Cause, Effect, and Player-Centric Time

Events, I stated in the previous section, are the basic building blocks of a video game's temporality. When starting a new game, players need to learn which *direct events* they can perform and how they are carried out. Do I control a character? If so, what can I make them do (jump, run, fly, punch)? This process involves testing the interface and observing the effects of button presses, mouse clicks, or stick movements. The next step is to discover the *indirect events*. How do direct events affect other entities? And also: How is the player character affected by other entities?

Events do not happen in a vacuum. They are the results of previous events, and are thus chronologically dependent on them. A significant part of the gameplay experience consists in instantiating causal sequences of events that will result in desired outcomes. Understanding these causal concatenations (between interface and gamespace and between entities within the gamespace) is typically a heuristic process; though often manuals, tutorials, and the design of games themselves inform the player as well. Going back to the SUPER MARIO BROS. example of section 1.2, if Mario jumps (direct event) and stomps (indirect event) on a Koopa Trooper (a tortoise-like enemy) by landing on it, the creature will retract into its shell. After the stomp, Mario can run into the shell and propel it forward (indirect event). Any enemies in the path of the hurtling shell will be instantly eliminated (indirect event). Once the shell is off screen, it won't damage any more enemies. If Mario runs behind the shell while keeping it on screen, it will wipe all the enemies out while scoring multiple points—and maybe even granting Mario an extra life. If the player is not careful, however, the sliding shell can ricochet on a surface, such as a warp pipe, and damage or kill Mario as well. While these specific events are characteristic of SUPER MARIO BROS., causal sequences like this one are the backbone of video games.

"WE'RE ALL PUPPETS, LAURIE"

We make sense of the world (whether it is the real or a virtual one) through the perception of causation. We think of our environment as being made up of objects and agents taking part in events that influence each other. And we see ourselves as agents affecting the world and being influenced by it. Events are consequences of other events and, in turn, cause other events to happen. The causal relations we perceive between them help us understand and control our environment. Causation is so central to our everyday experience that it can be disturbing to realize that it is actually an artifice of our perception (Pinker 2007, p. 209).

Dr. Manhattan, a character in the graphic novel WATCHMEN (Moore and Gibbons 1986), perceives time not as flowing in one direction, but as a whole, with his own present, past, and future coexisting. He can also perceive the atomic and subatomic scales, and control matter at will. His human friends, who are trying to change an alarming course of events, count on him as an ally. But, even though Dr. Manhattan possesses the power to influence the world as he pleases, and still retains some human qualities, his godlike perception causes him to lose all interest in human affairs and retreat to the sterile surface of Mars. During a conversation with Laurie, the Silk Spectre, Dr. Manhattan claims: "We're all puppets, Laurie. I'm just a puppet who can see the strings."

In the nineteenth century, astronomer and mathematician Pierre-Simon Laplace (1814/1902, p. 4) eloquently expressed the discrepancy between our causal intuitions and the deterministic picture that physics paints of the universe in a famous thought experiment that came to be known as *Laplace's demon*. Laplace postulated an intelligence so vast and powerful that it would know the position of every particle in the universe and understand all the forces that govern them at any given instant. By processing the information from an instant in time, this intelligence would be able to see the past and the future with the same clarity as it could see the present. Cause and effect would make no sense to this entity, since it would not see events unfolding and objects affecting other objects, but an all-encompassing picture of the spatiotemporal fabric of the universe. While we are busy watching the movie of history unfold, Laplace's demon would have access to the whole film strip simultaneously. Dr. Manhattan is like this demon (but only with access to his personal life history). Losing his sense of causality also makes him lose his sense of purpose. But we are neither Laplace's Demon nor Dr. Manhattan. We are humans that experience time flowing in one direction and the events that unfold in it as the result of previous events. Our actions are oriented towards goals that we see as the potential product of events that we can set in motion. Video games are designed to fulfill these causal intuitions.

CAUSAL ILLUSIONS

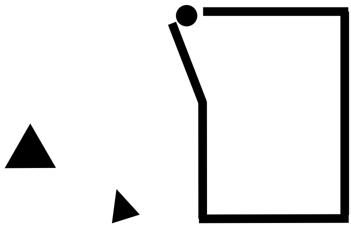
A series of animated gifs circulating online prompt you to blow on your screen after and a five-second countdown. Once the timer reaches zero, one of the versions of this gif cuts to a close-up of Donald Trump with his hair being lightly blown by a gust of wind. If you do as the gif requests and blow on your screen, it *feels* as if you are blowing on Trump's hair.[1] This illusion reveals what is happening under the hood: We don't really observe causation; we see correlations and automatically infer causation. We are so inclined to detect causal relations where there are none that statisticians insistently repeat the mantra that *correlation does not imply causation*.

