of the world, the price of milk at our local grocery could be affected. A lack of empathy and understanding of different tribes and xenophobic hatred can really work against us.

Most games encourage demonizing the opponent, teaching a sort of ruthlessness that is a proven survival trait. But these days, we're less likely to need or want the scorched-earth victory. Can we create games that instead offer us greater insight into how the modern world works?

If I were to identify other basic human traits that games currently tend to reinforce and that may be obsolete legacies of our heritage, I might call out traits like

- Blind obedience to leaders and cultism

- Rigid hierarchies

- Binary thinking

- The use of force to resolve problems

- Like seeking like, and its converse, xenophobia

It's not surprising that games boil down to so few basic patterns. After all, as cavemen, we needed to be able to recognize food or danger under widely varying circumstances.

For better or worse, games have been ringing changes on the same few subjects. There's probably something deep in the reptile brain that is deeply satisfied by jumping puzzles, but you'd think that by now we would have jumped over everything in every possible way.

When I first started playing games, everything was tile based, meaning that you moved in discrete squares, as if you were popping from tile to tile on a tiled floor. Nowadays you move in a much freer way, but what has changed is the fidelity of the simulation, not what we're simulating. The skills required are perhaps closer to being what they are in reality, and yet an improvement in the simulation of crossing a pond full of alligators is not necessarily something relevant.

The mathematical field of studying shape and the way in which apparent shapes can change but remain the same is called *topology.* It can be helpful to think of games in terms of their topology.

Early platform games followed a few basic gameplay paradigms.

- **"Get to the other side" games**. *Frogger, Donkey Kong, Kangaroo.* These are not really very dissimilar. Some of these featured a time limit, some didn't.

- **"Visit every location" games**. Probably the best known early platformer like this was *Miner 2049er, Pac-Man* and *Q*Bert* also made use of this mechanic. The most cerebral of these were probably *Lode Runner* and *Apple Panic,* where the map traversal could get very complex given the fact that you could modify the map to a degree.

Games started to meld these two styles, then they added scrolling environments. Eventually designers added playing in 3-D on rails and finally made the leap to true 3-D with *Mario 64.*
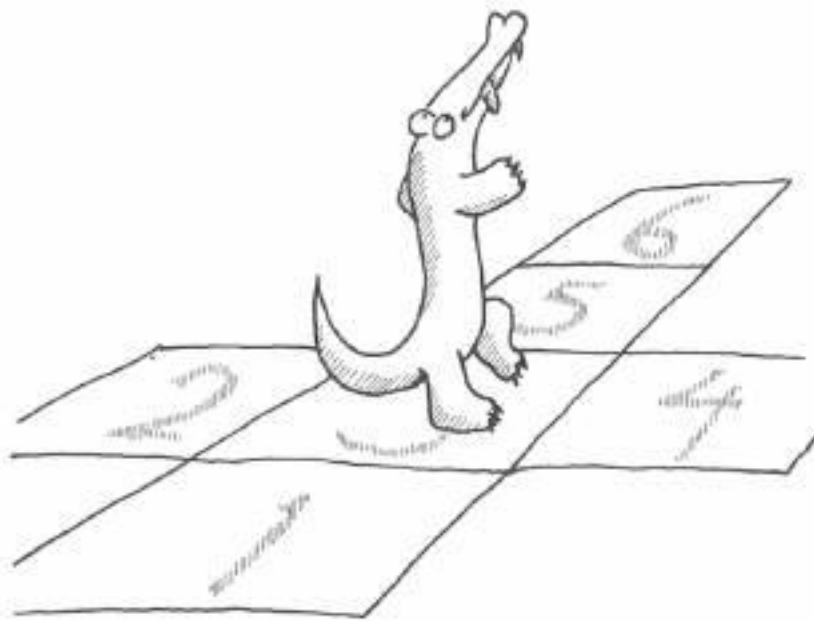
HOPSCOTCH   JUMPING ROPE   HURDLES

2-D PLATFORMER   3-D PLATFORMER

JUMPING
through
THE AGES

exhibit
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Advancement

And in fact, most games pick one subject and then run a bunch of variations on it.

A modern platformer makes use of all of these dimensions:

- "Get to the other side" is still the basic paradigm.

- "Visit all the map" is handled by a""secrets" system.

- Time limits add another dimension of challenge.

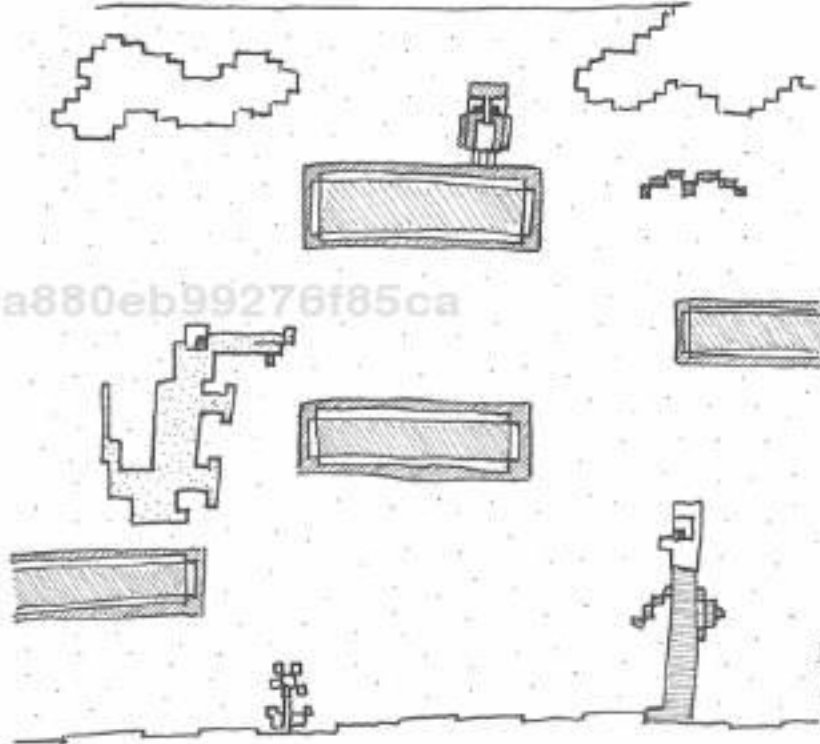Since the original *Donkey Kong,* players have been able to pick up a hammer to use as a weapon. One of the commonest signs of incremental innovation in game design is designers simply adding more of a given element rather than adding a new element. Hence, today we have a bewildering array of weapons.

Platformers have now covered all the dimensions. They have started pulling in elements of racing and flying games and fighters and shooters. They have built in secret discovery and time limits and power-ups. Recent games have included more robust stories and even elements from role-playing games. Are there more dimensions on which to expand?

Going from *Pong* to a modern tennis game is not so large a leap. How odd that we've ended up in the recursive pattern of making games that model other games—it suggests that there's something that the real-life sport of tennis can teach that doesn't require running around on a court in a white outfit now. Nonetheless, rather than teaching the skill of hurling rocks and judging trajectories, it would be nice if games instead taught things like whether or not the price of oil is going to rise in response to signing or not signing a global warming treaty.

This may sound bleak, but in fact, it's not. The skills needed around a meeting room table and the skills needed at the tribal council are not so different, after all. There are whole genres of game that are about husbandry, resource management, logistics, and negotiation. If anything, the question to ask might be why the most popular games are the ones that teach obsolete skills while the more sophisticated ones that teach subtler skills tend to reach smaller markets.

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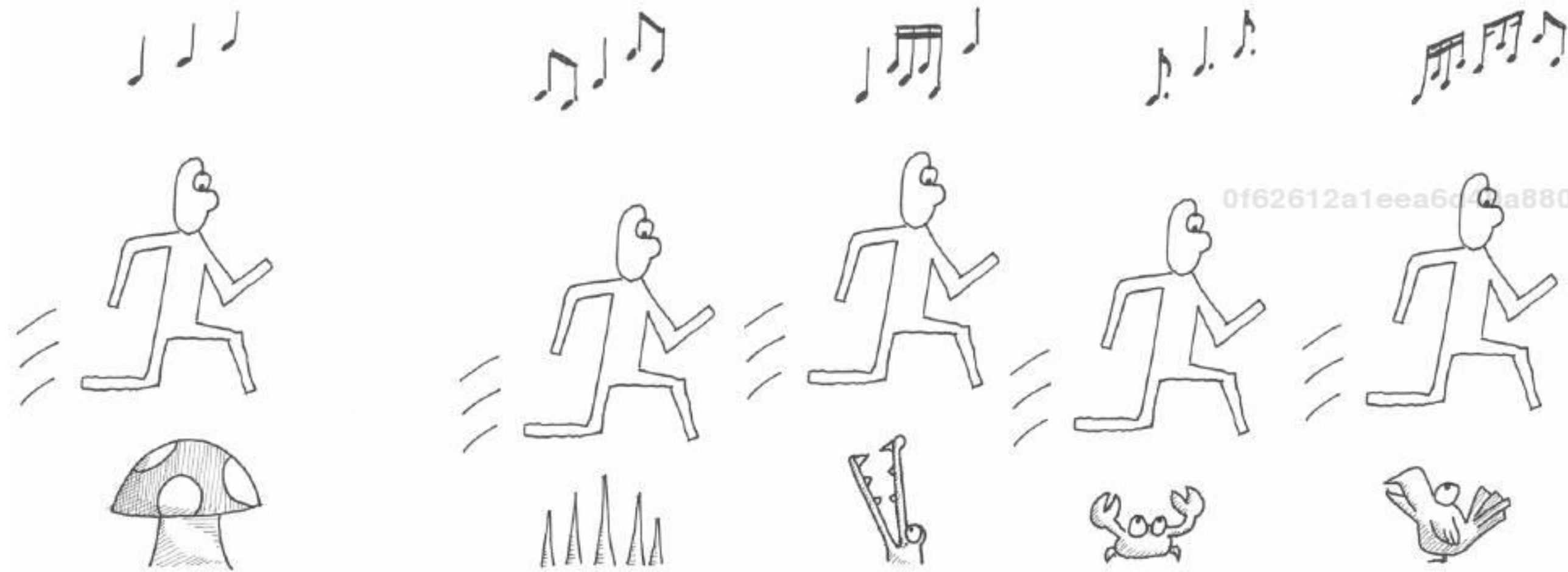
Just like variations on a theme in music,
these are basically training to recognize
a pattern in a variety of situations.

