

## Background

*Grabin* is a unique computer game project started by myself as a 'mod' for the computer game *Unreal Tournament 2004*. To explain some terminology here, a 'mod' simply means 'modification'- essentially a facelift for a game which uses the underlying game engine code to build a completely different experience, almost an entirely new game.

Of course, game mods constructed by enthusiasts such as ourselves cannot be sold for profit- to do so would require a game engine license priced in the hundreds of thousands. However making a game mod is not a purely masturbatory exercise. Firstly it is there as an entertainment based application: free distribution of a whole new game to anyone who is interested. Most importantly, however, its creators gain experience in the games industry, and if the mod is successful and original enough it could even lead to employment with a multi-billion dollar game development company.

My mod is titled '*Grabin*', an unattractive name which references a colloquial term for an old game I used to play. Though the name sounds bland, the concept behind *Grabin* is hopefully quite original. Simply put, it aims to add a more skilful element of gameplay to the usual 'kill everyone' game type. In *Grabin*, players must draw on the screen with their mouse to do most actions in the game. Movement is fairly standard for a first person shooter, but to attack, protect yourself, fly etc, and even open doors, you must 'gesture' the correct symbol with your mouse to perform the desired action.



Figure 1: *Black and White's* Gesture System

Games in the vein of the infamous '*Black and White*' or the role-playing game '*Arx Fatalis*' used gestures as a means of spellcasting - 'drawing' a shape on the ground or in the air would cause some resulting spell. These games were hugely successful and sold in the tens of millions, not to mention winning literally hundreds of awards (Lionhead, 2003 and Arkane, 2001), perhaps in part for these unique interactions. *Grabin* aims to take the concept of gesturing and extend it to an entirely more expansive and powerful mode of gameplay.

The environment in which *Grabin* takes place is planned to be very different from the realistic approach most games currently have. Objects will behave unexpectedly physically and interactively, gravity will suddenly change direction, walls will close in on you, perspective will play tricks with your mind. Suffice it to say that *Grabin* will be based upon a virtual world with a whole new set of laws.

## Summary

A 'museum' highlighting the uniqueness and gameplay of *Grabin* will be constructed and released before distribution of the finished game. As it reflects a sort of 'half release' of the final game, the name *Half-Grabin* is an apt title. It will give gamers a chance to see what is in store, suggest improvements to the game, and will build interest in anticipation of the game's release. In doing so, the long term release of *Grabin* will become more widespread and polished, and its authors will gain reputation and recognition within the games sector, becoming more industry employable.

## Rationale

If we are given the most readily accessible and simple definition of the term 'museum':  
*A building, place, or institution devoted to the acquisition, conservation, study, exhibition, and educational interpretation of objects having scientific, historical, or artistic value* (Lexico, 2004).  
Our minds conjure a variety of historical connections and images of old men in bland suits. Of course this stereotypical museum, the history / art museum, is of interest to only those interested in history or art: indeed, a particularly narrow clientele.

Webster's provides this more abridged offering at the start of its take on the word:  
*A temple of the Muses, hence, a place of study...* (Porter, 1998)  
In this sense, we consider the term 'museum' as simply a place of learning. The act of learning being straightforwardly the process which occurs *To gain knowledge, comprehension, or mastery of through experience or study...* (Houghton, 2000)

If we are to think of these two definitions together we are left with the idea that a museum can be primarily designed to provide learning to its patrons. Knowledge, comprehension and mastery can all be presented and offered in a museum.

But mastery and knowledge of what? In most cases a museum teaches the rules, facts, history and laws of our world. For the case of this proposal, let us take the notion of a science museum- a space designed for the sole reason of educating young minds. Usually the mode of teaching in such a situation is through interaction. Patrons or users wend their ways between various exhibits, acting on them (constrained by the nature of each exhibit) and gaining knowledge.

What specific facts does a science museum teach us, though? How objects react to touch, external influences and other objects... gradually building up a picture of how the world acts and reacts- the nature of the world we live in.

This is perhaps the primary reason that few people find art and history museums interesting- the knowledge gained in them is not *useable*. Learning in a science museum is immediately applicable to someone's surroundings. Thus, it becomes a tool to make life easier, and something worth persuing.

The fundamental problem with a science museum, however, and one which makes it so entertaining for young children, is that it is only engaging for a user *so long as they are learning*. Anyone older than age 8 probably gleans less enjoyment from such a museum, or even none at all. But the concept of a science museum is sound. It is the prior knowledge within us and the easily learnt nature of our world which makes it boring after only a short while. Once one knows everything demonstrated in a science museum, what is the point of trying to learn more about it? With this in mind, we can make the notion of a science museum more entertaining and extend our audience not by extension of the museum, but rather by changing the laws and rules of the world on which it is based.

