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Introduction

Adventure Creator, or “AC”, is a toolkit for Unity that can be used to make 2D, 2.5D and 3D adventure games. Navigation, inventory, characters, conversations, cutscenes, saving and loading and more are all possible – and without coding.

AC also caters to those who are more comfortable writing code, as well as those just looking to extend the base functionality with some add-on scripts. The full API is available in the online scripting guide, and user-made scripts are shared on the wiki.

If you're new to Unity, you should get to grips with the basics of the Unity interface first, since Adventure Creator is tightly integrated into it. Tutorials that teach Unity’s interface can be found on the official site, while more can be found at unity3d.com/learn.

AC has three demo games available for you to try out: the 2D Demo, the 3D Demo and the Physics Demo. The source files for the 2D and 3D games come included with AC itself, while those for Physics game can be downloaded. To run the demo games from within the Unity Editor, see Running the demo games.

This manual goes into detail about each of AC’s features, but sometimes it’s best to go through more practical examples when learning. There a number of video tutorials that cover a wide range of topics aimed at getting you started:

Making a 2D game
This covers the steps in making a simple point-and-click 2D game. Since many of the topics are applicable to all games, it is recommended for all those are getting started.

Recreating Unity's adventure game
Unity made their own adventure game available as a Sample Project. Here, we take those assets and remake the game using AC, so this is a good choice if you already know Unity.

Making a 3D game
Here we make a more complex 3D game with direct-control, Mecanim-driven animation, close-ups and cutscenes. Assets required to follow along are available on the Downloads page.

Making a 2.5D game
A guide to creating 2.5D games with pre-made backgrounds. While this tutorial is more focused on a particular game style, it also covers translations, UI and Navigation.
First-person primer

Here we cover the essentials when it comes to a first-person puzzle game. This tutorial covers Timeline cutscenes, interaction logic, scene-switching, and the physics system.
Chapter I: The Basics
1. Setting up
1.1. Installation

Once purchased, Adventure Creator is installed by importing it from its page on the Unity Asset Store.

The full package includes both the 2D and 3D Demos. If you prefer to have a “blank” project without these demos, you can uncheck the Demo and 2D Demo folders when the Import dialog appears inside Unity.

Once imported, AC will check for the presence of a few inputs and layers that must be defined in order for it to work. It will then prompt you to auto-create these:

If you would prefer to do this manually, the following Layers must be defined in Unity’s “Tags and Layers” settings:

- NavMesh
- BackgroundImage
- DistantHotspot

The following Input must also be defined in Unity’s Input settings:

- Menu
Once installed, you should see Adventure Creator appear as a menu item in the top toolbar:

If it does not, check the Console window for compilation errors, which may occur if not all scripts are imported, or if another asset is creating a conflict.

A successful install will also show the **About** window:

With AC installed, you are now ready to run the demo games, go through tutorial videos, or open the Game Editor window to start working.

**NOTE:** Be sure to also read the guide to **Updating Adventure Creator**.

**PROTIP:** Depending on your chosen play-style, more inputs may need defining. AC will inform you of any missing inputs that it needs while the game is running in the Console window, and a list of available inputs can be found in the **Settings Manager**.

**PROTIP:** By default, AC will be imported into a directory inside the project's Assets folder named AdventureCreator. It can be moved elsewhere (e.g. to a Package), so long as its location is updated in the Adventure Creator section of Unity's Project settings.
1.2. Running the demo games

AC comes included with two demo games – a 3D game and a 2D game – that show off the basic workflow involved.

To run either of them, choose Adventure Creator → Getting started from the top toolbar, and then choose the game you wish you run:

![Adventure Creator interface](image)

Each game made with AC requires its own set of Managers, which are explained in the next section. When a demo is loaded, its Managers will be automatically assigned and its scene will be loaded.

**PROTIP:** If you have already created your own set of Managers before running the demo games, then those Managers will need to be re-assigned before you go back to your own project. This can be done by double-clicking the Manager Package file that was created by the New Game Wizard alongside your Manager assets.

Both demos are played with point-and-click movement, but the 3D Demo is equipped to also work with Direct and First-person movement. You can pick them apart and modify them to see how they’re made, and also use the characters to test with in your own game. You can’t, however, use them in anything you publicly release.
1.3. The Game Editor window

All games made with AC have eight “Managers” – asset files that each control a different aspect of the project. For example, the Inventory Manager holds all inventory items the player can pick up:

- Scene Manager
- Settings Manager
- Actions Manager
- Variables Manager
- Inventory Manager
- Speech Manager
- Cursor Manager
- Menu Manager

These Managers are modified via AC’s Game Editor window, which can be accessed from the top toolbar under Adventure Creator → Editors → Game editor:

At the top of this window are eight tabs – one for each Manager. The currently-selected Manager, as well as its associated asset file, is listed beneath these tabs:

If you keep this window open when loading either of the demo games, you’ll see that each demo has its own set of Managers. By default, the 3D Demo game’s Managers will be loaded in, but you can create your own using the New Game Wizard.
1.3.1. The New Game Wizard

The first step of any new project is to create your own set of Managers. This can be done using the **New Game Wizard**, found in the top toolbar:

This will open up the wizard window, which consists of simple forms that are used to create your game’s Managers with some basic options already set for you.

Click **Next** to tab through each page, providing details where prompted. You will be given a chance to review these details on the last page:

Click **Finish**, and your game’s Managers will be created in a new subfolder in your Project window. A **Manager Package** file will also be created, which you can use to re-assign your Managers in bulk should another set become assigned instead – see **Updating Adventure Creator**.

**PROTIP:** Once complete, you will be asked if you want to convert the open scene into one that AC can work with. This can be done at any time within the **Scene Manager**.

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1.3.2. The Scene Manager

The Scene Manager exposes settings unique to the open scene, and allows for the handling and creation of AC objects in your Hierarchy. It is this Manager that is used to convert a “regular” Unity scene into an “AC” one.

A Unity scene is considered to be an “AC” one by the presence of an AC GameEngine in the Hierarchy. If there is none, the Scene Manager will invite you to organise your scene objects. This can be done either with a set of folders (empty GameObjects to aid structure) or without:

Once either is chosen, a GameEngine will be added and the rest of the Scene Manager will be revealed in the form of five sub-sections:

Scene settings

This is where the scene’s pathfinding method is chosen, as well as where the default objects such as your starting camera and starting player position are assigned. The Create button to the right of these fields can be clicked to automatically create and assign a new prefab.

