Lizard Incremental (working title)

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***Abstract*—An incremental/clicker game based on lizard breeding. There are many paths the evolution of the lizards can take, developing dinosaurs and birds, eventually leading to mythical reptiles being bred, which normally brings about an end-of-the-world scenario, allowing the universe to reset and the game to start over with some buffs.**

I. Introduction

INCREMENTAL games are becoming increasing popular, but many follow in the footsteps of the clicker games that inspired the genre. As this type of game continues to branch out, their complexity increases. The breeder genre of games is not as developed, with most examples being online trading/commodity based games. This game attempts to combine the two genres. The incremental features are used to promote the core functionality of breeding lizards, instead of their value to other players. As with most incremental games, the numbers get very large relatively rapidly so players must balance reducing costs with upgrading. Unlike other incremental games, the player should feel as though they are constantly making small amounts of progress in several areas, which keeps them playing. To achieve this, each area should have both ”upward” and ”outward” progression objectives, where ”upward” objectives require progress in a different area and ”outward” progression can be repeated indefinitely to amass more of rare/limited resources.

Two etymological points of clarification are made here. While birds and dinosaurs are decidedly not lizards, this document refers to all creatures the player character can breed as lizards to simplify the terms used. This game also uses a modern cladistic definition of reptile, Sauropsida, which includes birds as they are closest related to crocodiles.

Section II discusses the design of the game, and covers inspirations, goals, and the aesthetic. Section III explains key mechanics and how they will work. Section VIII closes out the document with some comparison of other games.

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II. Design

This game is a browser-based incremental game, in the spirit of KittensGame by bloodrizer. The game focuses on the player finding lizards to breed, and then applying selective breeding to improve their lizards to achieve certain goals. As they work towards these goals, new opportunities for advancement are discovered by the player. Investing in these opportunities, the players unlocks the ability to cross species barriers, eventually unlocks the ability to breed both dinosaurs and birds. They also learn to teach their intelligent lizards to speak, leading to a lizard society. As these goals take a long time to achieve, the player must decide which areas to focus on. Do they breed for stats to succeed in competitions? Or do they breed for personality, so their lizard society can thrive? Or perhaps inbreeding has lead to genetic illnesses in their breeding population, and the player needs to introduce new genetics. These emergent goals are important in keeping the player engaged, so if breeding difficult or not fun they will stop playing.

Much of the beginning progress of the game is trying to get past the heavy penalties it provides. An important aspect of the game is risk. Almost every action has the potential to go wrong for the player. While this should almost never leave the player unable to recover, they might find that resetting is the quicker route to take.

By resetting the game, the players are granted more power and the game becomes a little more forgiving. The permanent upgrades that resetting provides encourages abandoning the run as the times required increase. As the player continues to advance, they will want to breed mythological creatures, some of which lead to scenarios that require the player to reset.

A. Inspirations

The mechanics are inspired by KittensGame by bloodrizer, and other games of the genre. Paperclips: The Decision game also inspires certain aspects of the tone of the game. The core gameplay is also inspired by Metroidvania games where an unlock in an area allows progress in another part of the game. The concept is inspired by the creator’s partner’s love for reptiles, and should showcase a passion for caring about reptiles and mad science.

B. Goals

- Push the creators game design and programming skills to the next level.
- Expand the breeding game genre.
- Increase awareness of responsible reptile pet ownership.
- Create an open-source incremental game.

C. Aesthetic

The game is largely comprised of UIkit buttons, which provides a light-weight pure JavaScript alternative to using images. The main interface is divided into three sections. The far left lists statistics such as current lizard numbers (broken down by breed), in-game currency, and timers. The middle section is the primary interaction of the game, and has tabulated sections that correspond to the ”areas” of the game (shop, breeding area, competition, etc). Each ”area” should have its own buttons and a logical layout for the content on

the page. Several areas have their own tabs, such as the shop, technology, and competition areas. The right section contains a console/log that displays important events that occur.

The game also contains a bestiary that has artist-drawn renditions of the lizards and breed variants that the player has already unlocked.

III. Mechanics

The PC, in order to fuel their herpetology passion, has trained their cat to go out and find lizards in their neighborhood. This process takes a short while (about 5 seconds, which is improvable with technology), until the cat returns and can be sent back out. Sometimes cats fail to return from an expedition, return with a dead lizard, or cannot find lizards. The player is never left with less than one cat. As the player cannot breed lizards yet, they sell off their starting lizards until they can purchase upgrades.

