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Designing and Integrating Puzzles in Action-Adventure Games

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Puzzles are key to adventure games and can be a crucial component of action-adventure games. They are a source of great satisfaction once solved, and potentially a source of just as much frustration. Everyone remembers quitting a captivating game when stuck with an impossible puzzle, or even being unable to find the puzzle in the first place!

And yet, there is very little literature and research dedicated to this major aspect of game design. This article was written to offer a set of tangible rules for designing and integrating puzzles.

What Makes a Good Puzzle?

The role of puzzles in a game varies widely. An adventure game such as *Riven* is entirely designed around them. Puzzles are the essence of the game itself. On the opposite end, an action-adventure game with a strong "action" bias like *Outcast* only uses puzzles to set intermediate

goals for the player. Between the two extremes, games like *Resident Evil* and the series *Alone In The Dark* attempt -- more or less successfully -- to blend action with detective work.

Before going into the details of how to design and integrate puzzles, let's define what makes a good puzzle.

There are three major game genres that employ puzzles; they are: adventure games in the traditional sense such as *Myst*; Action-adventure games that are strongly bent on "action" like *Star Trek Voyager - Elite Force*; and Mixed action-adventure games such as *Alone In The Dark*.

While this categorization does not seem to explain what makes a good puzzle, each genre relies on a different type of puzzle for success and understand this will help us define what makes a good puzzle for each genre. The answer will obviously hinge on individual tastes and habits, but it's important to have a standard as objective as possible.

The rule I often apply is this: What is a player looking for when buying a game? This approach helps me pinpoint the very essence of a game category: the discovery of new sceneries in some adventure games, the humor in a platform game, etc.

We can now attempt to answer the question: What does it take to build a good puzzle?

Classical Adventure Games

When we say "adventure game", the first thing that comes to mind are images of inextricable puzzles and recollections of hours spent staring at the computer screen. Is an adventure game nothing but a string of puzzles? No. It's a mistake to think that gameplay in an adventure game is merely a succession of brain twisters and just as many opportunities to get hopelessly stuck.

A detailed analysis of the great adventure game classics reveals one key

aspect in their gameplay: investigation. Adventure games rely on the same mechanisms as a real-life investigation. Indeed, gameplay is virtually always limited to a cycle where a player must explore locations to discover objects, clues or mechanisms until the player realizes he or she is stuck in a game area and needs to find a way to move on when finally, the player discovers the lock/unlock feature using clues previously collected.

Most adventure game fans confirm this analysis, saying that unraveling a mystery, discovering new elements (characters, décor, machines, etc.), and advancing within the adventure, are their chief motivators. Very few gamers are actually interested in the puzzles themselves.

What this tells us is that investigation is the driving force of adventure games; so puzzles should encourage the player to explore and interact with the environment, not spend hours on end in front of a static screen. The puzzle should not be limited to a lock mechanism. It must make a seamless whole with the clues surrounding it.

Action-Adventure Games with an Emphasis on "Action"

The key aspect in this game category is movement. This is directly related to the gameplay, which is combat-dominated; but movement is also provided by the script: characters make their escape, infiltrate, mount attacks, etc. Games like *Alien versus Predator 2* or *Star Trek Voyager - Elite Force* are accomplished implementations of this principle. The player's actions are unchanged - move and fight - but the script regularly changes the pace of the game and the context of the action.

These games seem less capable of incorporating puzzles and still, almost all of them do. Indeed, puzzles respond to two basic requirements. First, they should diversify the gameplay. Action-adventure games biased on "action" often provide monotonous gameplay, and scattered puzzles are a way to liven up the monotony. *Half-Life* is one of the best examples. Moving ahead in the game often requires the player to understand how a particular gadget

works and use it to move on. These puzzles are all related to the movement of the hero. Motion remains the dominant theme. I rate these under the category movement puzzles. Second, they should guide the player by bringing up goals to be accomplished. Simple puzzles such as finding three keys to open a door give the hero's action a purpose. These are goal puzzles.

