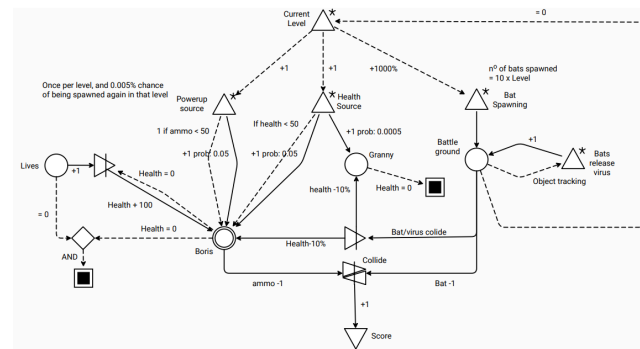


Marking Criteria	Describe how your game matches the criteria (Description of each item is limited to 50 words)
Game design matching the 'Covid-19 Fighter in the UK' theme (5%)	
Justification of the choice of game type:	The game is based on the 1978 game space invaders, a classic arcade style game with bats instead of aliens, and Boris Johnson shooting vaccines instead of a cannon. There are some more elements to my game, including powerups etc.
Game story:	The year is 2022. After an unsuccessful global human immunisation program, the bats have returned to infect us with many of their new Covid strains; The only solution is to now vaccinate the bats. The new Durham AstraZeneca vaccine promises to stop Bat-human transmission. Your job is to immunise the bats before they reach the vulnerable. Good luck.
Core development and implementation (30%)	
Game scene (visual representation [2D, 2.5D or 3D], internal data structure):	The visual representation is 2D; with an in-game representation with respect to the internal data structure, a dictionary <code>gameState</code> contains a series of variables that represent all game objects; so, a totally new scene can be constructed with all the objects and their existing methods.
Game flow and how it is designed (e.g., navigation, screen scrolling, levels):	You start on a main menu screen where you select the level at which you start, the level determines the frequency speed and aggressiveness of the bats, and so is therefore more difficult. You progress to the next level by killing all the bats in that level without running out of Boris's lives or the granny losing all her health. You play until the above conditions are met and your score is the number of kills you achieve and the level you reached. The game is over and you return to the main menu.
Game interaction (e.g., action detection and response generation):	When a bat has collided with a vaccine it performs an animation and eventually poofs and produces a sound. Collisions are detected between bats/virus's and the player/granny. The granny walks between the two bottom corners of the window, she turns around when she reaches the wall. You are also able to pick up more 'ammo' powerups and both the player and the granny are able to collect health powerups; and these are reflected in the game play.
Game object (e.g., use of sprite, 3D objects, animation, multimedia):	All game objects are essentially sprites, with the exception of 4 rectangles drawn to represent player and granny health. I made this game from an object-oriented perspective so, each game object have some inherent attributes and methods as well as custom ones, such as shooting; or having a health. Each sprite is given their own image, and some are animated, bats perform an animation for when they are alive and when they have been shot, the granny makes a walking animation

during game play. Sound is made use of, there is an intro sound bite of Boris speaking; and there also shooting noises, powerup collection noises and bat/vaccine collisions. The background has been designed by me, but the remaining game assets were acquired online. There are no 3D assets.

Game mechanics development and implementation (30%)

Main game rules / logics to control game progression, difficulty and end game conditions:



I have already described many attributes of the game and how it progresses, the main outline for the game flow is summarized:

- User selects what difficulty they wish to start at 1-10.
- Bats spawn increasingly at each level.
- Lives spawn when player health < 50.
- Vaccine Ammo spawns when player ammo < 50.
- Bats spawn some viruses (limited by time on screen).
- Player shoots vaccines (limited by ammo and ability to pick up the ammo drop).
- Player increases ammo inventory by 50 on collecting ammo drop.
- Collisions of virus or bat with granny or player, results in decreasing health 10 %.
- Player has 5 lives, when player health is depleted lives is decremented and health is replenished.
- Player health is increased by 25% if the player picks up powerup.
- Granny health is replenished if it by luck picks up a powerup.
- If granny health is 0 or, player health and lives are 0 the game reaches the end, a score is output
- Score is the number of bats killed.

If all bats are killed and the end conditions haven't been met, next level is progressed to, and repeat.