A. Lizard Generation

Lizards are generated from the wild with several key traits, each having an effect on the performance of the reptile in breeding, competition, and the village, as well as an impact on their price. Each lizard also has a randomly generated first and last name, a random color, as well as one of three sexes (male, female, and intersex, with a 49%, 49% and 2% chance, respectively). These traits are all generated when the lizard is brought back by a cat, bred lizards have the same traits, but their generation is determined by the genetics of the parents.

1) Species and Breed: Each lizard is assigned a species and a breed. Both are weighted arrays to ensure there are rare combinations. The species determines the natural range of the vital stats for the species, which was deduced by watching these species interact at a pet store. The breed helps to determine personality, with certain breeds being more likely to have certain personalities in the wild. Species has an impact on the price of the lizard when sold to the shop, based on the rarity of the species and the stats afforded to wild lizards.

B. Genetics and Ancestry

Lizards will be given a set of genetics that determine certain alleles. These alleles, include each of the stats, color, breed, traits, personality, genetic experience at village tasks, and genetic illnesses. Caught lizards are also randomly assigned two parent lizard names. Bred lizards have an ancestry chart that lists previous generations names, colors, and species.

1) Stats and Traits: Each lizard has three stats; speed, strength, and IQ. These stats play a large factor in the lizards performance in the competitions, and also directly add to the price of the lizard.

Each lizard is also caught with a trait, which directly impacts the lizards stats. Each trait may increase or decrease between one and three stats by up to four points. If a trait changes a stat by four, it should only impact one stat. Traits should largely be balanced between positive and negative effects, but each creating a different effect on the lizard. Some examples of traits include:

- Skittish: Speed +2, Strength -1, IQ -1
- Joyful: Speed +1, Strength +1, IQ +1
- Angry: Speed -1, Strength +2, IQ -1
- Strong: Strength +4
- Weak: Strength -4
- Ashamed: Strength -1, IQ -1

Caught lizards may only have one trait, while bred lizards may have more.

2) Personality: The lizard personality has seven axes, each with a value between 0 and 100. This comes from Ash's guide to RPG personality. These axes are:

- Outlook: Optimistic/Pessimistic
- Integrity: Conscientious/Unscrupulous
- Impulsiveness: Controlled/Spontaneous
- Boldness: Intrepid/Cautious
- Agreeableness: Agreeable/Disagreeable
- Interactivity: Engaging/Reserved
- Conformity: Conventional/Heterodox

Each lizards also gets two "key axes", which are the traits that define their personality. Lizards get a bonus to production when in job that uses a key axes.

Personality determines how successful a pairing of lizards will be when breeding, but also have an impact on the village and competition. For example, a lizard who is more controlled than spontaneous will gain EXP at a higher rate the longer they perform a task. The more extreme the value of the personality axes, the more the impact it has. A lizard that is 1% controlled will see significantly less EXP gain from continually performing the same task. Most jobs are also performed better by lizards with certain personalities.

C. Lizard Identification

As soon as the player has caught a lizard, the ability to identify the lizards is unlocked. Identification takes the form of a button that has a few seconds of cool down (this can be improved with technologies and items from the store). Identification initially only reveals limited information about the lizard: color, name, species, and breed. As progress is made in the game, more features are revealed at identification. Certain features, such as personality, genetic illness, and stats require the lizard to undergo testing, which makes the lizard unable to do any other tasks during that period.

D. Breeding

Breeding is the process through which lizards are paired and their traits "distilled" into new ones. It is also the process that can be used to transform the lizards into other branches of reptile evolution. The lizards are NOT having sex, instead the PC has invented a machine that replicates lizard DNA and simulates sexual reproduction. Breeding only becomes available after certain technologies and shop items have been purchased. While real lizards may lay up to 20 eggs in a clutch, the method the PC has developed to breed lizards allows only one per clutch but nearly instant birth.

1) Compatible mates: Because lizard DNA is being cloned, the sex of the lizard is irrelevant to their ability to mate. The lizards are required to sit together in an enclosed space for a long time, so lizards with a low compatibility will fight which renders the breeding unsuccessful.

To determine compatibility, there are quite a few considerations. Lizards with personality scores that are within 10% of each each on 6/7 axes and lizards that are within 5% on 5/7 axes are "soul mates". Lizards that scores that are inverted within 10% on 6/7 axes and 5% on 5/7 axes are "mortal enemies". Soul mates and mortal enemies have a 100% and 0% base chance to mate, respectively.

All other lizards compatibility is expressed as a chance of successful pairing. Lizards get along best when they have similar key axes, but all other axes dissimilar ("Opposites attract"). The lizard with the lowest compatibility score is deemed the "dominant" parent, and their value is the determinate of success. The offspring also adopts this parent's last name.