A lot of it can probably be traced to visceral appeal. Remember, we live most of our lives in the unconscious. Action games let us stay there, whereas games that demand careful consideration of logistics might require logical, conscious thought. So we ring changes on old, often irrelevant challenges because, frankly, it's easier.

We've evolved exquisite sensitivity to visceral challenges. A survey of games featuring jumping found that the games with the "best controls" all shared an important characteristic: when you hit the jump button, the character on screen spent almost exactly the same amount of time in the air. Games with "bad controls" violated this unspoken assumption. I'm pretty sure that if we went looking, we'd find that good jumping games have been unscientifically adhering to this unspoken rule for a couple of decades, without ever noticing its existence.

That's hardly the only case of our adjusting our work to better target the unconscious mind. A very common feature of action games, for example, is to push you through a task faster and faster. This is purely intended to address the visceral reaction and the autonomic nervous system. When you learn any physical skill, you are told to do it slowly at first and slowly increase the speed as you master the task. The reason is that developing speed without precision is not all that useful. Going slow lets you practice the precision first, make it unconscious, and then work on the speed.

You don't tend to see "time attack" modes in strategy games, for this same reason. The tasks in the strategic games are not about automatic responses, and therefore the training to execute at reflex levels of speed would be misguided. (If anything, a good strategy game will teach you not to get too familiar with the situation and will keep you on your toes.)

This whole approach is intended for learning by rote. When I was a kid, I had a game for the Atari 2600 console called *Laser Blast*. I got to the point where I could get a million points at the maximum difficulty setting without ever dying. With my eyes closed. This is the same sort of training that we put our militaries through—the training of rote and reflex. It's not a very *adaptable* mode of training, but it is desirable in many cases.

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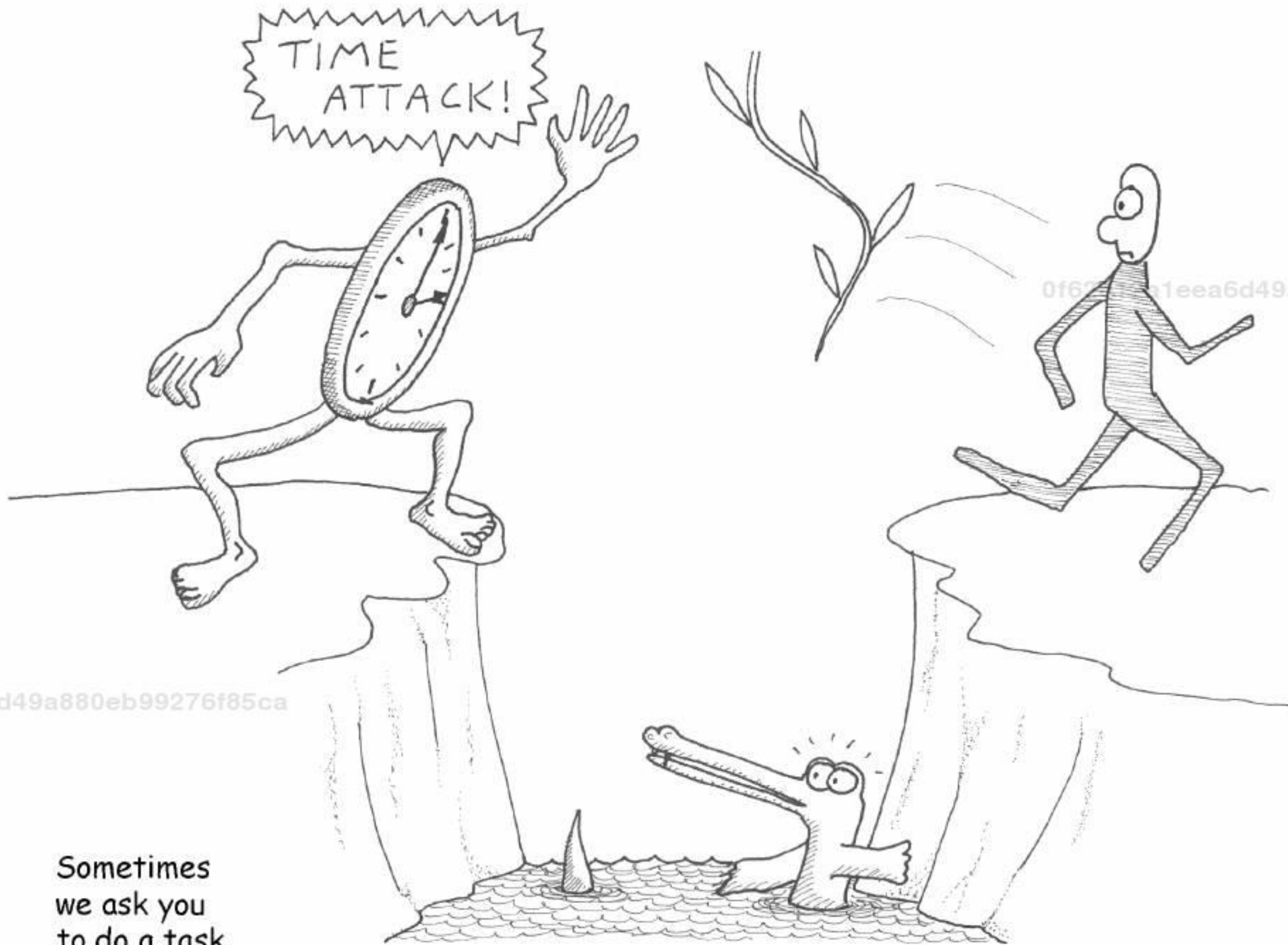
Sometimes we ask you to do a task faster.

A more interesting tactic that applies to a wider range of games is asking the player to be thorough. This is a broader survival skill. It requires patience, and a certain enjoyment of discovery. It also works against our inclination to work directly on the final goal.

In many games, you are asked to find "secrets" or to explore an area completely. This teaches many interesting things, such as considering a problem from all angles, making sure that you should make sure you have all the information before you make a decision, and thoroughness is often better than speed. Not to denigrate training by rote and reflex, but this is a much subtler and interesting set of skills to teach, and one that is more widely applicable to the modern world.

Games have these characteristics:

- They present us with models of real things—often highly abstracted.

- They are generally quantified or even *quantized* models.

- They primarily teach us things that we can absorb into the unconscious as opposed to things designed to be tackled by the conscious, logical mind.

- They mostly teach us things that are fairly primitive behaviors, but they don't *have* to.

Seen in this light, it's not surprising that the evolution of the modern video game can largely be explained in terms of topology. Each generation of game can be described by a relatively minute alteration in the shape of the play space. For example, there have only really been around five fighting games in all of videogaming history. Significant advances have been limited to a few features like movement on a plane, movement in 3-D, and the addition of "combos" or sequences of moves.