The next step is to apply a 'science museum' aesthetic to the world of *Grabin*. The game universe is perfect for such a setup. The virtuality of the world permits a whole new set of physical laws to be defined, as well as a whole set of different ways to interact with the user's surroundings.



Figure 2: The *Half-Life* Hazard Course as a Simple Instructional Museum

Anyone who has played the hugely successful and critically acclaimed *Half-Life* will probably remember the 'hazard course' - a tutorial level which is supposedly played before the actual game begins - designed to teach the mechanics, movement and nature of the gameworld. In this sense, the *Half-Life* hazard course is a museum, or more specifically a science museum. However, the entertainment gleaned from this, and hence the playability of it, was limited by the nature of the *Half-Life* world itself. The tutorial 'museum' was really only teaching interaction within a 'dumbed down' version of our real life universe. You could run, jump, hit things and shoot... and as such, coupled with its linear nature, it became boring soon after the basic controls had been mastered.

The secondary failure, or perhaps an overlooking of the *Half-Life* hazard course was that it was not released before the actual game. If it had, it perhaps would gain an important role in extending awareness of the game's existence as well as building up a *Half-Life* fanbase before the actual game had even been released. This approach could possibly be much more successful than the usual 'game demo' method. Such demos usually consist of a much more constricted picture of the final game, more a small taste of what is to come than a complete experience. Releasing *Half-Grabin* as a museum rather than a demo can give a much more diverse look at what is to come in *Grabin*, with 'exhibits' detailing most facets of final gameplay.

## Product

The *Grabin* museum will exceed against other game demos and interactive museums by expanding playability, not only by being non-linear - for such a notion of freedom to move between exhibits runs parallel to most definitions of a museum (Gompf, 1999) - but also simply by teaching about the *Grabin* world itself. The depth of the learning process, as well as the entertainment value in a world which abides by only a scant few of our own laws, is perhaps at its highest in the universe of *Half-Grabin*.

In fact, the museum *Half-Grabin* will not only teach the mechanics and laws of the gameworld in the exhibits themselves, but the act of actually travelling between exhibits will be part of the learning act. Players will be required to figure out what the strange symbols on the ground and walls mean, how to use those symbols with the gesture system to provoke some world action, and how to cope with the consequences of that action.

*Half-Grabin* then becomes in a sense more educational than a real-world science museum. In a science museum, you are learning something discreetly at each exhibit. In *Half-Grabin*, problem solving elements emerge, as the successful use of one exhibit may be necessary to understand another. The primary difference though, is this notion of 'learning by travelling' - if some of the knowledge gained at one exhibit is necessary to even *move on* to another, then we see the world itself as the main exhibit, the smaller exhibits as tools to learn interaction and player discourse within that world.

What needs to be primarily acknowledged though is that *Half-Grabin* is as educational, if not more, in the virtual world of *Grabin* as a science museum is in reality. They both teach us the rules and constraints inherent in their universes, and both leave it to us to apply what we have learnt to further our agency within those realms.

At this point it is worth noting the structure of the *Half-Grabin* space. Wayfinding and navigation within the museum will at times be fairly intuitive, but at others require some problem solving to proceed. The use of a virtual space, that of a computer game, gives us many different ways to expand

the museum, not necessarily in the usual way. Halls can lead upwards instead of sideways, players can fall to dizzying heights without getting a scratch, and generally as in all virtual environments, space can be structured however we wish. There are no budgetary concerns on how much the museum will cost to build.

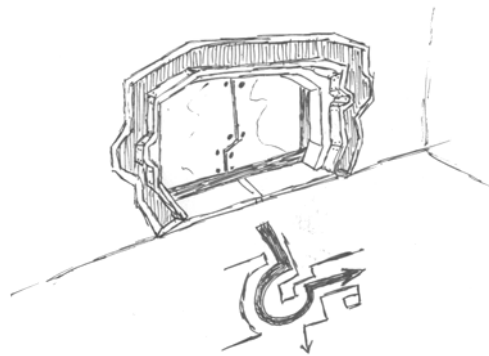


Figure 3: Signage in *Half-Grabin* is More Open to Suggestion

Signage within *Half-Grabin* takes on an interesting turn, again by use of the gesture system. Instead of arrows which direct players around the museum and notices which tell them where they are, in *Half-Grabin* there will be strange shapes etched onto the walls, ceilings and floors to tell them what to do. This knowledge will not be readily apparent however, and a degree of problem solving is required to match the symbols up to some action (or gesture) and some object to enact it upon. This again helps players learn the nature of the world they find themselves in.