Scene cutscenes

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These are where the scene’s three “automatic” cutscenes are defined. **On start** will run whenever the scene begins through natural gameplay, **On load** will run whenever the scene is switched to after loading a save game or player-switching, and **On variable change** will run whenever a variable is changed using the Variable: Set Action. For more on Actions, see *Actions and ActionLists*.

**PROTIP:** ActionLists can also be started when a scene begins or loads with the ActionList Starter component.

**Scene attributes**

Scene attributes allow you to create a list of properties about your scenes, and give each scene different values of those properties. For more, see *Scene attributes*.

**Visibility**

A typical scene will consist of Triggers, Hotspots, Markers and other AC objects. This panel allows you to control their visibility within the Scene window, provided Gizmos are enabled.

**Scene prefabs**

This provides a list of objects that you can add to your scene, including cameras, cutscenes and Hotspots. When an object type is selected, existing objects of that type are listed above together with a description of what that type does. Double-clicking an icon creates a new object in the scene.

**PROTIP:** Each sub-section within a Manager is collapsable by clicking its header. This is useful when you want to focus only on certain parts.

**PROTIP:** If the Unity Editor is currently in “Prefab Mode”, objects will be added to the prefab’s hierarchy, not the scene.
Exactly which prefabs are listed will depending on what Camera perspective your game uses. The following is a brief run-down of what each prefab type is for:

**Camera**

- **GameCamera**
  The standard camera type for 3D games, which can track a moving target.

- **GameCamera Animated**
  A camera that either plays an animation when made active, or positions itself along a timeline as a target moves along a path.

- **GameCamera Third-person**
  A camera that follows a target by keeping the same distance from it at all times, with the ability to rotate.

- **SimpleCamera**
  A camera that has no controls and doesn’t move by itself, but can be attached to a custom camera script to make it compatible with AC.

- **GameCamera 2D**
  The standard camera type for 2D games, which can track a moving target. A “grid-snapping” option causes the camera to move only in discrete steps, which can be useful when making pixel-art games.

- **GameCamera 2D Drag**
  A camera that can be dragged around using the mouse.

- **TintMap**
  A texture that covers the scene which is used to tint sprites as they move around.

- **GameCamera 2.5D**
  The standard camera type for 2.5D games, which allows for background images to be placed behind 3D objects.

- **Background Image**
  A texture used as a background by 2.5D cameras.

- **Scene sprite**
  A sprite used to mask 3D objects in 2.5D games.
Logic

Arrow prompt
A set of on-screen arrows that the user can interact with to trigger Cutscenes.

Conversation
A selection of dialogue options that the player can make when talking to an NPC.

Container
A collection of inventory items that the player can take from and place into.

Cutscenes
A series of Actions that form a cutscene or logic process.

Dialogue Option
A series of Actions that run when a Conversation's dialogue option is chosen.

Hotspot
A volume of the screen that the player can interact with in 3D or 2.5D games.

Hotspot 2D
An area of the screen that the player can interact with in 2D games.

Interaction
A series of Actions that run when a Hotspot is interacted with.

Interactive boundary
If assigned to a Hotspot, Draggable or PickUp, a volume in the scene that the Player must be inside for the Hotspot to be interactive. The Player must have a Rigidbody and Collider.

Sound
A source of sound effects linked to AC's sound system.

Trigger
A volume of a 2.5D or 3D scene that runs a series of Actions when some object passes through it.

Trigger 2D
An area of a 2D screen that runs a series of Actions when some object passes through it.

Variables
A collection of Variables, which can be used to keep track of logic and progress.
Moveable

**Draggable**
A 3D physics object that can be dragged around by the cursor either freely or locked to a track.

**PickUp**
A 3D physics object that can be picked up, rotated and thrown by the cursor.

**Straight Track**
A track that locks Draggables to move only along straight lines.

**Curved Track**
A track that locks Draggables to move only in arcs.

**Hinge Track**
A track that locks Draggables to only rotate along one axis.
Navigation

**Collision Cube**
A cube that blocks 3D physics objects or raycasts from passing through it.

**Collision Cylinder**
A cylinder that blocks 3D physics objects or raycasts from passing through it.

**Collision Cube 2D**
A box that blocks 2D physics objects or raycasts from passing through it.

**Marker**
An arrow used to reference a position that a 3D character should have.

**Marker 2D**
An arrow used to reference a position that a 2D character should have.

**PlayerStart**
An arrow used to reference the Player's starting position in 3D games.

**PlayerStart 2D**
An arrow used to reference the Player's starting position in 2D games.

**SortingMap**
A way of controlling the scale and ordering of sprites as they move around a scene.

**Path**
A pre-determined path that character can move along.

**NavMesh**
A custom mesh that defines the area that character can use when pathfinding in 3D scenes.

**NavMesh segment**
A plane that defines an area that can be baked with Unity's Navigation tools.

**Static obstacle**
A cube that defines an area that is left out when baking with Unity's Navigation tools.

**NavMesh 2D**
A polygon that defines the area that characters can use when pathfinding in 2D scenes.
1.3.3. The Settings Manager

The Settings Manager is where the bulk of your game’s project-wide settings are defined - for example, whether it is 2D or 3D, and how is controlled.

The fields within are interdependent – some may only show if some other combination of settings are made. This means that only the settings you see are the ones relevant to your game. Settings can be changed at any time – even during gameplay.

**PROTIP:** Any Manager field can be changed at runtime through custom scripting. To modify a field, right-click on the field’s label and choose *Copy script variable* – you will then be able to paste a link to the field in your own script or custom Action.

The Settings Manager consists of 15 sub-sections:

- **Save game settings**
  Relates to the number and naming of save game files, as well as the ability to automatically add save components to your scene objects.

- **Cutscene settings**
  Allows you define an ActionList asset that runs when the game begins. This is useful if you want to initialise Variables or some other data regardless of the starting scene.

- **Character settings**
  Allows you to define one or more Player prefabs that can be controlled. If Player switching is allowed, then the Player prefab can be changed during gameplay. This can be left empty if you don’t need a Player to be visible on-screen.

- **Interface settings**
  Relates to how the game is controlled, including the Input method, Movement method and Interaction method.

- **Inventory settings**
  Relates to how inventory items are handled. To define which inventory items can be used in your game, use the Inventory Manager.

- **Available inputs**
  Lists any inputs that your game can make use of, depending on the settings chosen. Checking **Assume inputs are defined?** will boost performance, but errors will occur if any inputs listed are not defined in Unity’s Input settings.
Movement settings
Relates to pathfinding and – in the case of point-and-click movement – NavMesh searching.

Touch-screen settings
If the Input method is set to Touch Screen, then this section will show a number of options related to how the game plays on a mobile device. For more, see Touch-screen input.