This is not to say that many of the classic fighting games didn't bring significant incremental advances. Of course they did. But did they effectively "add another hole to the donut"?
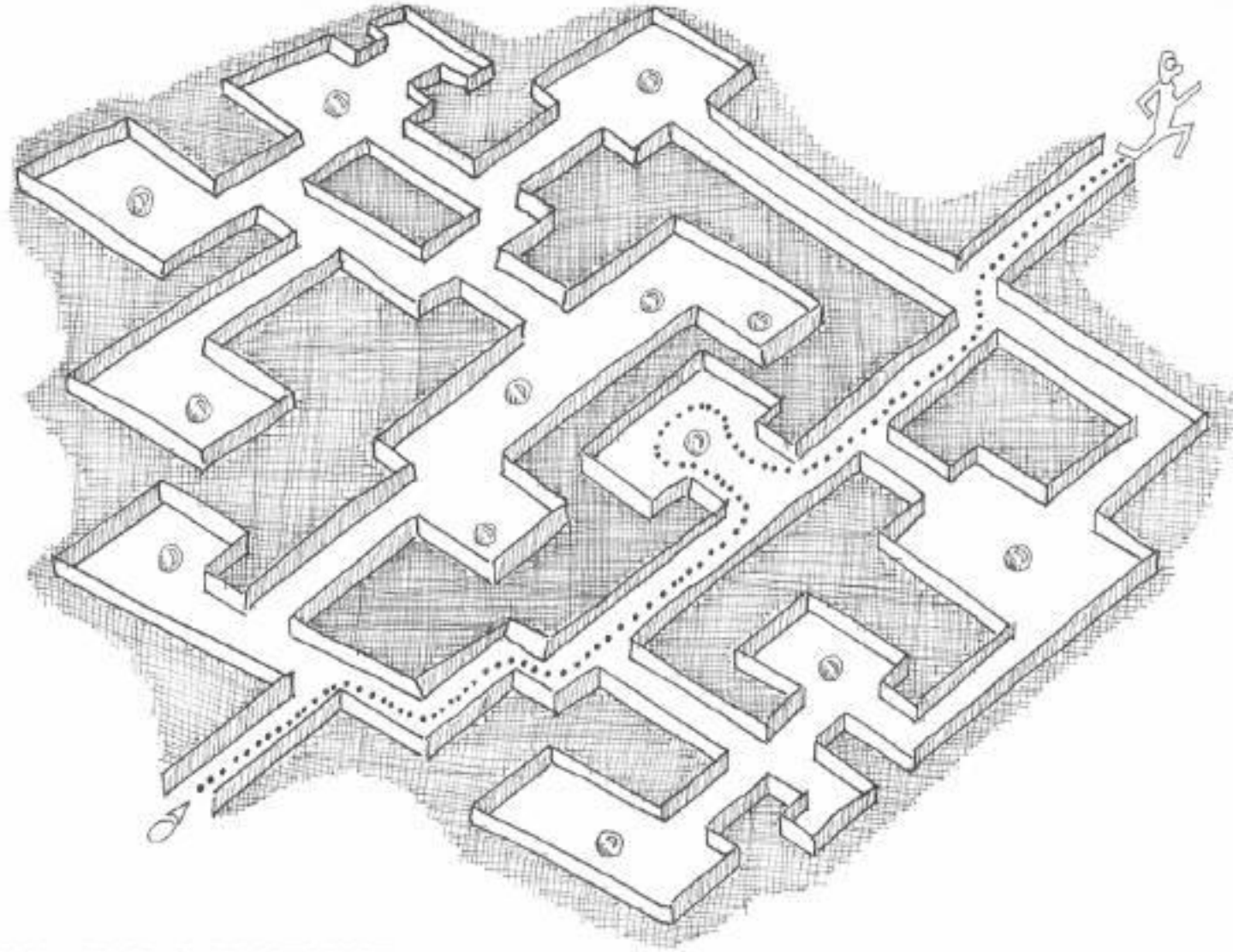
YOU FOUND
1 OF 15
SECRETS

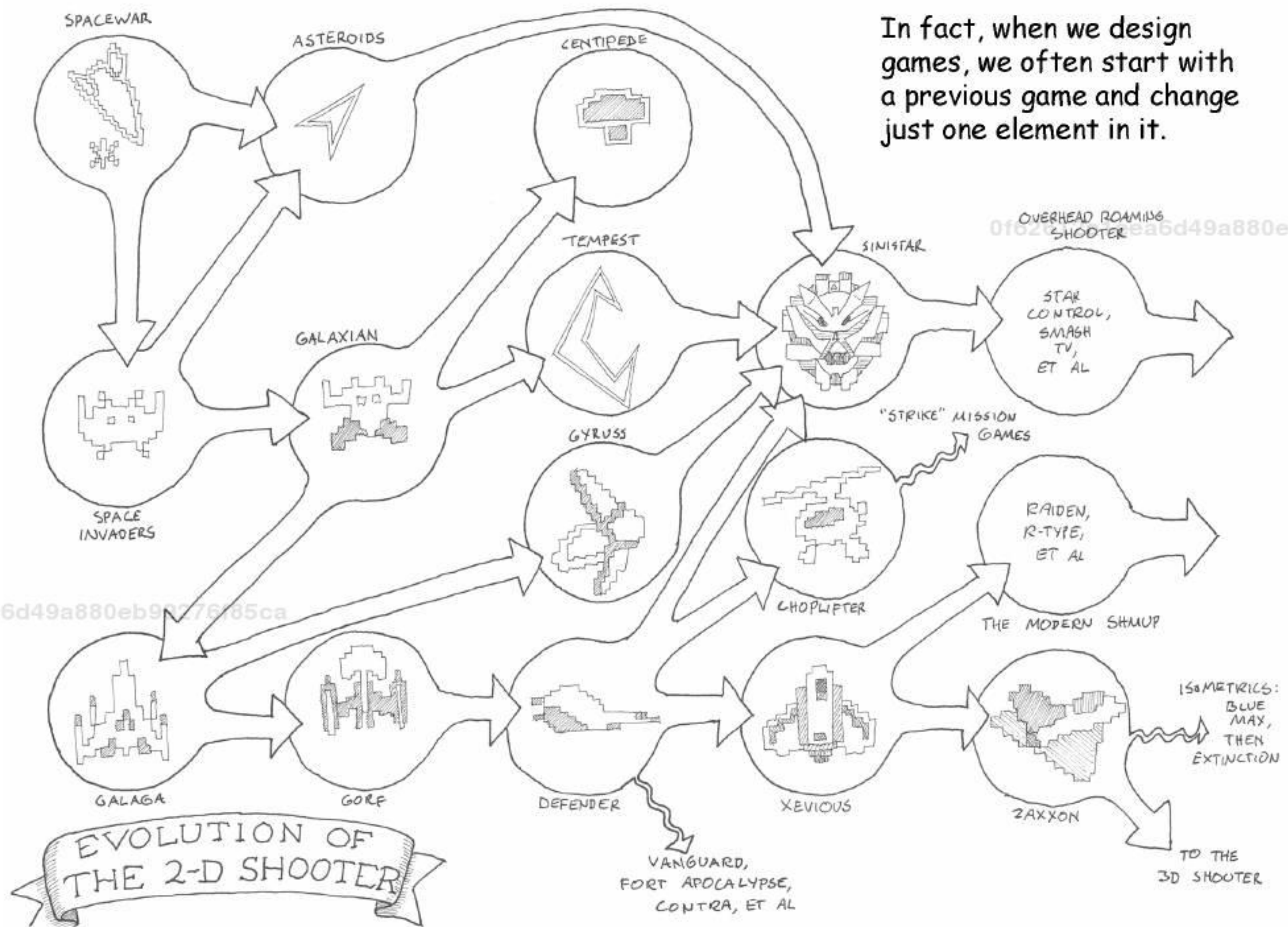Sometimes we ask you to do it more thoroughly.

Consider the evolution of the 2-D shooter or "shmup." *Space Invaders* offered a single screen with enemies that marched predictably. After that came *Galaxian,* which had no defenses and enemies that attacked a bit more aggressively.

Simple topological variants then ensued: *Gyruss* and *Tempest* are just *Galaxian* in a circle. *Gorf* and others added scrolling and also had an end boss and stages that changed in nature as you progressed. *Zaxxon* added verticality, which was then quickly thrown away in the development of the genre. *Centipede* gave you some room to maneuver at the bottom, and a charming setting, but isn't really that different from *Galaxian. Asteroids* is an inverted circle: you're in the middle, and the enemies come from outside.

Galaga was probably the most influential of all of these because it added bonus levels and the power-up, a concept that has become standard in every shmup since. *Xevious* and *Vanguard* added alternate modes of fire (bombs and firing in other directions). *Robotron* and *Defender* are special cases. Both have the element of rescuing. This has been pretty much abandoned today (sadly—though *Choplifter* was a wonderful sidetrack there).

Now, I don't know what the first 2-D shooter to have power-ups and scrolling and bosses at the end of stages was, but a case can be made that there hasn't been a topologically different 2-D shooter since. Unsurprisingly, the shooter genre has stagnated and lost market share. After all, we learned that mechanic a long time ago, and everything since has been learning patterns that we *know* to be artificial and unlikely to be repeated anywhere.

This offers a possible algorithm for innovation: *find a new dimension to add to the gameplay*. We saw this in the way that puzzle games evolved after *Tetris*: people started trying to do it with hexagons, with three dimensions, and eventually, pattern matching of colors became the thing that replaced spatial analysis. If we really wanted to innovate on puzzle games, how about exploring puzzle games based on time rather than space, for example?

SPACEWAR

ASTEROIDS

CENTIPEDE

In fact, when we design
games, we often start with
a previous game and change
just one element in it.

OVERHEAD ROAMING
SHOOTER

TEMPEST

SINISTAR

STAR
CONTROL,
SMASH
TV,
ET AL

GALAXIAN

GYRUSS

"STRIKE" MISSION
GAMES

SPACE
INVADERS

CHOPLIFTER

RAIDEN,
R-TYPE,
ET AL

THE MODERN SHMUP

ISOMETRICS:
BLUE
MAX,
THEN
EXTINCTION

GALAGA

GORF

DEFENDER

XEVIOUS

ZAXXON

TO THE
3D SHOOTER

EVOLUTION OF
THE 2-D SHOOTER

VANGUARD,
FORT APOCALYPSE,
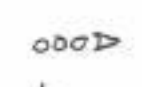CONTRA, ET AL

CHAPTER FIVE: WHAT GAMES AREN'T

Until now, I've been discussing formal game design—abstract simulations. But we rarely see truly abstract simulations in games. People tend to dress up game systems with some fiction. Designers put artwork on them that is suggestive of some real-world context. Take checkers for example—abstractly, it's a board game about entrapment and forced action, played on a diamond-shaped grid. When we say "king me" in checkers, we're adding a subtle bit of fiction to the game; suddenly it has acquired feudal overtones and a medieval context. Usually, the pieces have a crown embossed on them.