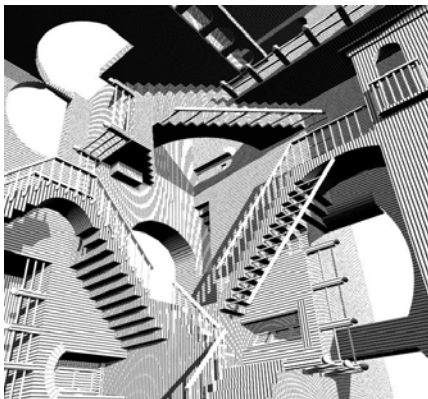


Figure 4: Exhibits like Escher Drawings can Be Created and Navigated by Changing Gravity



Figure 5: More Modular Exhibits like Fireball Combat are Possible

The nature of each exhibit in *Half-Grabin* will be greatly varied from installation to installation. Some exhibits may appear very modular, such as one where you must enter a room to practise throwing gesture-summoned fireballs at an AI opponent. Others may be more intrinsic to the landscape – such as changing the direction of gravity to safely navigate a confusing upwards and sideways oriented passageway. There will be many different types of exhibit and puzzle in *Half-Grabin*, some will be very obvious, some will be subtle and an approach will need to be worked out before proceeding into them.

Grouping these exhibits is a matter of randomness. Since each is principally teaching an element of gameplay or interaction to the player, the only ordering which needs to be done is in case of some linear progressions of exhibits. For example, an exhibit which teaches how to open doors would have to be presented to the player before he or she is able to open doors leading elsewhere. This does not necessarily need to disrupt the non-linear nature of the museum – it can instead serve as a way of teaching the player. If they fail at something, they must return to an earlier point to learn the skills required. These exhibits are then grouped within the main exhibit – the museum itself – and serve as tools to understanding it in whole. Players construct their own narrative sequence while moving throughout the museum and looping back to earlier points. In time this serves to heighten the interactive experience.

Of course this alone will not be enough to make users interested, and to *keep* them interested. The notion of replayability is important here. The exhibits in *Half-Grabin* will, at most points, be unsolvable. That is to say, there will be no apparent 'end' to each – a player can continue to interact with them for as long as he or she wishes. This keeps the core gamer interested, by providing primary motivation to beat the game, as long as the gameplay is interesting and above all challenging

(Adams, 2001). These exhibits also provide great variety in gameplay, not just in measure of the number of exhibits, but in the structure of each. Each exhibit behaves somewhat randomly, and it is in fact possible to provide completely non-deterministic behaviour and opponents (Adams, 2001) through *Unreal Tournament 2004's* advanced bot AI.

*Half-Grabin* is scheduled for final release at a date preceding the release of *Grabin* itself. It will be circulated throughout all the major computer gaming hubs, such as gamespy and planetUnreal, well before the polished game itself comes out. In this way a fanbase can be manifested through the use of forums and chat services, gamers will become interested in seeing a final product, and any suggestions on game improvements and enhancements can be taken into consideration.

## Technical

It is worth taking a moment to elaborate more specifically on the nature of *Grabin's* gesture system, and the limitless possibilities it invokes for the *Half-Grabin* exhibits.

The gestures themselves are based on an 8-directional system. We have a circle, cut into 45° sections, which we number from 1-8 in a clockwise direction.

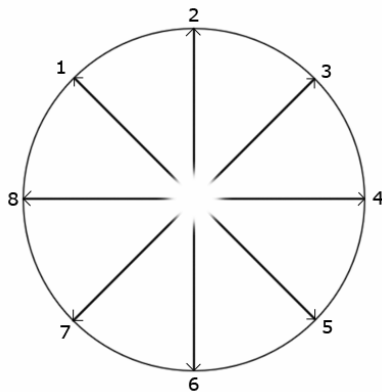
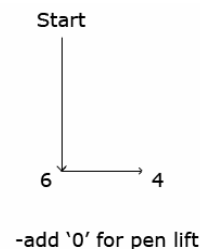


Figure 6: *Grabin* Directional System



resulting number = 640

Figure 7: Drawing an L Shape

We then push these numbers onto a simple data stack, which for all intents and purposes can be thought of as a big integer. As we draw a shape, we add the numbers to the back of the old number, using zero as a marker for when the pen is lifted (to get multi-shape gestures). For example above, when we draw an 'L', we get the number '640'.