Inter-species, inter-clade, rare, and mythological pairings all incur a flat reduction to successful breeding. These reductions are additive with one another.

Technology upgrades can decrease all breeding penalties. Research can also be done to provide boosts to successful breeding of certain species, and eventually provide a boost to all pairings. Technology can also increase the success rate of both soul mates and mortal enemies, as well as reduce the chance of lizard death on unsuccessful breeding. The shop has an item that unlocks the ability to see the exact percentage of success while trying to breed lizards. Before this item is purchased, the PC makes a guess as to how the lizards will get along.

Pairings with a success rate at or below zero are never successful, and may cause a failure in the machine that can either lower the success rate of future pairings by between 9% and 25% for a period of time or prevent the machine from being used (while it's being cleaned) for a period of time. Pairings with a success rate at or above 100% are always successful, and provide a bonus to the offspring. This bonus may be increased trait carryover or a percentage bonus to stats.

Every unsuccessful attempt to breed has a chance to kill at least one of the lizards. Compatibility percents below 70% have a chance related to their success rate, with higher values leading to a lower risk of death. Pairings with under 15% compatibility have an additional chance to kill both lizards. Values 70% and above have a low flat rate of death.

2) Genetics: There are two methods of inheritance: simple and complex. Generally, simple inheritance is for things that should stay relatively steady, while complex inheritance is used for systems that have intricate interactions. Simple inheritance is used for genetic experience, stats, traits, and personality. Complex inheritance is used for color, breed, and genetic illness.

In simple inheritance, the "dominant" parent determines the base values of the genetics, while the other parent acts as a modifier. The dominant parent generates a range of numbers that the value could be between. If the second parent's stats are within the range, determine which quartile of the range they fall in. The offspring's stats will be within one quartile higher or lower than the second parent's value. If this would give the offspring a number higher or lower than the range, extend the range by the size of each quartile. If the second parent's stats are outside of this range, add or remove the standard deviation of the two parents to the generated number. The goal of this process is to typically generate better lizards, so the chance of a worse offspring should be fairly low.

Complex inheritance system uses Mendelian inheritance. Each lizard has a set of genes that corresponds to their phenotype. The genotypes of the parents are placed into a Punnett Square to determine the probability of each possibility.

3) Species progression: After some research, the PC is able to buy the parts they need to upgrade their machine to breed lizards of different species. At first, this will be used to increase the stats of specific breeds by cross-breeding them with species that have better stats or that can be sold for more.

By breeding specific species (and traits) with one-another, the player will have the chance to yield rare lizards. These typically have better stats than their common counterparts.

After an upgrade to the machine, the PC discovers they may use catalysts to enhance the breeding of two lizards. These are obtained through cat expeditions, and extremely powerful and rare ones can be bought from the store. Catalysts typically provide a percentage for an advantageous effect, such as a +1 to speed, or 15% bonus to rare lizard generation. Rarer catalysts, when combined with the correct combination of species can yield rare or mythological creatures. Most recipe books are available from the store, to help guide the player into these combinations.

Eventually, after more research, the player unlocks the ability to regress evolution. Regression always requires a specific catalyst, and follows a specific evolutionary chain. After four regressive evolutions, the PC has bred the Sauria, the most recent common ancestor of reptiles and dinosaurs. When the Sauria is bred with a lizard, it creates a dinosaur. To breed more species of dinosaurs, and to introduce genetic variation, the player must repeat this many times.

Later still, the player can repeat the process by breeding a Sauria with a dinosaur and a special catalyst to create birds. With all of these options finally open, the play can build the recipes that breed end-game and mythological reptiles.

4) Genetic Illness and Inbreeding: The breeding mechanics encourage selective breeding to get specific breeds, traits, and increase stats. There are two systems in place in order to stop players from abusing the breeding system with pure numbers: inbreeding and genetic illness.

Inbreeding encourages the player introduce recently-caught lizards to their bred populations. As populations become more related, they will start to exhibit negative traits. These negative traits the stat range provided while mating, as well as the success rate of breeding. These reductions start relatively benign and increase rapidly.

Genetic illnesses are more subtle than inbreeding, their goal is to get the player to pay close attention to how they're breeding their population. These illness range in effect from putting a cap on stats to introducing traits. In the early game, these cause offspring to occasionally be "duds", and increasing

the number of carriers. Eventually, the player learns it was genetic illnesses causing these duds, and may choose to breed the illnesses out of the population.

Technology is available to show the percentage of inbreeding of a chosen pair, as well as determining if a lizard is a carrier of genetic illness. Players can also research improvements to the machine that reduce the chance of offspring developing genetic illnesses, and reduce the negative side effects of inbreeding.