This is similar to word problems in math class. The fiction serves two purposes: it trains you to see past it to the underlying math problem, and it also trains you to recognize real-world situations where that math problem might be lurking.

Games in general tend to be like word problems. You won't find many games that are pure unclothed abstractions. Most games have more in common with chess or checkers—they provide some level of misdirection. Usually there are metaphors for what is going on in the game.

While metaphors are fun to play with, players can basically ignore them. The name of the unique checker piece that has made it to the other side is basically irrelevant, mathematically speaking. We could call the regular pieces chickens and the crowned ones wolves and the game would not change one whit.

Games, by the very nature of what they teach, push toward this sort of understanding. Since they are about teaching underlying patterns, they train their players to ignore the fiction that wraps the patterns.

player

force projection

playfield

enemies

SPACE INVADERS

GALAXIAN

TEMPEST

SCROLLING SH'MUP
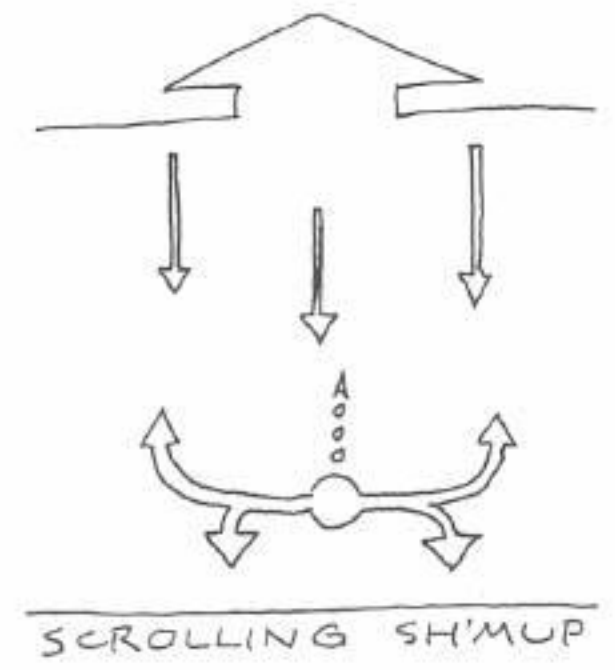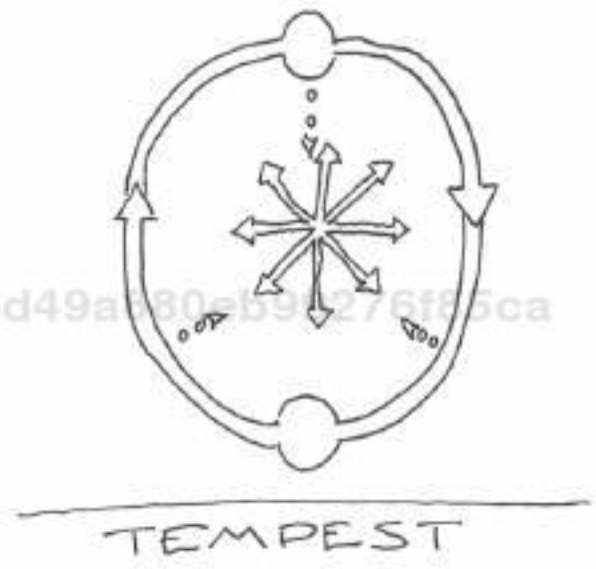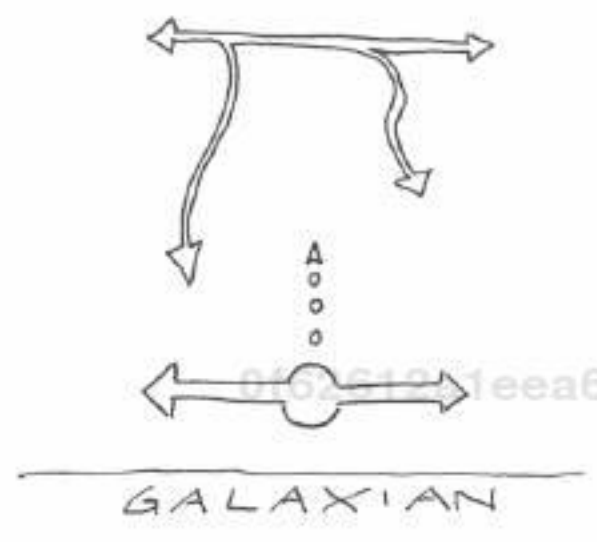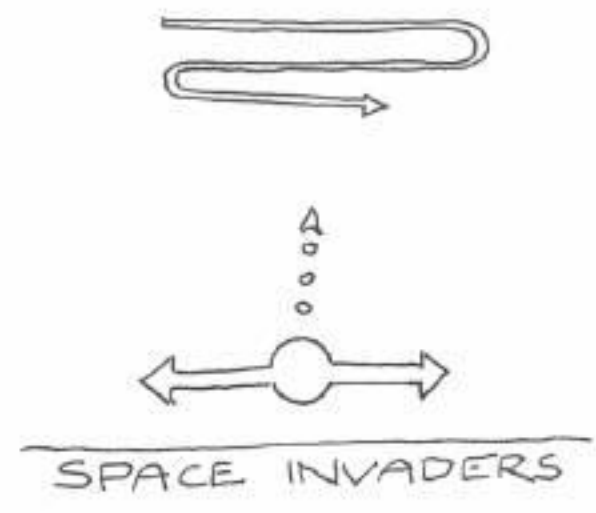
Games are largely about getting people to see past the variations and look instead at the underlying patterns. Because of this, gamers are very good at seeing past fiction.

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Back in 1976, a company called Exidy scored a first in video game history: its game *Deathrace* was taken off the market because of public concerns about the game's violent nature. *Deathrace* was loosely based on a movie called *Deathrace 2000*. The premise involved driving a car to run over pedestrians for points.

Mechanically, *Deathrace* was the same as any other game that involved catching objects moving around the screen. If you looked at this game today, however, with its crude pixilated graphics and its tiny iconic people, you wouldn't be particularly shocked. After all, countless other gore-fests have come along that make the game look quaint.

I don't think debates about the suitability of violence in the media will disappear. Much evidence shows that media have some effect on how we act. If media didn't have an effect, we wouldn't spend so much effort on using it as teaching tools. But evidence also shows that media aren't mind-control devices (of course they aren't, or else we'd all behave like the people we read about in the children's stories we read in elementary school).

Gamers, however, have always viewed this issue with some perplexity. When they defend their beloved games, they use one of the most self-defeating rallying cries in history: "It's only a game!"

In the wake of school shootings and ex-military people decrying first-person shooters as "murder simulators," this argument doesn't carry a lot of weight. Academics who disagree with the portrayal of games as damaging to children tend to muster learned arguments about privileged spaces and magic circles. Much of the public dismisses these arguments as coming from an ivory tower.

But there's a very good reason why the gamers are incredulous.

This is why gamers are dismissive of the ethical implications of games—

they don't see "get a blowjob from a hooker, then run her over."

Remember, games train us to see underlying mathematical patterns. The fact that I can describe *Deathrace* as being a game about picking up objects on a two-dimensional playing field is evidence that its "dressing" is largely irrelevant to what the game is about at its core. As you get more into a game, you'll most likely cut to the chase and examine the true underpinnings of the game, just as a music aficionado can cut past the lyrical content of different types of Latin music and determine whether a given song is a *cumbia* or a *marinera* or a *salsa*.

Running over pedestrians, killing people, fighting terrorists, and eating dots while running from ghosts are all just stage settings, convenient metaphors for what a game is actually teaching. *Deathrace* does not teach you to run over pedestrians any more than *Pac-Man* teaches you to eat dots and be scared of ghosts.

None of this is to minimize the fact that *Deathrace does* involve running over pedestrians and squishing them into little tombstone icons. That's there, for sure, and it's kind of reprehensible. It's not a great setting or staging for the game, but it's also not what the game is really about.

Learning to see that division is important to our understanding of games, and I'll touch on it at greater length later. For now, suffice it to say that the part of games that is *least* understood is the formal abstract system portion of it, the mathematical part of it, the chunky part of it. Attacks on other aspects of games are likely to miss the key point—at their core games need to develop this formal aspect of themselves in order to improve.