Camera settings
Allows you to set the game’s perspective, and enforce an aspect ratio. For more, see Cameras.

Hotspot settings
Relates to the way in which Hotspots are selected and displayed – also see Hotspot detection.

Audio settings
Allows you to choose whether your game plays audio via standard Audio Sources, or makes use of Audio Mixer Groups. For more, see Sounds.

Raycast settings
Allows you to define which layers objects are placed on when made active and inactive, as well as the lengths of Raycasts used to detect Hotspots and other interactive objects.

Scene loading
Relates to the way in which scenes are loaded, and whether or not to use a loading screen between them. For more, see Loading screens.

Options data
Allows you to set the values of options, such as speech volume and the current language, without going to the Options Menu in-game – see Options data.

Debug settings
Provides a number of tools for debugging, including the ability to list all active ActionLists in the Game window, as well as output Action comments to the Console.
1.3.4. The Actions Manager

Actions are the building blocks of AC’s visual scripting system. Each Action performs a different task, and complex cutscenes and logic can be formed when Actions are chained together.

The Actions Manager lists all Actions that are available to your project. This includes the default set that come included with AC, as well as any custom Actions you may have installed.

It consists of five sub-sections:

**ActionList editing settings**
This provides a number of control options when working with the ActionList Editor.

**Custom Action scripts**
This allows you to point to a directory where any custom Actions you may have are installed. When set, any such Actions found are automatically installed.

**Action categories**
Lists all available Actions, by category. Clicking on a category reveals all Actions within that category via the Category sub-section that then appears:

**Category**
Lists all Actions available in the category selected above. Clicking on an Action displays the final sub-section with more details about that Action.

**Action**
Displays information and options about the selected Action. Here, you can set the node colour of all Actions of this type within the ActionList Editor, disable it, make it the default (either globally, or for that category), find instances of this Action type in your project.

**PROTIP:** Disabling an Action type will prevent it from being available in the selector field at the top of all Actions, but will not remove existing instances of that type. If a disabled Action type is found within an ActionList, it will run as normal but cannot be changed to another.

For a description of each Action included with AC, see *Actions and ActionLists.*
1.3.5. The Variables Manager

Variables are used to implement logic in a game, by allowing you to keep track of progress or choices made by the player. A game can have two sets of Variables:

- **Global**, which exist outside of any scene and can be accessed at any time
- **Local**, which exist in a single scene and cannot be accessed outside of it

For more, see Variables.

The Variables Manager is used to define such Variables and keep track of them during gameplay. The top of it allows you to choose between viewing Global and Local Variables, and the following sub-sections appear beneath:

**Editor settings**
Allows you to see the realtime values of listed Variables during gameplay, as well as filter lists by name.

**Preset configurations**
Allows you to manage presets, which allow you to bulk-assign Variable values. For more, see Variable presets.

**Global/Local variables**
Shows a list of existing Variables, and allows you create more. Clicking a Variable shows its properties below.

**Global/Local variable properties**
Shows the selected Variable’s properties, including label, type and initial value. If preset configurations exist, preset values can be set here.
1.3.6. The Inventory Manager

Inventory items are items that can be picked up by the player, and used either on each other or Hotspots in the scene. For more, see Inventory items.

The Inventory Manager is used to create items, as well as define categories, crafting recipe and properties. It consists of four tabs:

Items

The Items tab is where the Inventory items are defined, and may be the only tab needed if your game doesn’t have a complex inventory system. It has three sub-sections:

Global unhandled events
Unhandled events are “fallback” interactions that will run if there is no defined response when an item is used on something. Each item can have their own set of unhandled events, but these ones can be used for all items. For more, see Inventory interactions.

Inventory items
Shows a list of existing items, and allows you to create more. When an item is clicked, its properties are shown below:

Inventory item settings
When an item is selected above, its properties are listed here. Here you can name an item, choose its graphic, as well as define interactions that run when it is manipulated.

Categories

This tab allows you to create inventory categories, which are a way of grouping inventory items together. Once two or more categories exist, each item can be assigned one via its properties box.

Crafting

Simple interactions between two items can be defined in the Items tab. However, more complex interactions can be made in the form of crafting – where multiple items can be combined on a grid to create another. This tab allows you to manage all recipes that a Crafting Menu will accept. For more, see Crafting.
Properties

This tab allows you to define properties, which can then be applied to items in the Items tab. For more, see Inventory properties.

Documents

This tab allows you to define Documents, which are multi-page text blocks that the Player can read and collect. For more, see Documents.
1.3.7. The Speech Manager

The Speech Manager is used to control how speech is displayed and heard, as well as manage translations and script sheets. It consists of five sub-sections:

**Subtitles**
Relates to how subtitles behave when displayed on-screen. They can be made to scroll, respond to user clicks, and play audio. The **Display time factor** field is an important one: if text does not scroll, it will be used to determine the total display duration of the subtitle. If text scrolls, or the speech has audio associated with it, then it is used to determine the display duration after the scrolling/audio.

**Speech audio**
Relates to the playback of speech files and the way in which they are matches with their associated speech line. For more, see **Audio files**.

**Lip syncing**
Provides a number of options related to automated lip-syncing. For more, see **Lip syncing**.

**Languages**
Allows you to manage the translations that players can choose from while playing. Each translation can be imported from, and exported to, CSV files for editing. For more, see **Managing translations**.

**Game text**
Lists all of text in your game which can be translated, as well as speech lines that can make use of speech audio or lip-sync files. The **Gather text** button is used to search your project for relevant text – see **Gathering game text**.
1.3.8. The Cursor Manager

The Cursor Manager is used to define what graphics the cursor can have, as well as which icons are available when interacting with Hotspots, NPCs and inventory items. It consists of seven sub-sections:

**Global cursor settings**
This provides you with the option to switch between cursor rendering modes, as well as game-wide cursor behaviour.

**Main cursor settings**
This is where you choose when a cursor is shown, and what the default cursor looks like.

**Walk cursor**
This is where you can provide an optional cursor shown when the Player is in “walk mode”.

**Hotspot cursor**
This is where you can provide an optional cursor shown when hovering over Hotspots. This can be overridden by using inventory icons, so that the cursor changes depending on what interactions are available for a given Hotspot.

**Inventory cursor**
This provides you with options related to how the cursor changes when dealing with inventory items.

**Interaction icons**
This is where interaction icons are defined. An interaction icon can be used as a cursor – but also placed in Interaction Menus and made to form a Hotspot label (e.g. the “Pick up” in “Pick up stick”). This works by associating each Hotspot interaction with a given interaction icon. For more, see Hotspots.