E. Store

After you identify your first lizard, a person in your neighborhood opens up a shop and offers to buy lizards from you in exchange for in-store coupons. They have cats up for adoption, and suspiciously always seem to always have what you need in stock.

The store is mostly dedicated to selling upward advancements that progress the plot. This is to help centralize progression, to keep the player from getting confused as to their next step. These are items that can only be purchased once per rebirth. Several avenues for progression are offered at once, so the player must choose how to progress. It also sells items that have a semi-permanent effect on mechanics, and items that carry onto the next rebirth.

Some items can be purchased an unlimited number of times. These items increase the speed at which the game can be played. Purchasing an additional cat, for example allows the player to collect another lizard on each expedition. The marginal cost of these items increases rapidly, which encourages the player to find ways to lower costs or rebirth.

Items may require rewards from various parts of the game, such as lizards with certain traits, certain research, or items obtained from competitions. It should be clear how to acquire these items from the description.

The store has a multiplier to cost, which can be reduced using research. As the player buys more items, befriending the shopkeeper, this multiplier very slowly decreases, this effect carries through rebirths.

F. Technology

The technology section encourages both upward and outward play. Players unlock technology after purchasing a science kit from the store. No research carries over to the next rebirth.

After obtaining a science kit, you put in in the corner of your room and when you have a new idea you jot it into the journal, which generates a steady stream of ideas. These ideas are then spent on upgrading game mechanics. The player can increase the generated ideas by researching certain technologies, purchasing certain items in the shop, or upgrading the village.

G. Competition

After spending more time in the reptile community, you learn about a local lizard group that holds competitions, where lizards compete for prizes. After purchasing an entry token from the shop, the PC can enter their lizards into these competitions.

There are several leagues to determine which lizards may participate in them, they are: Small, Large, Common, Dinosaur, Bird, Rare, Mythical, and the Master's League. There are competitions for each individual stat, as well as competitions for each combination:

- Speed: Sprints
- Strength: Block-pushing
- IQ: Bug tik-tac-toe
- Speed and Strength: Endurance race
- Strength and IQ: Puzzle
- Speed and IQ: Hide-and-seek
- Speed, Strength, and IQ: Obstacle course

This amounts to a total of 56 competitions. The Small, Large, and Common leagues are available as soon as competitions are unlocked, while others are unlocked as you unlock a reptile in that category. The Master's League is only available to breeders who have won every event in the previous leagues, and must be won with a single lizard.

Completing each competition rewards coupons, while completing a whole league awards permanent items. Only the Common League is required for advancing the plot, and awards the items that unlocks regressive evolution. All other items provide boosts to various functions, increasing in reward with the difficulty of the league. These items stay after prestige. If more than one is obtained, their effects combine.

Each event is ruled by one of the personality axes. The more extreme the personality value for that axes is, the easier the competition is for the lizard. Lizards whose personalities are milder in the axes will compete against harder opponents.

Competitions are not easy on the lizards, and they may get injured. These injuries may be permanent or temporary, and reduce stats or fitness for breeding.

Technology that reduces recovery time from injuries and technology that reduces the chance of injury are available. The shop also sells items that can be used to instantly heal a lizards injury, but these come at a hefty price.

H. Village

The PC realizes that the hyper-intelligent lizards they are breeding could probably understand human language, if taught. This process takes some time. The lizards that are taught language are able to do small tasks for the PC, assisting with the breeding process by herding their fellow lizards, writing down ideas for the PC, and taking care of cats to reduce the time it takes for them to return to the hunt.

After the player has collected 5 - 7 lizards that understand language, the lizards start to form a primitive society. Understanding that they need the PC's machine, they agree to continue helping the PC if the PC will help them advance their society. They dream of a world where lizards and humans coexist in peace. This unlocks resource collection. As the lizard village is developed, the lizards effectiveness in all other tasks also increases.

The lizard society requires a leader position, and the perfect leader is a rolling-average of the personality of all the lizards

in the village. This leader acts as a representative between the village and the PC. A perfectly fit leader will provide a 10% bonus to all village tasks, while a perfectly unfit leader will provide a -50% penalty to all village tasks. A village with no leader has a -75% penalty to all tasks if there are fewer than 15 villagers. If the village has more than 15 villagers and no leader, lizards may be assigned to tasks but will refuse to work.

Personality also matters for the tasks the lizards are working on. An intrepid lizard will prefer dangerous tasks (logging, mining, leadership), while a cautious lizard will prefer safer tasks (research, cat monitoring, facilitating breeding). Engaging lizards will prefer working in large groups, earning a bonus for additional lizards working besides them, while reserved lizards will have a penalty for the same. There is an option in the menu to enable "easy management mode", which will always choose the second or third best option when assigning lizards.