Psychologist Albert Michotte (1963) conducted studies in the 1940s, which showed that "we *see* causality, just as directly as we see color" (Kahneman 2011, p. 76). These studies upended the widespread assumption that we infer causality from repeated observations of events that goes back to David Hume (2007, section VII). In one experiment, Michotte created an animation in which a square in motion touched a stationary square, and then the second square started to move in the same direction and at the same speed as the first—just like a billiard ball hitting another. Michotte's subjects described what they had just seen as the first square *causing* the second one to move. Just as it plays out for those who blow at Trump's hair gif, Michotte's subjects experienced an illusion of causation. Infants as young as six months old have also been shown to experience this causal illusion and act surprised when the sequence is tampered with (Leslie and Keeble 1987).

In the same decade as Michotte, psychologists Fritz Heider and Mary-Ann Simmel (1944) showed that the perception of *intentional* causality is intuitive, too. They created an animation in which a big triangle, a small triangle, and a circle, move in and around a rectangle (figure 1.22). The way the figures are animated creates the illusion that the big triangle is a bully attacking both the small triangle and the circle in their house, represented by the big square. Our minds effortlessly see this story (or a similar version of it) unfold and we can feel the emotion of the scene, even though it is clearly just a set of geometric shapes moving on the screen.

1 You can try for yourself here: http://popkey.co/m/ajoj0-donald+trump-hair-wind-blow+on+screen (accessed November 18, 2017).

Figure 1.22: Illustration of the Heider-Simmel illusion.



Video games are casual illusions similar to those described above. The difference between video games and Michotte's and Heider and Simmel's illusions is that the former are not just animations; they are systems that can be interacted with. When playing, players are not thinking of electrical signals in the CPU, but in terms of the objects and characters shown on screen. But the "real" action is happening inside the computer or console running the game, not on the screen. The events on the audiovisual layer are epiphenomena crafted to inform players of the game state. Technically, one could play a game (and lose) with the screen and the speakers turned off, since the electrical signals in the computer would continue firing nonetheless.

CAUSATION IN LANGUAGE

Linguist Leonard Talmy (1988) dissected the notion of causality in his analysis of the semantic category of *force dynamics*. This concept of force dynamics involves two entities that exert forces. The focal entity is called the *agonist*, which is influenced by another entity called the *antagonist*. Both entities can have one of two *tendencies*: a tendency toward rest, or a tendency toward motion. The antagonist's tendency commonly opposes the agonist's tendency. Each entity also has a different relative *strength*. The entity with the highest relative strength will determine the *resultant* of the event. In a sentence like *the ball kept rolling because of the wind blowing on it*, the ball is the agonist and it has a tendency toward rest, while the wind is the antagonist and it has a tendency towards motion. The wind is the entity with superior relative strength, which is why it causes the ball to roll.

Figure 1.23 depicts these basic elements.[2] A circle represents the agonist, and its intrinsic tendency is marked by an arrow for movement and a dot for rest. The antagonist is represented by an arrow. If the antagonist is stronger, it is depicted with a plus sign; if it is weaker, it contains a minus sign. Here a basic script: An *agonist tending*, an *antagonist acting*, and the *agonist reacting* (Pinker 2007, p. 222). When combined, these elements and its variables result in four basic force-dynamic patterns.

Figure 1.23: Types of agonist and antagonist.

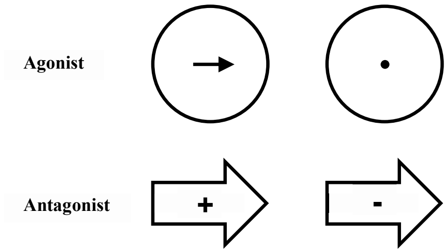


Figure 1.24 shows four different patterns, two of the *causative* type and two of the *despite* type. In both *despite* cases, the agonist retains its initial tendency (to rest on the upper right and to move on the bottom left). In the *causative* cases the resultant is opposed to the agonist's tendency (on the top left the agonist is caused to move, and on the bottom right it is caused to rest) (Talmy 1988, pp. 53-56). It should be noted that the sentences are formulated in an awkward way in order to emphasize that only an event (and not just an object) can cause another event. Normally we would say "the wind blew the ball" instead of "the ball kept rolling because of the wind blowing on it" (Pinker 2007, p. 221).