Still, these two types of puzzles have their shortcomings. Movement puzzles threaten to disrupt the pace of the game and may fail to provide the desired movement to the player. Indeed, such puzzles can turn out to be frustrating if the player cannot find the solution quickly or lacks the necessary dexterity.

Goal puzzles, in turn, are often overly simplistic. The player quickly understands that they are nothing but excuses intended to keep him going, instead of challenges intimately braided into the story.

In conclusion, a good puzzle designed for action-adventure games with the emphasis on "action" should follow these rules:

- As movement is the very essence of these games, puzzles should be kept simple to avoid breaking up the pace.
- Movement puzzles are not platform challenges where the player's success ultimately hinges on dexterity. These puzzles rely on the player's capacity to understand how to use a series of mechanisms to overcome an obstacle or use décor elements to advance.
- Goal puzzles should enrich the adventure instead of being an excuse for it.

Mixed Action-Adventure Games

These games provide a mix of seemingly incompatible genres. The player encounters mechanisms of a classical adventure game such as exploring and complex puzzle solving, as well as pieces of genuine action. Won't the action-hungry -- movement-hungry -- player be frustrated when the pace suddenly slows down for an investigation?

Still, this category boasts remarkable hits like *Resident Evil 2*, *Silent Hill* and *Alone In The Dark*. When a gamer buys *Resident Evil*, he is not looking for action before everything else. If that were the case, his choice would go with an action-oriented action-adventure title. Also, the player is not looking for a classical adventure game. No, what he wants first and foremost, is story.

True, a story is at the heart of any adventure game, but the kind of story we look for in a game like *Silent Hill* stands out in a unique way: in classical adventure games and in action-oriented games, the player controls the world; in mixed games, the world controls the player; he becomes the object of the game. The dramatic intensity of the narration is much stronger.

In *Silent Hill*, the hero finds himself prisoner in a city overcome by evil. His only goal is to find his daughter and make his escape. There is no "cleaning up" to do. He stands no chance in the face of such horrors. The city is stronger than he is.

Since the essence of this game family is the story, we won't find a specific type of puzzle here. There is a mix of investigation and movement puzzles.

The Golden Rules for Integrating a Puzzle

Puzzles can be categorized into one of three large groups, regardless of the games genre: investigation, movement, or goal puzzles. We have also established the ground rules to follow in designing good puzzles. Let's take a closer look at how these rules need to be implemented.

Integrating an Investigation Puzzle

The rules for integrating an investigation puzzle come as four basic principles:

- Maintain consistency between game pace and gameplay.

- Use an appropriate game architecture.
- Respect the universe of the game.
- Assist the player in solving puzzles.

Maintain Consistency Between Game Pace and Gameplay

If the game alternates between investigation and action, the puzzles should follow in line. Don't break up the pace of an action sequence with a puzzle that requires concentration, such as opening a chest.

Resident Evil 2 does an excellent job implementing this principle. The player reels between action and investigation. Investigation scenes, however, retain the game's general atmosphere - the fear of being attacked is permanent. The puzzles are simple and require the player to move a lot, further exposing him to sinister encounters.

Investigation puzzles must rely on discovering, examining and manipulating objects. Puzzles should encourage the player to explore, discover his universe - instead of freezing solid in front of a brain twister. A lot of puzzles in *Myst - Riven* are designed in this way. Most of the riddles can be solved by examining the décor and associating it with the clues.

Use an Appropriate Game Architecture

The game architecture, the synopsis, is the backbone of your product. It determines the order in which players encounter puzzles, the way they are integrated into the script, and how often they turn up. The following rules serve as a guide to using the appropriate game architecture:

- Always design easy, gratifying puzzles at the beginning of your script. To encourage the player to "step into" the adventure, he needs a sense of initial success. Let's not forget that game débuts are often turned into demos. Scaring the audience off with an impossible puzzle is certainly not the best way to encourage potential buyers!
- Make sure the player can easily find the puzzles. Since puzzles are potential dead-ends, they should be easily identifiable. Absolutely avoid having the player stray around the game not knowing what

to do next. Many approaches are available, such as a cut scene highlighting the puzzle when the player enters a particular location, or a visual gimmick (reflection, blinking light, etc.) to draw his attention.