**Cutscene cursor**
This is where you can provide an optional cursor shown when a cutscene is playing, to indicate that the player cannot interact with the scene.
1.3.9. The Menu Manager

The Menu Manager is where your game’s user-interface is constructed. The interface consists of a series of Menus, which can be rendered using either AC’s own system, or with Unity UI. The default interface, as created by the New Game Wizard, provides you with a series of Menus that can handle inventory, conversations, options, as well as saving and loading.

For more on creating your own interface, see Menus. The Menu Manager has five subsections:

**Global menu settings**
Here you can set global settings such as an Event system prefab (if using Unity UI to render) and the ability to preview the selected Menu in the Game window (if using AC to render).

**Menus**
Lists all Menus used by the game. Here you can select Menus to edit them, and create new ones.

**Menu properties**
Shows the properties of the currently-selected Menu. Here you can choose the conditions for when it is shown, change its appearance, and define ActionLists that run whenever it is turned on or off.

**Menu elements**
Lists all Elements present in the currently-selected Menu. Here you can select Elements to edit them, and create new ones.

**Menu element properties**
Shows the properties of the currently-selected Element. Here you can change its appearance and behaviour when the Player interacts with it.

**PROTIP:** Each of the default Menus created by the New Game Wizard work with both Adventure Creator and Unity UI drawing modes, and you can switch back and forth at will. It’s recommended that you use AC for prototyping, and then UI for refinement.
1.4. Preparing a 3D scene

After creating your Managers with the New Game Wizard, you are ready to begin creating your scenes. The Game Editor window is best docked in a tall vertical pane when working.

To begin working in 3D, make sure that your Camera perspective is set to 3D in the Settings Manager:

You can now change to the Scene Manager, from where you can create the GameObjects needed for an adventure game.

Creating a scene for a 3D game typically consists of five steps:

- Adding a PlayerStart
- Adding visuals
- Adding colliders and/or a NavMesh
- Adding cameras
- Adding interactivity

The sections below cover each step. For a practical guide to follow along with, see the Making a 3D game video tutorial.
1.4.1. Adding a PlayerStart

With a new scene, the top of the Scene Manager will have two Organise scene objects buttons: With folders and Without folders:

Both of these buttons will set up your scene to be useable by Adventure Creator – the only difference is whether or not “helper” folders (empty GameObjects) will also be created to help keep things organised. As you use the Scene Manager to create Hotspots, Conversations and other prefabs, it will place them into the relevant folders automatically.

AC makes use of its own MainCamera object for rendering – see Cameras. If it detects that another camera is present, then it will ask you if you would like to replace it completely, or convert it into a camera that AC can use.

Once the scene is converted, a blue arrow will be placed at the centre of the scene:

This is a PlayerStart, which is used to give the player a starting position and rotation when the scene begins. You can see that the Scene Manager has automatically assigned this as the Default PlayerStart within its Scene Settings panel:

PROTIP: A scene can have multiple PlayerStarts, with each one setting the Player’s starting position when entering from another scene. The difference with the Default PlayerStart is that this will be used if the game begins from this scene, or if no more suitable PlayerStart is found.
1.4.2. Adding visuals

We can now dress the scene with geometry and lights, and move the PlayerStart into an appropriate spot. If you are using scene folders, the _SetGeometry folder is provided for your scene’s visuals.

You can do this before the previous step, if you prefer.

![Scene with geometry and lights](image)

**NOTE:** Be careful when placing your geometry’s colliders on the Default layer, as this is the layer used by interactive objects that the cursor “discovers” by hovering over them. If another collider on this layer is in between the camera and a Hotspot, it will block the Raycast – though this can be useful if you want walls to hide interactive objects.
1.4.3. Adding colliders and/or a NavMesh

We can now work on allowing our characters to move around. We’ll start with the floor, which all 3D characters require (unless unaffected by gravity). We can make one either by using Unity’s own colliders, or the CollisionCube prefab that is listed in the Scene Manager:

Double-click this prefab type, and a blue cube will be created in the scene. Manipulate its transforms so that the top face covers the whole ground. This cube won’t be visible during gameplay – it’s used purely as a “barrier” to prevent characters from falling.

If the Player character uses anything other than point-and-click control to move during gameplay, colliders will also need to be created for the walls to prevent him from clipping through the set.

**PROTIP:** The 3D Demo game has wall colliders even though it uses point-and-click movement. This is so that you can experiment with different movement types in the scene to see which one suits your own game.

Now we will want a Navigation Mesh, or NavMesh, which marks the area in a scene over which our characters can move around through pathfinding. In 3D scenes, we can use either provide a custom mesh or bake one with Unity’s own navigation tools. If you choose to use a custom mesh, be sure to assign it as the Default NavMesh in the Scene settings.
1.4.4. Adding cameras

Next come cameras. We can have as many cameras as we choose, but only one default – which we can automatically create and assign under **Scene settings** in the Scene Manager. The standard camera type for 3D games is the GameCamera, which has controls for moving and turning as it follows a target – which by default is the Player. 3D games can make use of four camera types, as listed in the prefabs panel:

![Camera Types](image)

A description of what each prefab type is can be found in **The Scene Manager**.

**NOTE:** A scene can have multiple GameCameras, but only one MainCamera. All rendering is done through the MainCamera, while the GameCameras are used only for reference: a MainCamera will copy the transform and camera values of whatever GameCamera is currently “active”.

To switch camera at runtime, use the **Camera: Switch Action** (see **Actions and ActionLists**). If multiple PlayerStarts are in a scene, each can be associated with a specific camera from their Inspector.
1.4.5. Adding interactivity

We can create an opening cutscene by assigning an On Start cutscene, under Scene cutscenes in the Scene Manager. A cutscene is a collection of Actions that chain together to form a sequence of events. For more, see Actions and ActionLists.

**PROTIP:** OnStart cutscenes will play whenever a scene opens through gameplay (i.e. if the game begins from this scene, or the player enters it from another scene). OnLoad cutscenes will play whenever a scene opens due to loading a save game or switching Player character. If you want to run a set of Actions regardless of why the scene is opened, place them in a separate Cutscene and have it shared by both OnStart and OnLoad.

To make the scene interactive, you can populate it with logic objects, such as Hotspots and Triggers, listed under the “Logic” pane of the Scene prefabs in the Scene Manager:

For more on Hotspots and other types of interactivity available, see Interactions.

We can now give the scene some life by adding characters, including our Player. This is covered in Creating characters.