All of the patterns in figure 1.24 are *steady-state* force-dynamic patterns, given that both the agonist and antagonist are present the whole time. Figure 1.25 shows four new, *shifting* force-dynamic patterns, in which the antagonist either enters or exits the scene (Talmy 1988, pp. 57-58). There are two additional *causative* patterns, which indicate causing (the lamp to topple) and blocking (the fire from burning), and the new *letting* patterns that represent cases in which the antagonist moves out of the way, allowing (the water to flow) and enabling (the particles to settle).

2 The illustrations used in this section are a combination of those used by Talmy (1988) in his original text, and those used by Pinker in THE STUFF OF THOUGHT (2007).

Figure 1.24: Steady-state force-dynamic patterns.

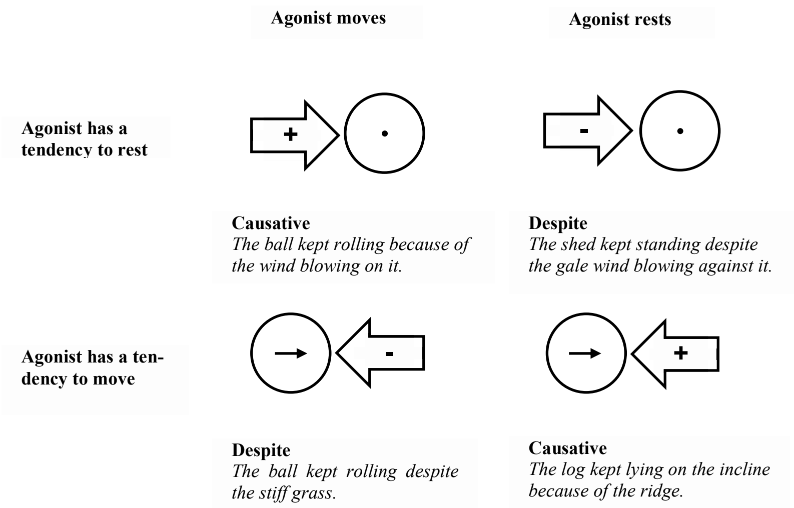
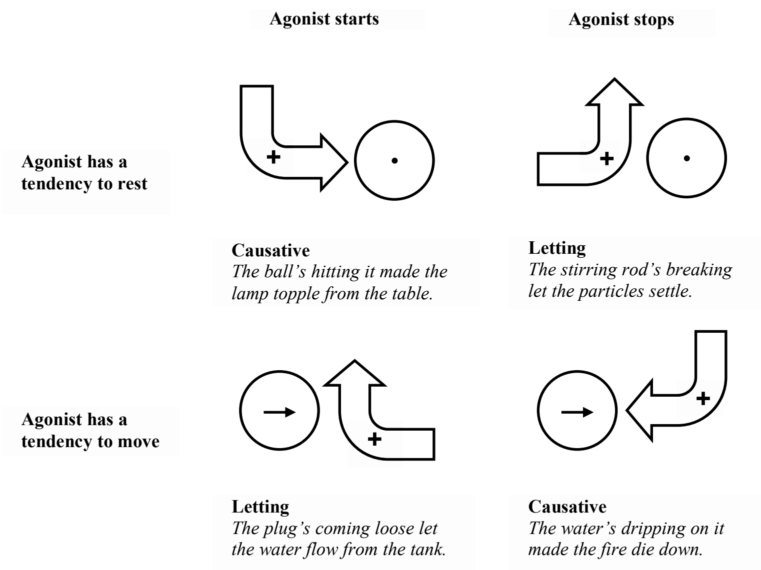
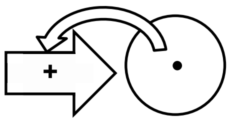


Figure 1.25: Shifting force-dynamic patterns.