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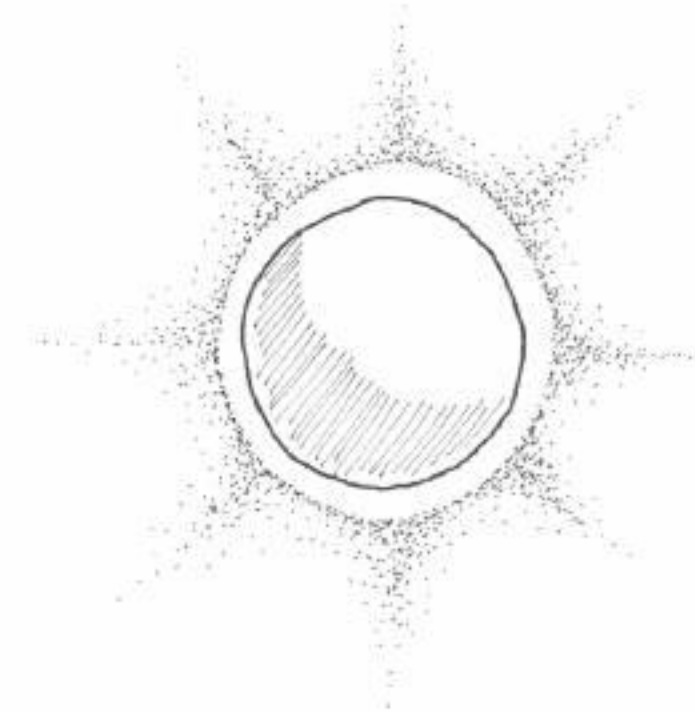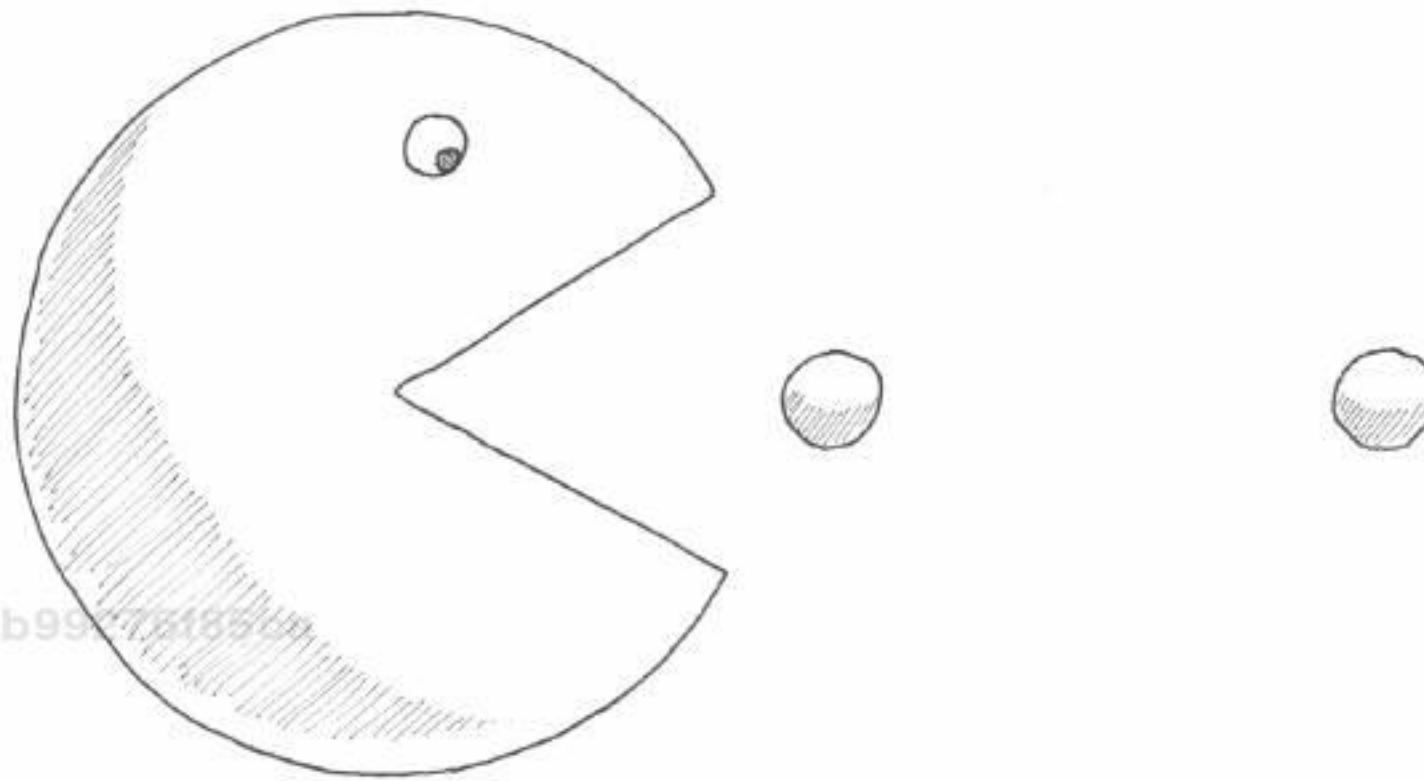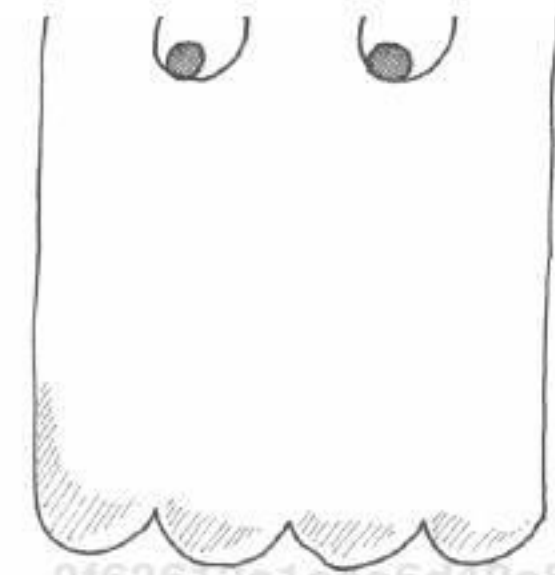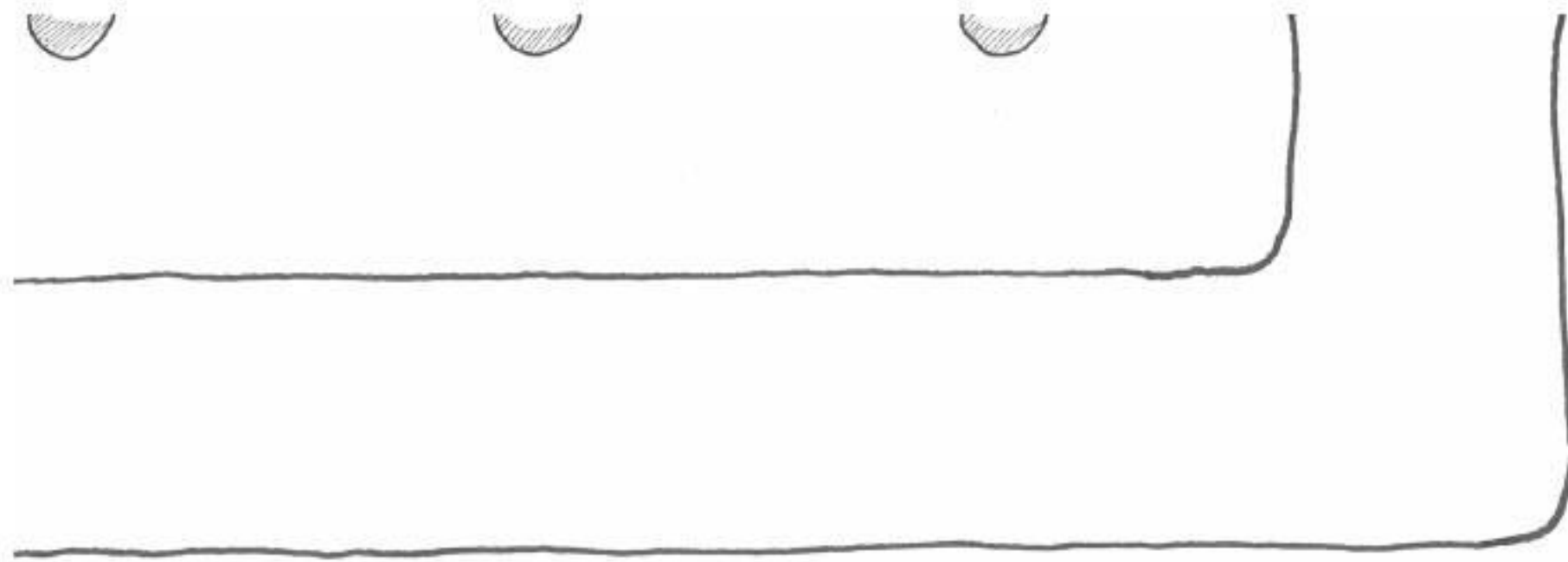
They see a power-up.

Alas, that isn't what we tend to focus on.

The commonest route these days for developing games involves grafting a story onto them. But most video game developers take a (usually mediocre) story and put little game obstacles all through it. It's as if we are requiring the player to solve a crossword puzzle in order to turn the page to get more of the novel.

By and large, people don't play games because of the stories. The stories that wrap the games are usually side dishes for the brain. For one thing, it's damn rare to see a game story written by an actual writer. As a result, they are usually around the high-school level of literary sophistication at best.

For another, since the games are generally about power, control, and those other primitive things, the stories tend to be so as well. This means they tend to be power fantasies. That's generally considered to be a pretty juvenile sort of story.

The stories in most video games serve the same purpose as calling the über-checker a "king." It adds interesting shading to the game but the game at its core is unchanged.

Remember—my background is as a writer, so this actually pisses me off. Story deserves better treatment than that.

Story, setting, and backplot in games are nothing more than an attempt to give a side dish to the brain while it completes its challenges— sometimes, the hope is that it makes up for an otherwise unremarkable game.

Games are not stories. It is interesting to make the comparison, though:

- Games tend to be experiential teaching. Stories teach vicariously.