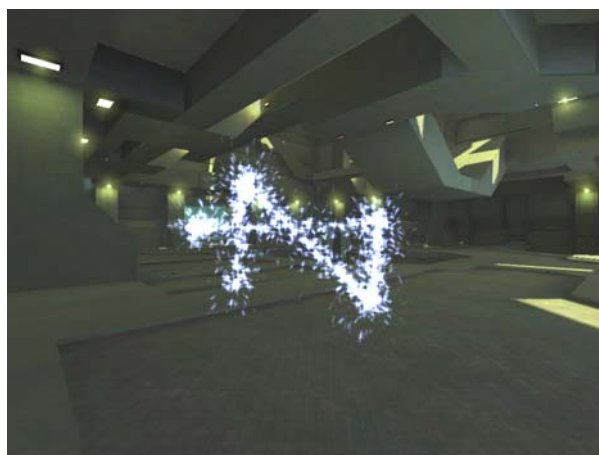


Figure 8: A Test Build of the *Grabin* Gesture System in Action

The beauty of this system is its simplicity. This number is then sent to the player, an object in the world, a creature or even a weapon, and that object is then free to interpret this number however it wishes and execute any action based on it. The same gesture could do completely different things on different objects, or could mutate into another gesture, or could require a series of different gestures. We can even have curved gesture shapes, for example a 'C' shape would read as '876540'. The implementation of what each gesture does is left up to the creator of the varying objects, and so we have a limitless application of the gesture system.

Applying this system to objects and entities in the gameworld is then a very straightforward process. Using the *Unreal* engine as a base for the mod makes development much easier, as this game engine

has always been distributed completely open source. Simple code hacking through object oriented programming and basic inheritance could utilise the gesture system to change *absolutely any facet of the gameplay*. This means that player movement, interaction and physics, world gravity, action, reaction and fluidity, air density and composition and enemy behaviour, AI and movement are all valid targets for complete remodelling, and can each be totally effected by player gestures. The only limit on what can be achieved is my imagination, and the *Grabin* world can be totally unlike reality.

## Audience and Domain Information

The development of *Half-Grabin* as a computer game in particular, is the major key to understanding its audience and reception, as well as how well it will achieve status as a museum.

In developing it as a game, we are implicitly defining its audience as gamers – those ‘hardcore fanatics’ who go to LAN parties and play games on the internet. Indeed, *Half-Grabin* will feature multiplayer, and will be playable over any type of network which *Unreal Tournament 2004* is. This provides us the possibility of cooperative games, even ‘guided tours’ in which players move freely around the museum trying to solve exhibits, but for the purposes of this document I digress.

*Half-Grabin’s* take on interactivity may also interest interaction designers and practitioners as part of its audience (for the entire notion of the gesture system is a unique way of interacting with an environment and certainly a unique development of interactive technology). If this is the case, it will most likely be regarded as less an entertainment and learning piece and more as an academic prototype. Perhaps this indicates some noise as to the purpose of the project, in fact *Half-Grabin* probably incorporates a little of both purposes. There is also the worry that it will be interacted with differently in such a light, but hopefully the project’s nature will prevent this from being a problem. I anticipate that much fewer designers will be interested by the project than gamers in any case.

*Half-Grabin’s* game aesthetic should itself be enough to cope with most noise generated by its viewers. Gamers will play it because they want to see an interesting game, and that is enough to get them started. What keeps them interested is replayability and the uniqueness of the *Grabin* world. Other games, such as *Black and White* and *Arx Fatalis*, have succeeded extremely well, because of these reasons. The limited gesture concept in both games was widely regarded as innovative and a huge step forward. *Half-Grabin* can only go on from there.

In the very simplest terms, *Half-Grabin* works as a museum because it teaches players about the *Grabin* universe. Whether or not it is understood by those playing it to be a museum is irrelevant, and probably unlikely. The old adage ‘does one need to know how a car works to drive it?’ sums it up reasonably well. *Half-Grabin* is a museum as above explained, because it is teaching players through various explorations and interactions how to best act within the *Grabin* world.

Its game aesthetic is also a powerful tool in providing learning stimulus and focus in general. It provides for execution of true multi-modal design practises, as player and enemy characterisation are possible, along with complex multi-narrative and engaging sound, music, colour, motion and perceived tactile sensations through use of game texturing and shaders. Computer games also embrace multicultural boundaries, particularly in the case of *Half-Grabin*, where little to no basis on the real world keeps it free of stereotype and marginalisation.

*Half-Grabin* provides procedural knowledge of the *Grabin* universe, through both interaction and experience. We see predominantly the experiential form of learning in *Half-Grabin*, which is arguably the most effective way to teach players. The game aesthetic provides the greatest involvement for players, embracing ideas at every node in the experiential learning cycle. It engages and interests its whole audience, with no emphasis on their learning mode.