**PROTIP:** The 3D Demo’s player prefab, Tin Pot, is designed to work with a variety of play styles and is useful when testing a scene if you don’t yet have a Player of your own. Just drop him into the scene and run it – he’ll override whatever prefab you have assigned in your Settings Manager.
1.5. Preparing a 2D scene

After creating your Managers with the New Game Wizard, you are ready to begin creating your scenes. The Game Editor window is best docked in a tall vertical pane when working.

**NOTE:** An important consideration when making a 2D game with pathfinding is that of your sprite scales, which you can adjust by modifying the Pixels Per Unit setting in your sprite Inspectors. The game's scale should have 1 unit roughly equal 1 metre.

The 2D Demo's graphics are built to an appropriate scale – you can compare your own sprites with those in the 2D Demo/graphics/Sprites folder to see if they need adjusting.

You may encounter problems if your NavMesh's scale is too small, which may be the case if you are using a low-resolution (e.g. 320x240) art style. You can tell if your scale is wrong by looking at the white squares that break up a Character’s path when pathfinding – they should be tiny (but visible) dots in the Scene window compared with the rest of the scene.

To begin working in 2D, make sure that your Camera perspective is set to 2D in the Settings Manager:

The Moving and turning field beneath it is an important one, as it will affect the way your entire game is created. It determines how the cameras, sprites, Hotspots and Navigation Meshes relate to one another. It is recommended that you use the default value of Unity 2D, but the three available options are described below:

**Unity 2D**

The game is played in Unity's own “2D” view. Characters move purely in the X/Y plane, and are scaled to create a depth effect. The game use 2D components, and Polygon Collider pathfinding.

**Top Down**

This mode is now deprecated.

**World Space**

The game is played with perspective cameras, with the main “background sprite” behind all Characters. Characters move in 3D space and rely on 3D collider and physics components, with no need for “cheating” a depth effect.
Screen Space

The game is played with perspective cameras, with the main “background sprite” behind all Characters. Characters move in 3D space and rely on 3D collider and physics components, with no need for “cheating” a depth effect. Unlike World Space, however, characters move and turn according to perceived object positioning, rather than true positioning. For example, if a Hotspot appears above the Player, then it will be considered behind them instead. This is a convenience as it means that interactive objects can still be placed on the 2D plane – only the NavMesh need be in 3D.

PROTIP: Not sure which option to pick? Just go with Unity 2D – the others were made before Unity’s 2D tools were introduced.

You can now change to the Scene Manager, from where you can create the GameObjects needed for an adventure game.

Creating a scene for a 2D game typically consists of six steps:

- Adding a 2D PlayerStart
- Adding visuals
- Adding a 2D NavMesh
- Adding a Sorting Map
- Adding 2D cameras
- Adding interactivity

The sections below cover each step. For a practical guide to follow along with, see the Making a 2D game video tutorial.

NOTE: Looking to have 3D characters in your 2D scene? The 2.5D option allows for that, but it involves working in 3D space. If you want to work completely in 2D space, you can still use 3D characters in a 2D scene, provided that:

1) They have no collider or Rigidbody components.
2) They have custom shaders that allow them to render correctly alongside sprites, when their "sorting order" values are changed by a Follow Sorting Map.

Alternatively, they are each rendered by separate camera (see this wiki page).
1.5.1. Adding a 2D PlayerStart

With a new scene, the top of the Scene Manager will have two Organise scene objects buttons: With folders and Without folders:

Both of these buttons will set up your scene to be useable by Adventure Creator – the only difference is whether or not “helper” folders (empty GameObjects) will also be created to help keep things organised. As you use the Scene Manager to create Hotspots, Conversations and other AC prefabs, it will place them into the relevant folders automatically.

AC makes use of its own MainCamera object for rendering – see Cameras. If it detects that another camera is present, then it will ask you if you would like to replace it completely, or convert it into a camera that AC can use. Once complete, a blue arrow will be placed at the centre of the scene:

This is a PlayerStart, which is used to give the player a starting position and rotation when the scene begins. You can see that the Scene Manager has automatically assigned this as the Default PlayerStart within its Scene Settings panel:

PROTIP: A scene can have multiple PlayerStarts, with each one setting the Player’s starting position when entering from a different scene. The difference with the Default PlayerStart is that this will be used if the game begins from this scene, or if a no more suitable PlayerStart is found.
1.5.2. Adding visuals

We can now dress the scene with set sprites, and move the PlayerStart into an appropriate spot. If you are using scene folders, the _SetGeometry folder is provided for your scene’s visuals.

When importing your scene's graphics into Unity, be sure to set their Texture type to Sprite, so that they can be placed in the scene.

Special attention should be paid to sprites that characters will be able to walk behind and in front of: Sorting Maps work by altering the sorting order of character sprites, you will need to separate your scene sprites' Order in Layer far apart enough for values in-between to exist.

**PROTIP:** Aren’t sure what Order in Layer values to give your set sprites? You can normally get by with just spacing them 5 units apart, e.g.:

- Background: –10
- Ground: –5
- Mid-foreground: 5
- Foreground: 10

See that this allows for sprites with an order zero (such as characters by default) to be above the ground.
1.5.3. Adding a 2D NavMesh

Now we will want a 2D Navigation Mesh, or **NavMesh 2D**, which marks the area in a scene over which our characters can move around through pathfinding. In 2D scenes, we can make use of Unity's Polygon Collider 2D to “draw” this NavMesh in our scene – see *Polygon Collider pathfinding* for more.

Once you’ve made a 2D NavMesh, be sure to set it as the **Default NavMesh** in the **Scene settings**.
1.5.4. Adding a Sorting Map

Because Unity 2D games are built on a 2D plane, characters will all have the same distance from the camera as they move around. To get around this, we use a Sorting Map. A Sorting Map can scale characters and affect their sprite orders as they move around, faking a depth effect. We can auto-create a Default Sorting Map in the Scene settings, and its Inspector looks like this:

![Sorting Map Inspector]

The Sorting Map works vertically, so position it at the top-most point of the scene's walkable region, and and click Add area in its Inspector. This will create a new mark beneath – position this one at the bottom-most point:

![Sorting Map Region]

We can use this Sorting Map to affect a character’s scale as they move down it – click Affect Character scale?. This will expose Scale % fields that we can use to set character scales at each end-point. The scales in between will be set automatically, and changing these values will update its appearance in the Scene window:
In order for a character to be affected by a Sorting Map, its sprite must have the Follow Sorting Map component attached. This is added automatically when using the Character wizard. Note that this should not be on the root of the character, i.e. the one with the NPC or Player component.

We can also use a Sorting Map to change a character sprite's Order in Layer value when inside each area – this allows them to be rendered on top of scene objects when “in front” of them, and underneath when “behind”.