Control of game object abilities:

Diagram 1:

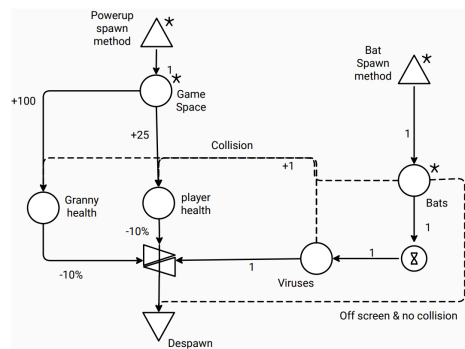
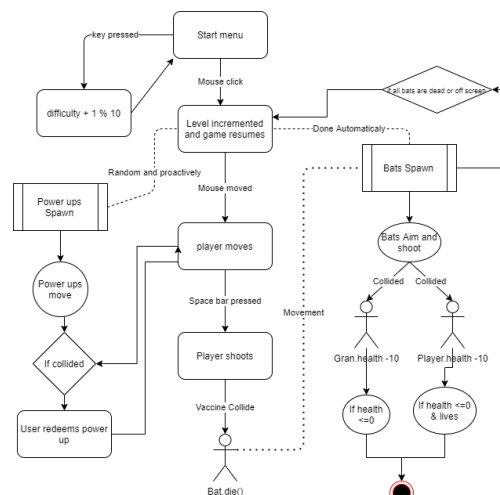


Diagram 2:



I am unsure what is meant by this section, however the way I interpret this is how the different game objects I created behave and respond.

My game objects are, Granny, Boris, Bat, Virus, vaccine and powerup [health, ammo]. Boris is the player who is controlled by the mouse and shoots with the space bar. The granny is automated to have no user controllable feature, she is a target which makes the game harder, she walks from one end of the screen to the other. The bats aim and shoot towards the granny; there is also an element of randomness as to whether or not they will shoot knowing they can reach the target; the player controls the aim of their shot with the mouse and a vaccine is shot, I explained in the other sections what happens on various collisions.

If the player has no ammo; they cannot shoot they need an ammo drop and collect it, if they have no lives if their health reaches 0 the game is over. If granny loses all her health the game is over.

Good use of game engine (12%)

Justification of the choice of game engine (pyGame, Unity) in terms of suitability of

This is an arcade game; it is mostly suitable for use on a computer; it is not very well adapted for use on a touch screen. pygame is a useful solution for making arcade games

matching the theme and the expected target audience (game player):	for use on a computer. It is not particularly targeted at any one demographic, perhaps Covid-19 meme enthusiasts.
Types of user input supported (keyboard, mouse, joystick, etc.):	You aim your player using your mouse, and shoot using the keyboard space bar.
Types of game object interaction supported (e.g., event triggering, collision detection):	<p>Event triggering:</p> <ul style="list-style-type: none"> • Health below 50%: A powerup is spawned. • Ammo below 50 vaccines: an ammo drop is spawned. • All bats have been killed: new bats spawned. • The player is near a bat: the bat shoots a virus. • The bat calculates if it can shoot a virus that will hit granny: it shoots at the granny. <p>Collision detection:</p> <ul style="list-style-type: none"> • Player with Bat, Bat dies, player health decreases. • Granny with Bat, Bat dies, player health decreases. • Player/ Granny with virus, health decreases. • Vaccine with bat, Bat dies.
Other game engine features used (e.g., asset, incorporation of external libraries):	<p>I used some sounds and images found online instead of developing all the multimedia myself. I did create some game assets independently, those that I did not are listed below.</p> <p>I use the game engine's own feature of <code>mask.overlap</code> to detect collisions between game objects.</p> <p>Game assets references:</p> <ul style="list-style-type: none"> • Boris Johnson image, https://www.vectorstock.com/royalty-free-vector/boris-johnson-pixel-art-england-vector-30838740 • Coronavirus, edited. https://www.labicok.com/fr/15-de-mayo-noticias-de-coronavirus/200130165125-corona-virus-cdc-image-super-tease-jpg/ • Crate, edited, https://opengameart.org/content/2d-wooden-box • Heart image, https://www.123rf.com/photo_79528364_stock-vector-pixel-art-heart-love-color-icon-valentine.html • Vaccine image, edited. http://pixelartmaker.com/art/13f59c6f9239910 • Bat animation, https://opengameart.org/content/pixel-art-bat-sprites • Grand mother animation. https://opengameart.org/content/grandma-nurse-walking • Sounds: https://freesound.org/people/LittleRobotSoundFactory/packs/16681/ https://www.101soundboards.com/boards/11364-boris-johnson-uk-prime-minister-soundboard

Demonstrate creativity (15%)	
Effective use of multimedia content:	As described above, there are animations, sounds and many game assets.
Advanced interaction implemented (e.g., game physics, object tracking, steering behaviour):	<p>Object tracking:</p> <p>The bats aim to shoot when the player is directly beneath it, it will also drop a virus targeting the granny estimating the time it would take for it to reach her. There is an element of luck also introduced to make sure the game is not unplayable.</p> <p>Bats also have a recoil method where they cannot just shoot many viruses at a time.</p>

***Note:** Your work must be done by yourself and comply with the university rules about plagiarism and collusion. (<https://www.dur.ac.uk/learningandteaching.handbook/6/2/4/>)