## Development Plan

The development of *Half-Grabin* will occur in phases. The primary deliverables for stage one are a working gesture system, as well as the required codebase and documentation to extend other world objects to use the system. Developed items at each phase will be as follows:

1. Compiled and tested code for the gesture system, along with necessary documentation on how to expand it.
2. Final gesture system and effects, as well as a few gesture attack powers.
3. Some interactive object classes, along with their 3d representation and texturing.
4. A basic museum layout map with environmental noise, textures and effects which can be moved around in freely.
5. Augmented museum with full interaction, exhibits, objects and decorations. Gesture system which totally changes and controls most aspects of the museum's behaviour.
6. Public release and testing.

Phase 1 will comprise all the code which goes to make up the gesture system, including the vector maths to drive it, variable passing to other objects, and the effects which display when drawing gestures. All the code will be fully documented so that it is easy to understand and reference back to in later stages. A document will also be created to explain how it works, and how to extend other game objects to take advantage of it. In addition, a website will be set up with project details and progress so that a fanbase can be started and interest provoked.

Phase 2 comprises the more aesthetically pleasing elements of the gesture system, such as 3d modelling and animation, and some more effect creation. Effects such as the player's arm drawing the gesture onscreen will be created in this stage. Attack powers will also be created, so that the gesture system can be fully tested. At this stage a basic fireball and levitation power are planned to be built and fit within the gesture system so that players can summon them by gesturing.

In phase 3, creation of other world objects to be interacted with begins. A door with a variable opening gesture will be created, as well as an elevator which ascends or descends at different rates depending on the gesture invoked by the player. By the end of this stage, foundations will be laid and tested for the player to interact with the world through gestures.

Phase 4 is the first mapping stage, in which the museum will be constructed along with supporting world detail models, textures, ambient noise, sounds, music, effects and misc geometry / animation.

In the 5<sup>th</sup> phase, the interactive elements from stage 3 will be placed into the museum, and further interactive elements will be created and implemented. Exhibit ideas will come to fruition, be created and be tested for playability. Random object behaviour and some AI will be introduced, and put into exhibits which they fit into. 3d modelling, texturing and animation will have to be used for the creation of new objects, enemies, friends and other AI constructs and world items. Further gestures will be created to control all manner of game features, such as wall climbing, gravity changing, surface friction and air buoyancy.

The final phase encompasses all the necessary publicity, distribution and circulation of the final work, and the feedback from it which will better develop the final release of the finished *Grabin* game.

Prior to a full fledged development effort, a prototype version of the *Half-Grabin* museum will be constructed for a feasibility test. This prototype will comprise the key elements of the museum which it requires to minimally function as a unique experience. Phases one and two will both be included, with phase three as an optional extra if ahead of schedule. This prototype will give a good idea of how the finished product will function, and can be used to establish whether future development is desired. The later phases' more time consuming and aesthetic elements of *Half-Grabin*, which do not provide core functionality, will be left for development following a working prototype.

With the nature of the project being a 'home grown' game museum, costs can be kept to an absolute minimum. The choice of the *Unreal* engine is important, as this game engine is distributed freely and completely open-source. All other required programs such as code editors, graphics programs and 3d modelling and animation packages are already purchased, and as such require no additional costs. The estimated fiscal burden for this project is a meagre \$200AUS, for webhosting and general publicity costs.

## Timeline

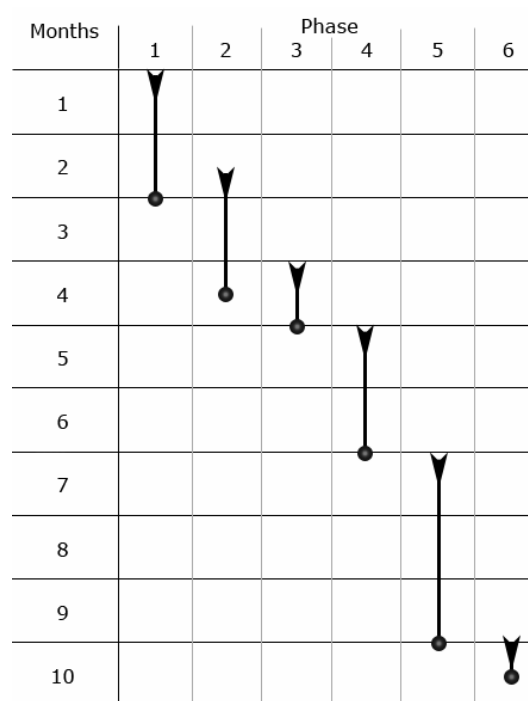


Figure 9: Half-Grabin Completion Estimated in 9.5 Months

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