**PROTIP:** Scaling by use of areas is linear. For more natural scaling, change the Character scaling mode to Animation Curve. This allows you to more precisely control scaling using a curve.

In this case, we have a tree placed on the ground. We will need an area above it, and an area beneath it. Click Add area to create a new area, and re-adjust their positions accordingly.
To automatically recalculate the scale values of all areas in between the top and bottom, click **Interpolate in-between** scales.

Now we must set correct **Order** values. You can see these in the centre of each area when the Sorting Map is selected:

These are the **Order in Layer** values that character sprites will have when inside each area. They can be adjusted in the Inspector, and should account for the orders of your background sprites. For example, if your ground is \(-5\), and the tree is 5, then the top and bottom areas could have values of 0 and 10 respectively.

**PROTIP:** The Follow Sorting Map can either affect Sprite Renderer's Order In Layer value directly, or – if attached to the character – a **Sorting Group** component instead. The latter is more useful if a character is made up of multiple sprites.

Since 2D games involve faking perspective, you may wish for your characters to move vertically more slowly than horizontally. You can adjust the **Vertical movement factor** slider to do just this, either globally in the **Settings Manager**, or per-scene in the **Scene Manager**.

**NOTE:** If two or more Follow Sorting Map components occupy the same Sorting Map region, their relative positions along the Y-axis will adjusted slightly to ensure they are rendered in the correct order. The amount by which they are adjusted can be set on the **GameEngine** object, via the **Scene Settings** component's **Shared Layer Separation Distance** value. If such sprites do not render in the correct order, try increasing this value until they do.
1.5.5. Adding 2D cameras

Next come cameras. We can have as many cameras as we choose, but only one default – which we can automatically create and assign under Scene settings in the Scene Manager. The standard camera type for 2D games is the GameCamera 2D, which has controls for moving and turning as it follows a target – which by default is the Player. 2D games can make use of two camera types, as listed in the prefabs panel:

A description of what each prefab type is can be found in The Scene Manager.

NOTE: A scene can have multiple GameCameras, but only one MainCamera. All rendering is done through the MainCamera, while the GameCameras are used only for reference: a MainCamera will copy the transform and camera values of whatever GameCamera is currently “active”.

To switch camera during gameplay, use the Camera: Switch Action (see Actions and ActionLists). If we have multiple PlayerStarts in our scene, we can associate each one with a specific camera from their Inspectors.
1.5.6. Adding interactivity

We can create an opening cutscene by assigning an **On Start** cutscene, under **Scene cutscenes** in the Scene Manager. A cutscene is a collection of Actions that chain together to form a sequence of events. For more, see *Actions and ActionLists*.

**PROTIP:** **OnStart** cutscenes will play whenever a scene opens through gameplay (i.e., if the game begins from this scene, or the player enters it from another scene). **OnLoad** cutscenes will play whenever a scene opens due to loading a save game or switching Player character. If you want to run a set of Actions regardless of how the scene is opened, place them in a separate Cutscene and have it shared by both OnStart and OnLoad.

To make the scene interactive, you can populate it with logic objects, such as **Hotspots** and **Triggers**, listed under the “Logic” pane of the **Scene prefabs** in the Scene Manager:

For more on Hotspots and other types of interactivity available, see *Interactions*.

We can now give the scene some life by adding characters, including our Player. This is covered in *Creating characters*.

**PROTIP:** The 2D Demo's player prefab, Brain2D, is designed to work with a variety of play styles and is useful when testing a scene if you don't yet have a Player of your own. Just drop him into the scene and run it – he'll override whatever prefab you have assigned in your Settings Manager.
1.6. Preparing a 2.5D scene

After creating your Managers with the New Game Wizard, you are ready to begin creating your scenes. The Game Editor window is best docked in a tall vertical pane when working.

AC’s 2.5D mode is used for games that make use of 3D characters and pre-rendered) or photographic) backgrounds. To begin working in this mode, make sure that your Camera perspective is set to 2.5D in the Settings Manager:

If your game makes use of pre-rendered backgrounds, it is also recommended to set Aspect ratio to Fixed.

You can now change to the Scene Manager, from where you can create the GameObjects needed for an adventure game.

Creating a scene for a 2.5D game typically consists of five steps:

• Adding a PlayerStart
• Adding backgrounds and cameras
• Adding colliders and/or a NavMesh
• Adding scene sprites
• Adding interactivity

The sections below cover each step. For a practical guide to follow along with, see the Making a 2.5D game video tutorial.

NOTE: This implementation involves placing characters in 3D space, so that perspective is correct. The alternative approach is to place characters in 2D space, and use sprites for backgrounds – see Preparing a 2D scene.

NOTE: Using URP? Unity’s Universal Render Pipeline uses its own technique to overlay cameras, so you’ll need this wiki script to have it work with AC’s 2.5D cameras.
1.6.1. Adding a PlayerStart

With a new scene, the top of the Scene Manager will have two Organise scene objects buttons: With folders and Without folders:

Both of these buttons will set up your scene to be useable by Adventure Creator – the only difference is whether or not “helper” folders (empty GameObjects) will also be created to help keep things organised. As you use the Scene Manager to create Hotspots, Conversations and other prefabs, it will place them into the relevant folders automatically.

Adventure Creator makes use of its own MainCamera object for rendering – see Cameras. If it detects that another camera is present, then it will ask you if you would like to replace it completely, or convert it into a camera that Adventure Creator can use.

Once the scene is converted, a blue arrow will be placed at the centre of the scene:

This is a PlayerStart, which is used to give the player a starting position and rotation when the scene begins. You can see that the Scene Manager has automatically assigned this as the Default PlayerStart within its Scene Settings panel:

PROTIP: A scene can have multiple PlayerStarts, with each one setting the Player’s starting position when entering from another scene. The difference with the Default PlayerStart is that this will be used if the game begins from this scene, or if no more suitable PlayerStart is found.
1.6.2. Adding backgrounds and cameras

2.5D games typically involve pre-rendered backgrounds and static cameras, with each camera used for a specific background.

AC makes the development of 2.5D scenes easier by having the background graphics drawn only at runtime, so that you don’t have to spend time placing graphics in the scene and getting them to line up properly.

We can have as many cameras as we choose, but only one default – which we can automatically create and assign under Scene settings in the Scene Manager. The standard camera type for 2.5D games is the GameCamera 2.5D, which can’t move but allows you to assign a Background Image to it. Both these prefab types are listed in the prefabs panel:

A description of what each prefab type is can be found in The Scene Manager.