- Games are good at objectification. Stories are good at empathy.

- Games tend to quantize, reduce, and classify. Stories tend to blur, deepen, and make subtle distinctions.

- Games are external—they are about people's actions. Stories (good ones, anyway) are internal—they are about people's emotions and thoughts.

In both cases, when they are good, you can come back to them repeatedly and keep learning something new. But we never speak of fully mastering a good story.

I don't think anyone would quarrel with the notion that stories are one of our chief teaching tools. They might quarrel with the notion that play is the other and that mere lecturing runs a distant third. I also don't think that many would quarrel with the notion that stories have achieved far greater artistic heights than games have, despite the fact that play probably *predates* story (after all, even animals play, whereas stories require some form of language).

Are stories superior? We often speak of wanting to make a game that makes players cry. The classic example is the text adventure game *Planetfall*, where Floyd the robot sacrifices himself for you. But it happens outside of player control, so it isn't a challenge to overcome. It's grafted on, not part of the game. What does it say about games that the peak emotional moment usually cited actually involves *cheating*?

Games do better at emotions that relate to mastery. Stories can get these too, however. Getting emotional effects out of games may be the wrong approach—perhaps a better question is whether stories can be fun in the way games can.

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Stories are a powerful teaching
tool in their own right, but
games are not stories.

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When we speak of enjoyment, we actually mean a constellation of different feelings. Having a nice dinner out can be fun. Riding a roller coaster can be fun. Trying on new clothes can be fun. Winning at table tennis can be fun. Watching your hated high school rival trip and fall in a puddle of mud can be fun. Lumping all of these under "fun" is a rather horribly vague use of the term.

Different people have classified this differently. Game designer Marc LeBlanc has defined eight types of fun: sense-pleasure, make-believe, drama, obstacle, social framework, discovery, self-discovery and expression, and surrender. Paul Ekman, a researcher on emotions and facial expressions, has identified literally dozens of different emotions—it's interesting to see how many of them only exist in one language but not in others. Nicole Lazzaro did some studies watching people play games, and she arrived at four clusters of emotion represented by the facial expressions of the players: hard fun, easy fun, altered states, and the people factor.

My personal breakdown would look a lot like Lazzaro's:

- **Fun** is the act of mastering a problem mentally.

- **Aesthetic appreciation** isn't always fun, but it's certainly enjoyable.

- **Visceral reactions** are generally physical in nature and relate to physical mastery of a problem.

- **Social status maneuvers** of various sorts are intrinsic to our self-image and our standing in a community.

All of these things make us feel good when we're successful at them, but lumping them all together as "fun" just renders the word meaningless. So throughout this book, when I have referred to "fun," I've meant only the first one: mentally mastering problems. Often, the problems mastered are aesthetic, physical, or social, so fun can appear in any of those settings. That's because all of these are feedback mechanisms the brain gives us for successfully exercising survival tactics.

Of course, learning patterns is
not the only thing that is entertaining.
Humans enjoy primate dominance games,
for example. You could argue that
jockeying for status is also a challenge,
of course.

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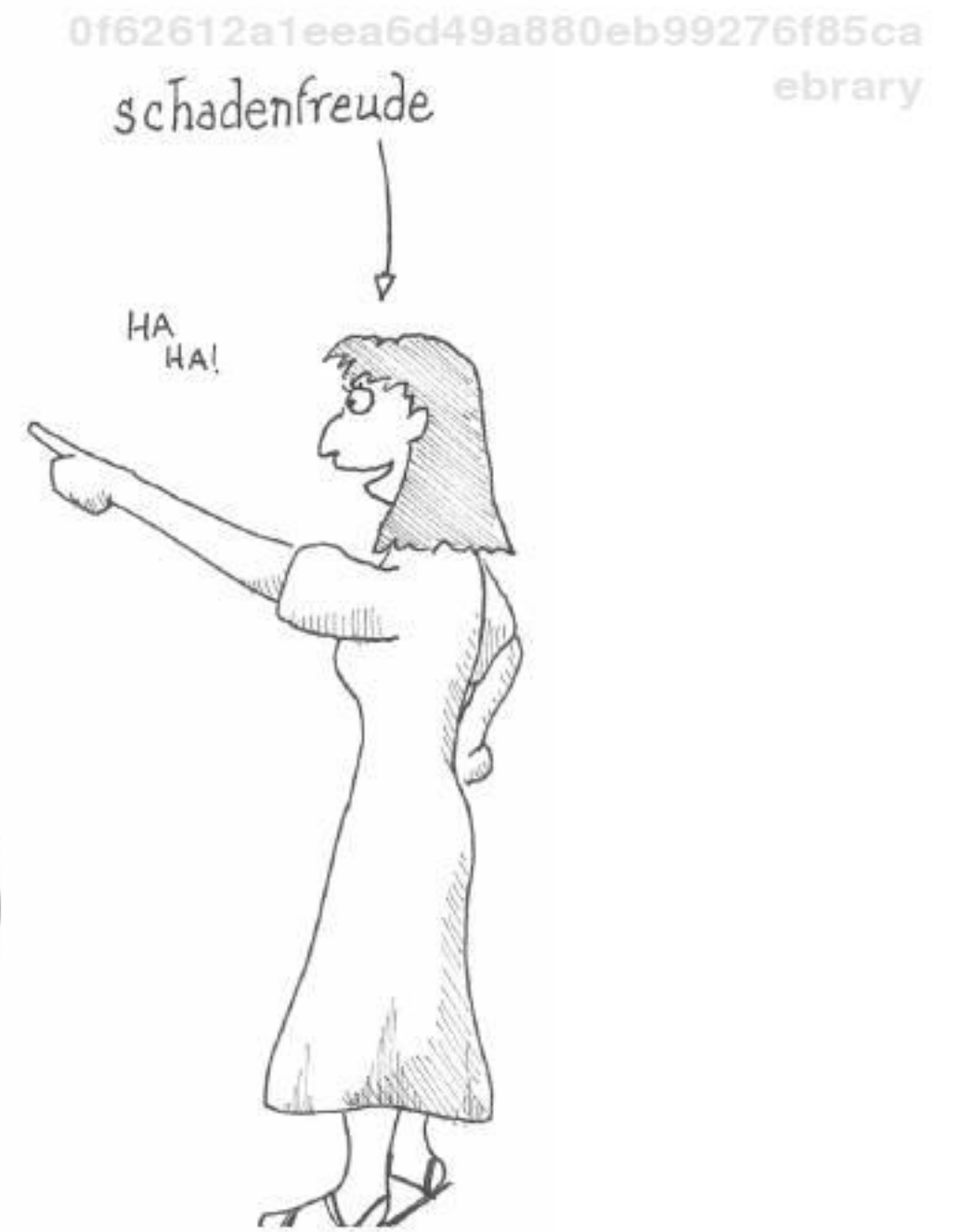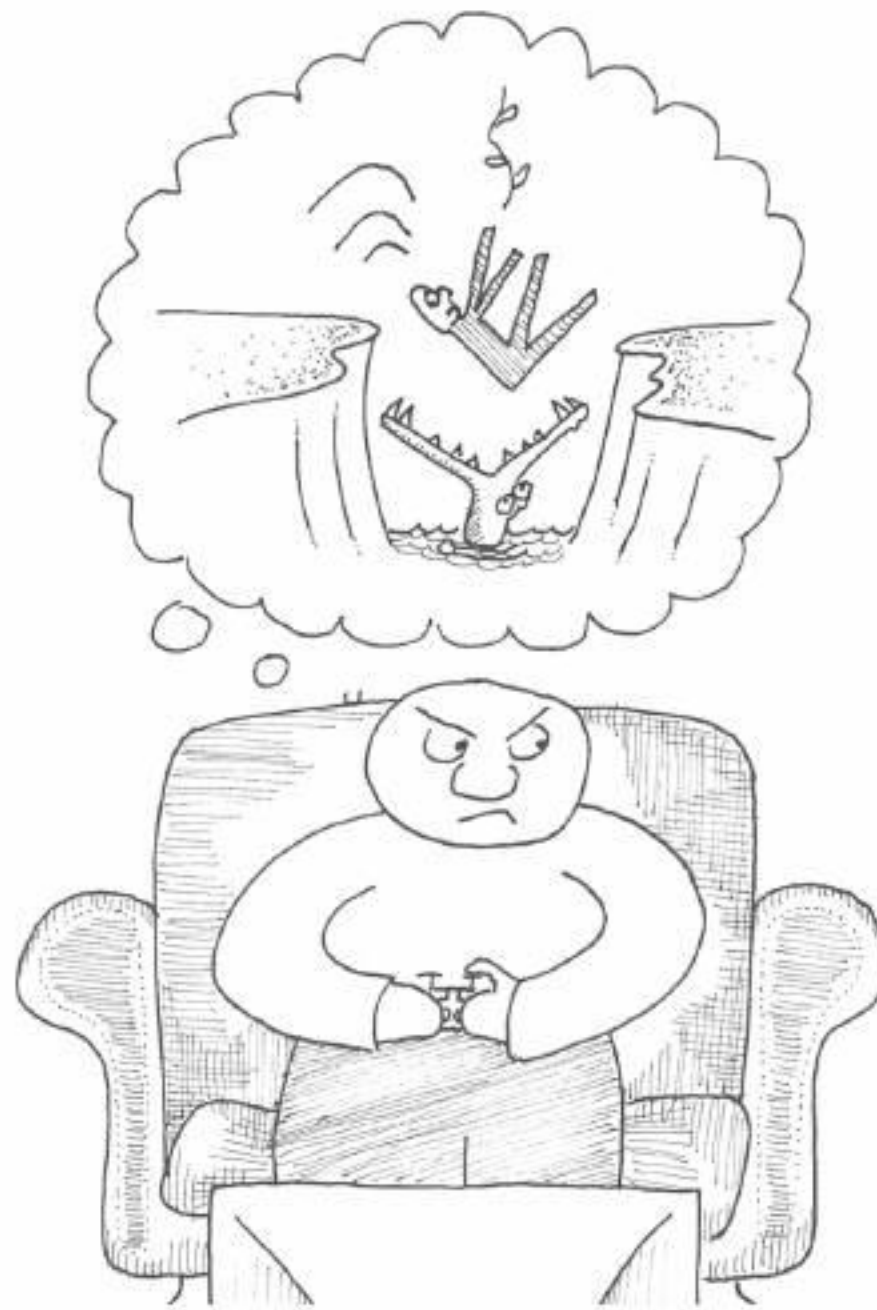
Physical challenges alone aren't fun. The feeling of triumph when you break a personal record is. Endurance running can be immensely satisfying but you have not solved a puzzle. It is not the same high as when you win a well-fought game of soccer thanks to your teamwork.