A final pattern I wish to describe here is the case where the balance of forces is shifted. Figure 1.26 illustrates one possible scenario in which the agonist starts with higher relative strength than the antagonist, but gradually loses it until the antagonist prevails. The verb "to overcome" is used here, and the curved arrow pointing from the agonist towards the antagonist symbolizes the shift in relative strength.

Figure 1.26: Overcome pattern.



Overcome
The enemy (antagonist) overcame us (agonist) as we stood defending the border.

Steven Pinker notes that this script of an antagonist impinging on (or not impinging and thus "letting") an agonist, "played out in different combinations and outcomes, underlies the meaning of the causal constructions in most, perhaps all, of the world's languages" (Pinker 2007, p. 222). There is reason to believe in the universality of this model, given the parallels between Talmy's analysis and our intuitive understanding of physics, as examined for instance by Andrea diSessa and his notion of *phenomenological primitives* (compare Talmy 1988, p. 91; diSessa 1986), and Phillip Wolff's (2007) experiments based on force dynamics. Talmy's analysis also resembles medieval theories of physics, which postulated an internal *impetus* in objects that led them to be at rest or in motion. Modern physics, on the contrary, can be starkly counterintuitive (Talmy 1988, p. 92), which is not only true for odd quantum mechanics. Talmy's notion of one object exerting a stronger force than the other, as commonsensical as it may seem, is at odds with the well-known principle of physics that if one object exerts a force on another object, the second object will exert an equal and opposite force (that is, equal in intensity, but in the opposite direction) on the first one (ibid).[3]

3 If the two objects have very different mass, then the acceleration will apply mostly to the less massive one. A common example is that if you throw a ball, the ball will fly, but you will not notice that the earth is rotating faster because of it, given that the effect on the earth is negligible. But if you throw a ball forward while on roller blades, you will be launched backwards as the ball soars through the air.

Languages reflect our intuitive understanding of the physical world, acting as a window into the human mind. We interpret the world as made up by entities and not by atoms. We see these entities exerting forces upon each other, as if they had inherent tendencies, and see the object whose tendency prevails as exerting a greater force in the interaction:

"[S]ome of the most basic force-dynamic concepts—blocking and letting, resistance and overcoming—have no principled counterpart in physics. For their viability, these concepts depend on the ascription of entityhood to a conceptually delimited portion of the spatio-temporal continuum, and on the notion of an entity's having an intrinsic tendency toward motion or rest" (ibid., p. 93).

Video games are systems that allow us to put these intuitions to practice. To be clear, my claim is not that they are deliberately designed to this end (at least not necessarily), but rather that these intuitions guide game designers as well as players, resulting in ludic systems that work in ways that mirror our naive understanding of causation. Tasks in video games typically involve an entity impinging on another entity to produce a result. Game objectives that involve fetching items, killing opponents, or overcoming physical obstacles, can be expressed in terms of force-dynamic patterns.

So far, the examples have focused on inanimate objects, but "language largely extends its concepts of physical force interaction to behavior within the psyche and between psyches" (ibid., p. 94).

FORCE DYNAMICS AND INTUITIVE PSYCHOLOGY

Including an agent in a force-dynamic pattern brings about a few complications. First, even though the construction in English and many other languages can be syntactically simple, as in *"I broke the vase*," an intermediate step can be added to the sequence, that is, the instrument used to perform the action: "*I broke the vase (by hitting it) with a ball*". But many languages, like English, allow mentioning just the agent and the final event, ignoring the intermediate step with the instrument (ibid, p. 60).

Additionally, including an agent adds a subsequent layer to the construct: the agent's volition. When talking about ourselves and others as agents, force dynamics manifests in the notion of the divided self. The sentence "*Susan refrained from playing video games*" refers to Susan's behavior as an internal struggle between two parts of herself: one that wishes to play video games and one that does not. Since the latter part was stronger, she managed to resist the temptation (ibid., p. 69). The semantic configuration of the divided self responds to the logic of force dynamics. One part of the self is the agonist and the other the antagonist, and they have different relative strengths.

The sentence "*I made myself finish the game (even though it was boring)*" emphasizes the divided self, given that it is reflexive: "*I,*" the stronger antagonist, made "*myself,*" the weaker agonist, finish the game. The sentence is also exertive, given that the antagonist is not blocking the agonist, but setting it in motion.