In your new camera’s Inspector, you’ll see a field for the Background image prefab:

Click Create to automatically create and assign a new BackgroundImage object. This is where the background image texture is assigned – see GameCamera 2.5D.

NOTE: BackgroundImages can render textures with GUITextures and Unity UI. However, due to Unity’s deprecation of the legacy UI system, only the Unity UI method is available when using Unity 2017.3 and later.

We can see this image in the Game window while editing by going back to the camera’s Inspector and clicking Set as active. When a camera is active, its background will be drawn underneath any visible objects in its view:

We must now adjust the camera so that it matches the position and rotation of the image’s perspective. A Perspective offset can also be applied via the GameCamera’s Inspector. This may take some trial-and-error, and is often easier to do in conjunction with creating a NavMesh.
To switch camera during gameplay, use the Camera: Switch Action (see Actions and ActionLists). If we have multiple PlayerStarts in our scene, we can associate each one with a specific camera from their Inspectors.

**NOTE:** If your background is pre-rendered in a 3D modelling package, you can usually extract the camera data used to render it and transfer it into Unity. Take a note of its position, rotation and field of view, and copy these values into your Unity camera's Inspector – though sometimes the axes ordering may be different. If you are instead using photographic backgrounds, take plenty of measurements when shooting!

**PROTIP:** A tutorial on adding shadows to 2.5D scenes can be found [here](#).

To switch camera during gameplay, use the Camera: Switch Action (see Actions and ActionLists). If we have multiple PlayerStarts in our scene, we can associate each one with a specific camera from their Inspectors.

**PROTIP:** Though the 2.5D camera can’t move, you can still have scrolling cameras in your 2.5D scene. That camera type is really just for convenience, and you can just drop in a GameCamera2D prefab if you want to have a moving one instead. For more on scrolling in 2.5D games, see [this tutorial](#).
1.6.3. Adding colliders and/or a NavMesh

We can now work on allowing our characters to move around. We’ll start with the floor, which all 3D characters require (unless unaffected by gravity). We can make one either by using Unity’s own colliders, or the **CollisionCube** prefab that is listed in the Scene Manager:

![Image of Scene Manager with Collision Cube selected]

Double-click this prefab type, and a blue cube will be created in the scene. Manipulate its transforms so that the top face covers the whole ground. This cube won’t be visible during gameplay – it’s used purely as a “barrier” to prevent characters from falling.

![Image of scene with blue cube]

Be sure to check how this looks with the background (see Adding backgrounds and cameras) – the orientation of the background camera should match the scene objects:
If the Player character uses anything other than point-and-click control to move during gameplay, colliders will also need to be created for the walls to prevent him from clipping through the set.

**PROTIP:** The 3D Demo game has wall colliders even though it uses point-and-click movement. This is so that you can experiment with different movement types in the scene to see which one suits your own game.

Now we will want a Navigation Mesh, or NavMesh, which marks the area in a scene over which our characters can move around through pathfinding. In 3D scenes, we can use either provide a custom mesh or bake one with Unity's own navigation tools. If you choose to use a custom mesh, be sure to assign it as the Default NavMesh in the Scene settings.
1.6.4. Adding scene sprites

Scene sprites can be used whenever we want to overlay some of the background over our characters (when behind a wall, for example), or when we want to animate a portion of the screen.

Any such sprites in our scene will differ from normal 2D images because they need to be aligned to the camera, and only visible when a given camera is active. AC’s **Scene sprite** prefab allows us to make these easily:

This prefab type contains a standard Sprite Renderer, and the **Align To Camera** and **Limit Visibility** components, which we can use to meet the requirements above.
1.6.5. Adding interactivity

We can create an opening cutscene by assigning an On Start cutscene, under Scene cutscenes in the Scene Manager. A cutscene is a collection of Actions that chain together to form a sequence of events. For more, see Actions and ActionLists.

**PROTIP:** OnStart cutscenes will play whenever a scene opens through gameplay (i.e. if the game begins from this scene, or the player enters it from another scene). OnLoad cutscenes will play whenever a scene opens due to loading a save game or switching Player character. If you want to run a set of Actions regardless of how the scene is opened, place them in a separate Cutscene and have it shared by both OnStart and OnLoad.

To make the scene interactive, you can populate it with logic objects, such as Hotspots and Triggers, listed under the “Logic” pane of the Scene prefabs in the Scene Manager:

![Logic pane](image)

For more on Hotspots and other types of interactivity available, see Interactions.

We can now give the scene some life by adding characters, including our Player. This is covered in Creating characters.

**PROTIP:** The 3D Demo's player prefab, Tin Pot, is designed to work with a variety of play styles and is useful when testing a scene if you don't yet have a Player of your own. Just drop him into the scene and run it – he'll override whatever prefab you have assigned in your Settings Manager.
1.7. Updating Adventure Creator

Adventure Creator is frequently updated with new features, and it's a good idea to download the latest update when it becomes available.

AC can detect updates for you by choosing Adventure Creator → Check for updates in the top toolbar.

You can update Adventure Creator from your Unity Asset Store account. Choose Windows → Package Manager from the top toolbar, then opt to view “My Assets” from the top left.

The contents of each update are listed within the changelog file within the root AdventureCreator folder. At the top of each version’s release notes is the Upgrade notes section, which describes any change made that may affect your game or you need to be aware of. You should read these notes thoroughly after updating.

⚠️ NOTE: Please read the upgrade notes thoroughly after updating. If you are “jumping” between updates (e.g. updating from v1.48 to v1.60), be sure to read the upgrade notes for each release in between.

If you import the full package, your Manager asset references will be reverted back to the 3D Demo game’s. You can re-assign your own Managers by finding the Manager Package file that the New Game Wizard created for you, and either double-clicking on it or clicking Assign managers from within its Inspector.

Alternatively, you can avoid this by not re-importing the References file in Assets/AdventureCreator/Resources. It is this file that keeps track of which set of Managers are currently-assigned.

⚠️ NOTE: When updating AC at the same time as a major Unity release (e.g. Unity 5.6 to Unity 2017.1), be sure to update AC before moving to the new version of Unity.
1.8. Project settings

When using Unity 2019.2 or later, AC has its own entry in Unity’s **Project settings** window. This can be accessed by choosing **Edit -> Project Settings**... from the top toolbar.

Here, it is possible to fine-tune some of the Editor settings such as gizmo colours, and Hierarchy icon placement.
2. Input and navigation
2.1. Input and navigation overview

Choosing how an AC game plays generally comes down to three key areas:

**Movement**
How the Player (if there is one) is moved around during gameplay

**Input**
The input device used to play the game

**Interaction**
How Hotspots, NPCs and Inventory items are used

Each of these can be changed at any time within the Settings Manager, under Interface settings:

![](Interface_settings.png)

**PROTIP:** What you choose for these options will affect not only the way your game plays, but also the way it is built. Playing around with the demo games is a good way to experiment: you can change the values and see what effect they have instantly.