Similarly, autonomic responses aren't fun in and of themselves. You have them developed already, so the brain only rewards you for doing them in the context of a mental challenge. You don't get a high from just typing, you get it from typing while pondering what to say, or from typing during a typing game.

Social interactions of all sorts are often enjoyable as well. The constant maneuvering for social status that all humans engage in is a cognitive exercise and therefore essentially a game. There is a constellation of positive emotions surrounding interpersonal interactions. Almost all of them are signals of either pushing someone else down, or pushing yourself up, on the social ladder. Some of the most notable include:

- **Schadenfreude**, the gloating feeling you get when a rival fails at something. This is, in essence, a put down.

- **Fiero**, the expression of triumph when you have achieved a significant task (pumping your fist, for example). This is a signal to others that you are valuable.

- **Naches**, the feeling you get when someone you mentor succeeds. This is a clear feedback mechanism for tribal continuance.

- **Kvell**, the emotion you feel when bragging about someone you mentor. This is also a signal that you are valuable.

- **Grooming behaviors**, a signal of intimacy often representing relative social status.

- **Feeding other people**, which is a very important social signal in human societies.

A lot of these feel good, but they aren't necessarily "fun."

We also enjoy visceral experiences of various sorts—
these are often challenges to ourselves.

get me
offa here!
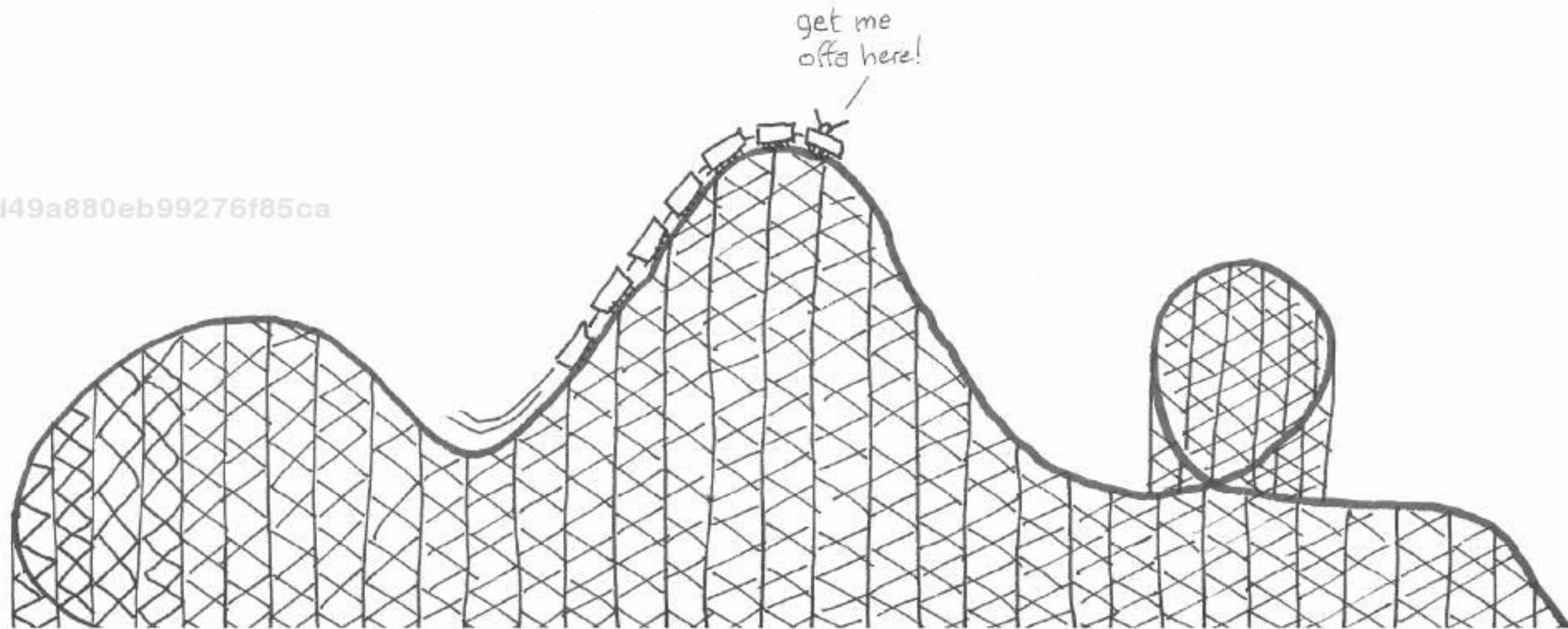
Aesthetic appreciation is the most interesting form of enjoyment. Science fiction writers call it "sensawunda." It's awe, it's mystery, it's harmony. I call it delight. Aesthetic appreciation, like fun, is about patterns. The difference is that aesthetics is about *recognizing* patterns, not learning new ones.

Delight strikes when we recognize patterns but are surprised by them. It's the moment at the end of *Planet of the Apes* when we see the Statue of Liberty. It's the thrill at the end of the mystery novel when everything falls into place. It's looking at the Mona Lisa and seeing that smile hovering at the edge of known expressions and matching it to our hypothesis of what she's thinking. It's seeing a beautiful landscape and thinking all is right in the world.

Why does a beautiful landscape make us feel that way? Because it meets our expectations, and *exceeds* them. We find things beautiful when they are very close to our idealized image of what they should be but with an additional surprising wrinkle. A perfectly closed off plot, with just a couple of loose threads. A picture of a farmhouse, but the paint is peeling. Music that comes back to the tonic note and then drops a whole step further to end on an unresolved minor seventh. It sends us chasing off after new patterns.

Beauty is found in the tension between our expectation and the reality. It is *only* found in settings of extreme order. Nature is full of extremely ordered things. The flowerbed bursting its boundaries is expressing the order of growth, the order of how living things stretch beyond their boundaries, even as it is in tension with the order of the well-manicured walkway.

Delight, unfortunately, doesn't last. It's like the smile from a beautiful stranger in a stairwell—it's fleeting. It cannot be otherwise—recognition is not an extended process.

You can regain delight by staying away from the object that caused it previously, then returning. You'll get that recognition again. But it's not quite what I would call fun. It's something else—our brains rewarding us for having learned well. It is the epilogue to the story. The story itself is the fun of learning.

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Last, people often take DELIGHT in things that are not challenges.