- Limit the investigation area around the puzzle. All the elements needed to solve the puzzle (clues, objects, plans, etc.) should be found near the puzzle itself. This way, the player won't be tempted to return to locations explored long ago in the hope of finding a missing object or clue.
- Design workaround puzzles: Solving one provides clues for another
- Since it's impossible to know which one will bring the player to a halt, consider offering a choice of puzzles. If the player defaults at one puzzle, he can always try another. Imagine our player attempting to solve puzzle A, and failing. He then tries his luck with puzzle B and succeeds. A clue is then offered concerning puzzle A.
- Avoid drowning the player in clues. To the designer, each piece of information given out has an obvious meaning since he knows the script inside and out. Not so with the player, who often cannot tell the essential clues needed to solve puzzles, from background information. Information of a general character should therefore be dispensed at appropriate times. I already discussed this aspect of design in an article published on Gamasutra.com: ["Turning a Linear Story into a Game: The Missing Link between Fiction and Interactive Entertainment"](#). Remember, there are software tools available to help designers and script writers in this area.
- Stick with a more linear adventure. The better the designer controls the order of discoveries, encounters, etc., the more likely the player is to solve each puzzle. It's always a good idea to guide the player throughout the entire adventure and keep the playing area limited. The player won't have to wander aimlessly in search of clues.

Respect the Universe of the Game

Game designers often go to great lengths to create a rich, credible other-worldly universe. Their reward is the famous suspension of

disbelieve which enables the player to become immersed into the history. It would be a pity, then, to break up the illusion with a puzzle that takes the player out of context. Too often, puzzles are seen for what they really are: nothing more than obstacles in the player's way. Some simple strategies can negate this effect.

Only use elements which are likely to be found at the location. The designers of *Resident Evil 3* took heed of this rule well. For instance, to get past a public fountain, the player must manipulate the valves in the right order to turn the water off and make way.

Use elements that are in line with the theme and time of the game. An adventure game unfolding in the Victorian era should make use of objects evoking the muffled atmosphere of secret cabinets: paper with writing in invisible ink, concealed drawers, etc. In *Journeyman Project - Legacy of Time*, part of the adventure unfolds in an amazing reconstruction of Atlantis as it was depicted by the ancient Greeks. There is no advanced technology and the player moves along in a setting reminiscent of ancient Greece. Puzzles only involve objects and crafts from that era: control a windmill, make a clay medallion, beg for a coin. The puzzles themselves are simple but contribute significantly to the sense of immersion. They are not merely an intellectual challenge, but also serve to enrich the game environment and maintain the all-vital suspension of disbelief.

Design puzzles that observe common sense. If the puzzle is to find a key that's been concealed by the landlord, it would be absurd to hide it on the other side of a brick wall! The key should be easily accessible to the landlord himself. Likewise, if a secret is protected by some sort of a mechanism, it would be obvious that its creator would not leave clues to the puzzle just lying around. Don't expect the player to solve puzzles that defy the rules of common sense.

Assist the Player in Solving Puzzles

A lot of players will lose interest and quit a game when a puzzle is impossible to break. We are in the business of entertaining people, not frustrating them. This should be on the mind of every puzzle designer.

Make sure the player has all the elements he needs to solve the puzzle. The key elements needed to crack a puzzle - objects or clues - should be found in the immediate vicinity. If a player fails at a puzzle, he knows there's a chance of finding a solution by rummaging about. He can concentrate his search on a small area and make sure to comb every inch, thus increasing his chances of finding the missing element. Encourage the player to use common sense when solving puzzles. The best way to help the player solve a puzzle is to let him use his knowledge of the real world. Finally, include help mechanisms.