When moving from individuals to interpersonal situations, or interaction with larger social groups, we can also observe force dynamics in action (ibid., p. 75). A person can, for example, *pressure* another person, *restrain* them from, or *push* them to do something. These are not meant as actual physical forces, but metaphors that stand for acts like persuasion, discouragement, or exhortation.

With social groups, we cluster individuals into entities such as peers, a crowd, or the public. Once a number of individuals become a single entity, force dynamics can be easily applied: "*His peers pressured him into smoking*," or "*the crowd brought the singer back out for an encore*."

CAUSATION IN VIDEO GAMES

When considering force dynamics in relation to video games, there are several layers of patterns to take into account: (1) the intra-psychological layer (the player's divided self); (2) player and interface (for example, the player and a controller); (3) interface and computer; (4) player-controlled entity (the avatar) and other in-game entities (sometimes controlled by other players); (5) game (feedback) and player; and (6) player and environment (a quiet living room, a busy arcade, or an e-sports event).

However, when talking about gameplay, the focus can lie on the player as the entity which interacts with other entities inside the gameworld, ignoring both the interface and the avatar. Just as we can say "*I broke the vase*" instead of saying "*I broke the vase (by hitting it) with a ball,*" we can also construct sentences about players causing in-game events such as "*he killed the monster*," or "*she threw a grenade.*"

Of the different layers of agonists and antagonists listed above, it is worth focusing on the fourth: the causal relationship between the player-controlled entity and other in-game entities. The entities that are not controlled by the player include inanimate objects, enemies, and friendly non-player characters. These entities constitute the gameworld.

There are two peculiarities about gametime that should be noted. One is that it can be reset (see section 1.2)—that is, the states of the gamespace can be saved and loaded. This aspect of games will be further analyzed in chapter two, section 2.2. The second peculiarity about gametime—in which the remainder of this section will focus—is that it is in many ways *player-centric*. As I have stated in the previous section (1.2 Structuring Gametime), *triggers* can be scattered throughout the gamespace to initiate events when the player encounters them. Consequently, events in a game often wait for the player in order to happen. It is a convenient technique to tell a story or make a virtual world come to life without resorting to cutscenes or textual exposition. But triggers have a disadvantage: They can make time in games feel artificial.

Returning to the example of HALF-LIFE described in section 1.2 can help illustrate this issue. In the beginning of the game, the player needs to escape the research facility of Black Mesa as it falls apart after an experiment goes awry. In one of the hallways of the complex there is an invisible trigger that, when activated, causes a machine to explode. If the player character dies after traversing said hallway, the player could load a previously saved state and replay that portion of the game. This means that the player will already possess knowledge of the detonation and could thus realize that the machine does not explode until a certain point in the hallway is reached. Therefore, an event that is portrayed as being disconnected from the player's agency is now revealed as caused by the player character's presence. The player can now see the character as the antagonist that brings the machine from a tendency toward rest to a tendency toward action by setting off a trigger. Furthermore, if it were possible to avoid the trigger, the pattern would not be of causing but of letting, as in: "*The player allowed the machine to stay in one piece (by not activating the trigger with the avatar).*" Gametime is player-centric when events do not occur unless the player character is situated at a particular location in the gamespace. One way of improving this strategy of using triggers to initiate scripted events could be to place them at random every time. Thus, the sequence of events would not become as predictable after a few replays of a segment.

Visible triggers can also be a double-edged sword for designers. On many occasions, they initiate missions in games. The trigger might take the form of an icon on the ground, where the mission starts, or a non-player character with whom the player needs to talk to start the mission. Designing missions so that they only start when players wish to is a great way to give them freedom. This type of trigger is frequently used in open world games, where players have access to vast maps with numerous missions and activities, some of which are part of the main story and others which are side stories or simple tasks. The tricky part of this strategy is that the player can choose when events in the main story should resume. Consequently, the possibility of *letting* things occur—whether intentionally or not—is restrained, leading to the problem of *freedom versus urgency*.

Freedom vs. Urgency

THE WITCHER 3: WILD HUNT puts the player in the shoes of Geralt of Rivia within a grim medieval fantasy world. Geralt is a Witcher, a monster hunter for hire. The main story arch of the game has the protagonist searching for Ciri, a woman he raised as his own daughter and who is in mortal danger. Ciri is being pursued by the Wild Hunt, a spectral group of huntsmen who wishes to capture her. Geralt needs to follow Ciri's trail, extract information from people she encountered in her path, and find her before the Wild Hunt does.