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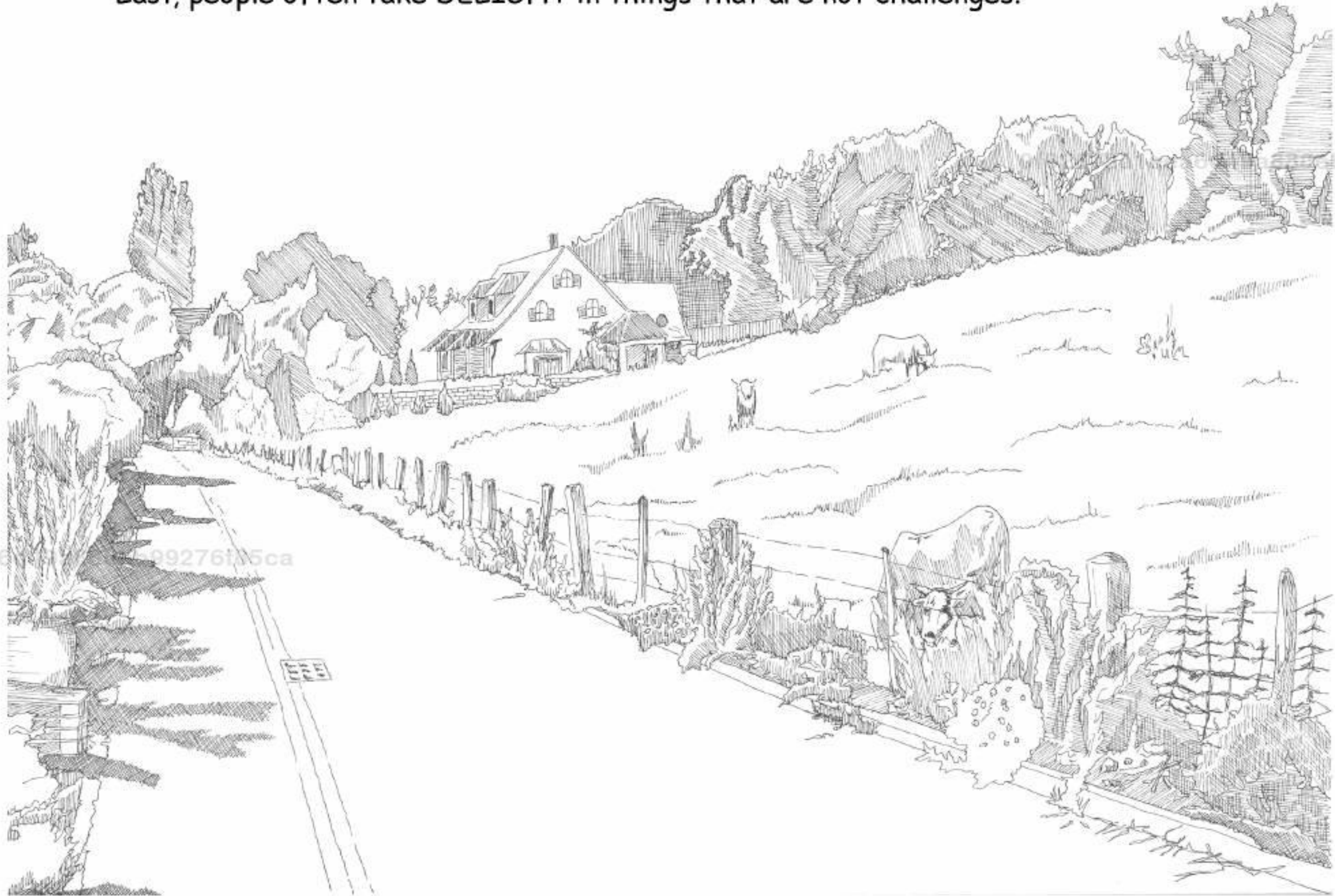
Fun, as I define it, is the feedback the brain gives us when we are absorbing patterns for learning purposes. Consider the basketball team that says, "We went out there to have fun tonight," versus the one that says, "We went out there to win." The latter team is approaching the game as no longer being practice. Fun is primarily about practicing and learning, not about exercising mastery. Exercising mastery will give us some other feeling, because we are doing it *for a reason,* such as status enhancement or survival.

The lesson here is that *fun is contextual.* The reasons why we are engaging in an activity matter a lot. School is not usually all that fun because we take it seriously—it's not practice, it's for real, and your grades and social standing and clothing determine whether you are in the in-crowd or whether you sit at the table close to the cafeteria kitchen.

It's very telling that when we lose a competition, we often say, "Well, I was just doing it for fun." The implication is that we are shrugging off the implicit loss of social status inherent in a loss. Since it was merely a form of practice, perhaps we didn't put forth our best effort.

We get positive feedback for climbing the social ladder. We're just tribal monkeys throwing feces at each other in order to own the top of the tree. But notice some of the subtleties there: climbing it while helping others (naches and kvell). Climbing it while pushing the boundaries of our knowledge (fun). Climbing it while strengthening our social networks, building communities and families that work together to improve everyone's lot (grooming, pairing, and feeding others).

As monkeys go, that's pretty darn good. In the general run of animals, it's amazing. It's a lot better than being a shark that only gets feedback for eating.

I think there's a good case to be made that having fun is a key evolutionary advantage right next to opposable thumbs in terms of importance. Without that little chemical twist in our brains that makes us enjoy learning new things, we might be more like the sharks and ants of the world.

But delight tends to wear thin very quickly.
Real fun comes from challenges that are always at the margin of our ability.
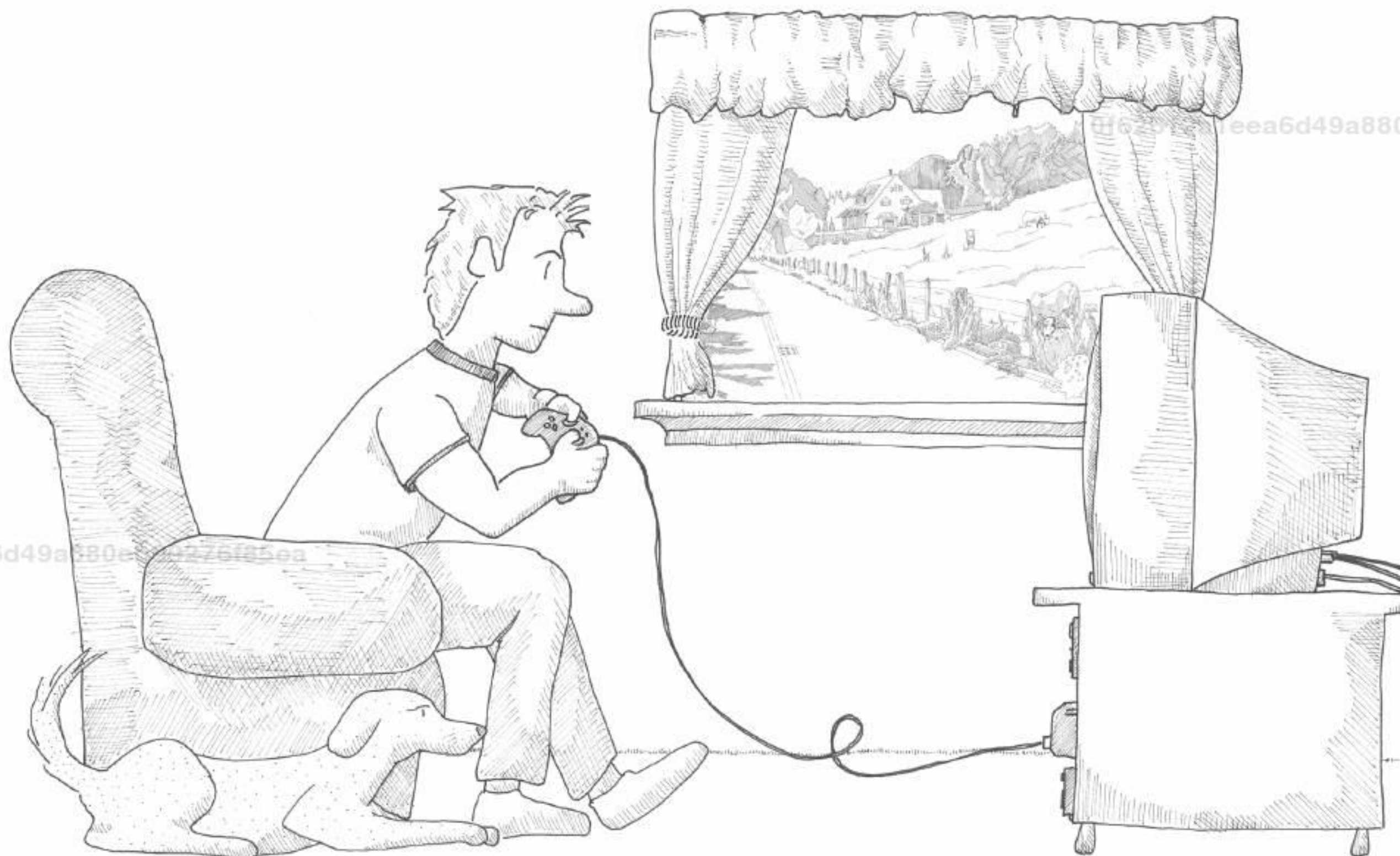
So how does it feel? Well, the moment a lot of players like to cite is "being in the zone." If you get academic about it, you might reference Csikszentmihalyi's concept of "flow." This is the state you enter when you are experiencing absolute concentration on a task. When you're in absolute control, the challenges that come at you are met precisely by your skills. Lazzaro called this "hard fun," and it's the state from which you are most likely to emerge feeling either frustration or triumph.

Flow doesn't happen very often, but when it does it feels pretty darn wonderful. The problem is that precisely matching challenges to capability is incredibly hard. For one thing, the brain is churning away and might make a cognitive leap at any moment, rendering the rest of the challenge trivial. For another, whatever is presenting the challenges doesn't necessarily have any sense of the level of understanding possessed by the player.

As we succeed in mastering patterns thrown at us, the brain gives us little jolts of pleasure. But if the flow of new patterns slows, then we won't get the jolts and we'll start to feel boredom. If the flow of new patterns increases beyond our ability to resolve them, we won't get the jolts either because we're not making progress.

When there's flow, players usually say afterward, "That was a *lot* of fun." When there isn't flow, they might say "that was fun" somewhat less emphatically. The absence of flow doesn't preclude fun—it just means that instead of a steady drip-drip-drip of endorphins, you're getting occasional bits. And in fact, there can be flow that isn't fun—meditation induces similar brain waves, for example.

So fun isn't flow. You can find flow in countless activities, but they aren't all fun. Most of the cases where we typically cite flow relate to exercising mastery, not learning.

To recap the preceding pages: Games aren't stories. Games aren't about beauty or delight. Games aren't about jockeying for social status. They stand, in their own right, as something incredibly valuable. Fun is about learning in a context where there is no pressure, and that is why games matter.

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When the balance is really perfect, people often zone out.

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