Other helpful mechanisms might include extra clues. When the player spends more than several minutes in front of a puzzle and then walks away without solving it, we can reasonably infer he has been unable to break it and has decided to look for clues elsewhere in the game. When the software detects such behavior, it can help the player by adding a clue to the scene. It could be a plan or a sheet of paper containing a phrase.

A hero's personal log can be provided to store everything the player has learned during his encounters and discoveries. A convenient way to draw attention to an important clue the player might have overlooked. In *Silent Hill*, for instance, annotations and graffiti are added to the player's diary.

Outside help can be offered. If the software determines the player is unable to overcome a particular puzzle, a teammate may contact him by radio and provide a clue. When the script allows it, a secondary character may enter the scene. In *Alone In The Dark - The New Nightmare*, we designed a "radio call" button. The player can page his teammate and extract some sort of help. Alternatively, the player may request clues from the game itself. In *Byzantine - The Betrayal*, published by Discovery Channel, the player has access to a progressive help system for each puzzle. The first level of help is a single clue. The second level is direct assistance. Finally, the third level reveals the solution flat out. As an interesting note, this system enables to player to break through any type of puzzle, whether he has run out of ideas with a brain twister, or doesn't know what to do and where to go.

As a last resort, the player can have a limited number of wildcards (jokers) that let him skip puzzles altogether. This solution was pioneered by *Urban Runner*, an action-adventure game developed and published by Coktel.

Integrating a Movement Puzzle

With this type of puzzles, the player's goal is to understand how to use the décor to travel from one point to another or to overcome an obstacle. Some readers will be surprised to find this type of gameplay in an article focusing on puzzles. However, the puzzles in *Riven* or *Tomb Raider* have a lot in common. First off, there are puzzles that block the players way and must be solved in order to advance. Secondly, the player must inspect the environment for clues. Finally, he or she must use logic to understand how to arrive at his goal.

Two categories of movement puzzles can be distinguished. In acrobatic puzzles, typical of the gameplay in *Tomb Raider*, the player's goal is simply to reach an exit point such as a window or an elevation. But this goal is out of reach being too far away or too high. The player must then explore the surroundings for any elements -- ledge, suspended object, etc. -- that may enable him to "put together" a way through. *Tomb Raider* was the game that brought this family of puzzles into the mainstream. These tasks often require dexterity on the part of the player, but that aspect is beyond the scope of this article.

In environment puzzles, which are generally more intellectual than acrobatic puzzles, players are required to use elements found in the décor itself to unlock or reach a passage. The *Half-Life* series has excellent examples. In *Half-Life: Opposing Forces*, the player discovers a booby-trapped door connected to a detonator through an electrical cable. But the cable is severed. The solution is to push a metal can over the cable to restore the connection and blow the door open. These puzzles are, by definition, perfectly integrated into the game but this also makes them less "detectable" by the player. They can therefore be a source of dead ends, even if the puzzle itself is straightforward. The challenge for the designer is to devise puzzles that fit well into the décor

while clearly standing out to the player.

As there are two categories of movement puzzles there are two sets of rules that apply to each respectively. The following are the rules for integrating acrobatic puzzles:

- Level modeling: highlight important elements in the décor. Careful observation of the décor is key to cracking these puzzles. Levels should be designed to highlight important elements in the décor, such as ledges, by using textures that stand out slightly against the general background, or by employing other visual gimmicks.
- The player must have access to an observation camera to study the décor from a different angle. The *Tomb Raider* camera is a trendsetter but other types of player-controlled cameras can be imagined.
- The goal to be reached (the exit) should be obvious to the player. The designer can use a carefully chosen camera angle, a cut scene or an appropriate setting to show the player his goal.
- Use visual clues. A clue such as a flock of birds taking off can be used to discretely draw the player's attention to an important element of the décor -- e.g. a platform he must reach to continue his adventure.
- Always introduce special moves. If solving a puzzle requires a special move the player hasn't mastered yet, make sure the move is introduced first.