Figure 1.27: Ciri (left) and Geralt (right) in THE WITCHER 3: WILD HUNT.

Source: https://forums.cdprojektred.com/forum/en/the-witcher-series/fan-art-aa/62634-ciri-screenshot-thread (accessed February 2, 2018).

Considering that the narrative motivation of the game is an urgent matter, the consistent way to play the game would be to follow the main quests to find Ciri as fast as possible. But THE WITCHER 3 offers players a diverse assortment of side activities and secondary quests to pursue that do not contribute to progress in the main mission. Geralt can destroy monster nests, rescue people in distress, eliminate bandit camps, take part in horse races, and play a card game called Gwent. All of these are short side activities, but Geralt's world also offers plentiful hunting contracts, treasure hunts, and secondary storylines, which commonly require completing several objectives to conclude.

While players can choose to follow only the main storyline, the player is constantly encouraged to take on side missions, especially since some of these quests cannot be played after the main story is over. Thus, the game puts the player in the position of choosing to play in a way that is consistent with the main story (and risk missing content), or ignore Ciri's plight and engage in other activities.

Luckily, the player is never punished for these excursions from Geralt's main quest. For all the urgency that the storytelling conveys, there is no real time pressure to find Ciri, since the main story always waits for Geralt to come back in order to continue. Unless the player activates one of the main quests (by, for instance, talking to a character), time in Ciri's story remains frozen. A scenario in which Geralt *lets* the Wild Hunt capture Ciri because he was distracted by a game of Gwent is never a possibility. In THE WITCHER 3, as in most (probably all) open-world games, gameplay freedom is the enemy of narrative urgency. This is a case of what game designer Clint Hocking (2007) called *ludonarrative dissonance*, that is, a clash between the ludic and the narrative elements of a video game. The main story compels players to act quickly, and the system allows them to take all the time they want.

Henry Jenkins (2004, p. 8) already noted that game designers struggle with the "balancing act" of "trying to determine how much plot will create a compelling framework and how much freedom players can enjoy at a local level without totally derailing the larger narrative trajectory." Freedom to choose what to do can clash with the impact of the narrative. THE WITCHER 3 does not necessarily suffer from this contradiction. It is, after all, a critically acclaimed and commercially successful video game. But game developers need to take these incongruences into account and weigh their costs against their benefits. In striving to perfect the medium as a storytelling tool, designers might need to find solutions to this conundrum.

The illusion of causation is a pervasive one. Players engage with gameworlds by intuitively labeling entities (including the ones they control) as agonists and antagonists, and assigning tendencies to each. This powerful predisposition drives our interaction with video games. The causative, despite, letting, and overcome patterns are the invisible glue that holds reality together, but we are overly prone to perceiving these connections, often seeing agonists and antagonists where there are none (remember the statistician's mantra: *correlation* *doesn't mean causation*). If game developers use triggers to control the occurrence of events, players might detect the causal connections between the character's actions and the events initiated by a trigger, adding undesirable noise to the fictional world.

—

This chapter started with an overview of how our minds construct the present moment and the perception of motion. The properties of video games analyzed in the subsequent section (organized in the presented typology) are the raw materials with which our minds construct gametime. Gametime has some special properties that set it apart from physical time: it can be paused, reset, rewound, accelerated, and slowed down. Finally, this chapter introduced the notion of causation. Without a sense of causation, the events that unfold in gameworlds (and in the real world) would be a random collection of occurrences without relation to each other. We chain events through causal patterns that help us make sense of the world and decide on the courses of action that will lead us to our goals.

Through the repetition of actions, the causal relations between events are deeply embedded into the players' minds and become second nature to them. In this way, players can interact with the gamespace without consciously thinking about their actions. Iteration will be the main focus of chapter two. Section 2.1 will explore the mechanism behind the everyday process of learning and automatizing actions through repetition. But gametime takes this learning process one step further, given that it can be reset. Players can, therefore, travel back and forth in gametime and interact with the same game state more than once; a phenomenon that will be analyzed in section 2.2. The present section has described a clash between mechanics and narrative with the problem of freedom vs. urgency. Chapter two will introduce two other sources of friction between gameplay and narrative: a temporal paradox that arises when players reset gametime (section 2.1), and the implementation of voice over narrators in interactive and iterative gameworlds (section 2.3).