Lizards gain job-specific experience points for performing tasks for a period of time. The more they enjoy the work, the higher the gain in EXP. Controlled lizards gain more EXP the longer they stay in a job, while spontaneous lizards gain less EXP the longer they stay in a job. Lizards advance through the ranks for each job: Unskilled, Skilled, Talented, Master, with each providing an additional bonus to job performance.

As the village grows, there is a chance that others hear about it. This may bring positive or negative events to the village, depending on who has heard about it. It may bring elusive mythological reptiles looking for a safe haven, or misguided humans seeking to destroy what they do not understand. Some events happen spontaneously, while in others the player will be asked to intervene. When the player intervenes, the choices they make will determine the outcome of the event.

Also of note, is that the words "lizard people" should not be used, nor should there be any mention of lizards controlling human politics. This term and conspiracy was popularized by David Icke, and draws on a lot of anti-Semitic rhetoric.

I. Endgame / Prestige

Relatively early in the game, the PC is visited by an other-worldly lizard-like creature. This creature warns the PC that the choices they are about to make will have a profound impact on the world. In order to ensure that the balance of the universe is preserved, they have created a point in time that the player may return to, before the player "started on their path". The player may prestige as soon as this happens. During endings that cause the end of the world, the PC is transported back to this time. On all other endings, the player may keep playing as long as they would like, to finish tasks or reach milestones.

As the PC returns to the point in time, they are once again visited by the other-worldly creature. The creature mentions that "the parameters must not have been right..." and implies that it seems to gain more power based on the choices you make. It offers the player the chance to allocate some this power to change the world on the next run.

The bonuses offered to the player are powerful, but expensive in terms of this being's power. They are all permanent, and any remaining points carry over to the next reset.

Eventually, it is revealed the creature is the PC, and needs the player to unlock the true ending where so it may continue to exist. This can only be unlocked once the player meets certain criteria, including beating the Master's League, researching an advanced technology, and buying an item from the shop.

J. Challenge Difficulty

It should take a while to progress in the game. The player should fairly often reach a point where they can progress no further without resetting. The multipliers this reset grants them should enable the player to advance further, until they reach another reset point, as well as increasing the speed at which players return to the point they reset at.

To encourage this, costs must show polynomial growth. Technology, bonuses, and multipliers will provide an edge, but should not on their own be enough to buy more than a few more cats or village huts.

IV. Monetization

This game is intended to be played in the browser and released open-source. Monetization is not a priority, but a few possible strategies are discussed here.

A. Platform releases

This is the most likely avenue for monetization. As the game is written on web technologies, porting it to various platforms and charging for those copies would be reasonable. If a player wants a downloadable version of the game, they can pay for it on itch.io or Steam.

1) In-app purchases: If ported to a platform that allows in-app purchases these could include powerful multipliers or unique creatures for the player to permanently have. These could also be any of the suggested paid features.

2) Mobile: A mobile release might be possible, but the calculations might be too advanced for some devices if they remain client-side. Careful consideration of performance should be performed before this happens.

B. Paid features

There are several avenues for paid features in the game. Nothing suggested here should limit advancement in the game without payment, but provide additional "quality of life" style upgrades.

- Subscription-based online backup
- Subscription that provides steady boosts
- Keeping a lizard after a reset
- Keeping village/technology/shop upgrades after a reset
- Lizard of the month

C. Expansions

There are two avenues for expanding the game. The core system could be re-used for a new game, perhaps breeding some other animals or a plant breeding game. This would reduce development time for the next game, increasing the marginal revenue of any sequel.

Players might also pay to spend more time with this game. Content packs that increase the complexity, such as adding more lizards or expanding to crocodiles or even ”the mammal update”. This would likely require some sort of account system, to keep track of users that upgraded to these expansion packs.

D. Advertising

Any hosted version of the game could feature advertising on the page. This requires the game to be hosted somewhere, which incurs costs. Advertising would need to be able to cover these costs. If the game is popular, this could lead to a profit, but the costs still increase as viewership does.

V. Conclusion

This game draws and expands upon concepts explored in other games. Some might be reminded of the breeding aspect of Pokemon, where competitive players need Pokemon with perfect IVs to remain competitive, and how natures have impacts on stats. Of course, the focus of Pokemon is not on breeding the titular animals, but instead on battling. There are a good number of other games that have breeding mechanics, but many are older or multiplayer only. Another recent example, Niche: A Genetics Survival Game, is turn-based, but does have some rouge-like elements. Hopefully this fresh take on two existing genres will inspire players.