Next, the rules for integrating environment puzzles:

- Position puzzles in dead-end situations. This way, you make sure the player discovers they are there and attempts to solve them. In *Half-Life: Blue Shift*, the player's advancement through the sewers is obstructed by a grinder. Loose crates drift in with the current and are inevitably shredded by the machine. The player recalls seeing a crate of explosives on the dock, and pushes it into the water. The crate then drifts along into the grinder, blows it open and clears a passage.
- Prefer simple mechanisms based on down-to-earth logic. In a

realistic game universe, the player expects familiar objects to behave in a familiar way. In *Half-Life*, a rocket engine sitting on a testbed needs to be started to destroy a monster. The player is able to solve this rather complex puzzle (requiring several manipulations in different, remote locations) because he knows such an engine will definitely destroy anything with its blast.

- Group components of each puzzle so they are close to one another. If the components are too scattered, the player will need to make the connection first.
- Illustrate the effect of an object essential to solving the puzzle. If solving the puzzle requires an uncommon use of an object or machine, let the player know that it can be done.

In *Jedi Knight 2*, the player has to destroy a huge hangar door to move on, but is still unaware of this. A huge anti-aircraft cannon is located near the door. As soon as the player settles in, enemies start to come out. The player fires the weapon for defense, but since his enemies come between the cannon and the door, the door inevitably takes cannon fire, and the player can see it beginning to break down. He has discovered where he needs to go and how to get there.

Integrating a Goal Puzzle

Finally, we move to the goal puzzle. As we recall, these puzzles are ways to guide the player along the adventure by setting short-term goals.

From the developer's standpoint, such puzzles are a godsend. They provide a semblance of a script and give the player something to do. They also make a level "economically feasible." Goal puzzles often have the player travel repeatedly across a level and therefore spend more time there.

Goal puzzles should be very simple since their reason for being is not to slow the player down while in the midst of an action game. "Simple", however, should not mean poor. Puzzles like these require particular attention. The solution is good script-writing.

Consider an example from any imaginable horror-survival game. The two heroes, one of them controlled by the player, have to ready a vehicle so they can clear a dangerous area. Some components are missing: gasoline and the ignition key. Also, the player's partner reports the electrically operated hangar door won't open because of a missing fuse. We have our goal puzzle: assemble three components in order to continue with the adventure. Let's take a look at how good script-writing can turn a dull quest into a heart-throbbing adventure.

The player's partner comes from a different location. He recalls having seen an electric panel and thinks he could pick up a working fuse there. Our two heroes split up. The partner leaves to collect the fuse while the player's character goes on to explore the premises for the other two missing components.

On his expedition, the player discovers a fuel store - with the electrically operated door locked and out of order. He can easily see why. He must inspect a nearby electric panel and discover that the fuse controlling the door is missing. The player must move on with his search. He stumbles upon the body of one of the pilots. He must search it, and reveal a set of keys. The player has found the first of the three components of the puzzle: the key to the vehicle.

Immediately after this find, a distress call comes in. His partner is surrounded by enemies and is asking the player to come to the rescue. The player must turn around and follow in the footsteps of his partner to find her. Pressure is now upon the player. Calls for help, increasingly desperate, come through in his earpiece. The player needs to find his partner as quickly as possible and relieve her.

Once saved, the partner reports finding the fuse needed to open the hangar door and gives it to the player. His action has earned him the second of the three components of the puzzle.

With the fuse, the player must understand that he can open the door into the fuel store and pick up the gasoline. He must now backtrack to the electric panel that controls access to the fuel store. He must install the fuse supplied by his partner, leave it in place to make sure the

security door doesn't close back, and go search for fuel, the third component of the puzzle.

But as he gets out, enemies mount a surprise attack. A cut scene shows a large number of enemies approaching. A massive attack at this moment in the game is designed to panic the player and force him to flee without recovering the fuse! Remember, it is essential for opening the hangar door.

This example shows how a simple component-gathering puzzle can be turned around for a much more appealing spin and concludes the rules on how to design and integrate puzzles in action-adventure games.

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