Some settings will lead to more options becoming available – the Settings Manager will only show fields that are relevant to your game’s play style. You make need to define additional inputs, too – you can see a list of what inputs your game can make use of under the Available inputs section of the Settings Manager.

The various interaction modes are discussed later – see Interactions. The rest of this section is dedicated to input and navigation.
2.2. Movement methods

A game’s movement method refers to how Player characters are controlled during gameplay. It has the following options:

**Point-and-click**
The Player is controlled by clicking where you want him to go via pathfinding.

**Direct**
The Player is controlled by moving him directly with keyboard keys / gamepad buttons.

**First person**
The Player moves and looks in first-person.

**Drag**
The Player is controlled by dragging the cursor in the direction you want him to move.

**Straight-to-cursor**
The Player will move directly to the cursor whenever a click is held.

**None**
The Player will not move unless instructed through ActionLists.

The Movement method is chosen in the Settings Manager, under Interface settings:

![Interface settings]

NOTE: This setting can be changed at any time with the Engine: Manage systems Action. However, as this affects the asset file itself, changes made to it will not be reverted when the game ends. If you do this, be sure to set the default value as part of your game’s ActionList on start game, as set in the Settings Manager.
2.2.1. Point-and-click movement

Point-and-click control is the most common way of moving in adventure games, with titles such as Monkey Island and The Longest Journey controlled in this way. If you left-click your cursor in the scene but not over an interactive object, the Player will make their way there. The effect of double-clicking can be modified in the Settings Manager, but is set to make the player run by default. On mobiles, this equates to single- and double-tapping.

You can also map control to the InteractionA input button, which is necessary if your game is played with a gamepad. If you wish to remove the default mouse behaviour, uncheck Left and right mouse clicks have default functionality? in the Settings Manager.

As this style makes heavy use of pathfinding to move the player around the scene, you will need to define a NavMesh for every scene – see Pathfinding methods.

If you are making a 3D game that involves gravity, you will also need to create at least one collider in every scene to act as a floor – see Adding colliders.

There are several options under Movement settings in the Settings Manager that relate to how the player's destination is determined. The NavMesh search % setting allows you to choose how far from the cursor the game will search for a NavMesh, if one was not clicked on directly. If this is greater than zero, you can use the NavMesh search direction to determine if the search is conducted radially outward from the cursor, or straight down.

The Destination accuracy slider determines “how close is close enough” when checking if the Player has reached their target. This may need to be reduced if your characters have a small scale.

If you have NPCs moving around as well, or some other dynamic element, you will need to set a non-zero Pathfinding update time, so that pathfinding can be recalculated mid-movement.

You can optionally supply a Click marker prefab, which appears in the scene when you click, at the player character's intended destination. A sample click marker can be found in Assets/AdventureCreator/Prefabs/Navigation/ClickMarker.
2.2.2. Direct movement

Direct movement allows you to control the player's movement directly, with either the keyboard, a controller, or on-screen buttons. Telltale's The Walking Dead series employs this movement method.

NOTE: When under Direct control, the Player does not take notice of the NavMesh – they are instead blocked by Colliders, which act as invisible walls to prevent them from clipping through the set.

When used on a touch-screen, this mode behaves like Drag movement. Otherwise, Horizontal and Vertical input axes are required. Run, ToggleRun and Jump are also valid, though Jump is only available for 3D Characters. For a description of these axes, see input descriptions.

If you want the intensity of the Horizontal and Vertical axes to affect the player's speed, check the Input magnitude affects speed? setting under Movement settings in the Settings Manager. Checking Account for player's position on screen? will cause pressing “down” (for example) to result in the player walking towards the camera, rather than just away from the camera's point of view.

If the camera cuts to a different angle, his will continue his direction until the user changes the input – this prevents the player moving in an unintended direction if the angle changes sharply. Note that the ActionList that performs this camera cut must be a background process. The angle threshold used by this process is set by the Max camera lock angle slide.

When input is released, the Player will continue moving towards the direction that the input was last indicating. This effect can be disabled by checking the Stop turning when release input? option.

The Direct-movement type setting allows you to instead enable Tank controls, in which the Horizontal axis rotates the Player on the spot.
2.2.3. First-person movement

First-Person control lets you navigate your game from the player character’s point of view, with the ability to look around freely.

When used on a touch-screen, it works by dragging one or two fingers (based on options chosen). Otherwise, Horizontal and Vertical axes are required for movement, and CursorHorizontal and CursorVertical axes are required for aiming.

To aim with the mouse, map those last two axes to the X and Y axes respectively.

**PROTIP:** A pre-made first-person Player prefab is available online.

Run, ToggleRun and Jump are also valid. For a description of these axes, see Input descriptions.

To control a Player prefab in first-person, you must update the prefab by giving him a new child GameObject and attaching both the Camera and First Person Camera components. The Camera component itself should be disabled:

![Camera components](image)

Position this GameObject such that the camera appears where the Player’s head should be. The 3D Demo game’s Player prefab, is equipped with such a camera:
The First Person Camera component provides various free-aiming options, while aiming smoothness and the maximum free-aim speed being controlled under Movement settings in the Settings Manager.

To be able to free-aim during gameplay, the cursor must be locked (see Cursor locking). You can also use the Player: Constrain Action to enforce free-aiming at all times.

During normal gameplay, the first-person camera will automatically be used regardless of the Default camera field in the Scene Manager. You can still switch camera during cutscenes with Actions. To allow for camera-switching during Conversations, uncheck Run Conversations in first-person?, also under Interface settings.

**PROTIP:** You can also switch to another movement method at any time by using the Engine: Manage systems Action. This is useful if you want to have “close-up” sequences where you want to be able to interact with certain objects from a fixed perspective camera. Just be sure to use this Action in your game’s ActionList on start game (defined in the Settings Manager) so that it begins with the correct value.

**NOTE:** Is your first-person Player only moving forward? Make sure their Animator’s Apply root motion option is unchecked, as this can cause movement issues.

**PROTIP:** A first-person Player prefab doesn’t need any graphics attached – you can get by with just a Player base object with a First-person child camera.
2.2.4. Drag movement

In this mode, the player can navigate a scene by clicking and dragging the left mouse button, or by pressing an input button named Interaction. The Settings Manager provides options for how the "drag distance" is visualised on-screen.

**NOTE:** Similar to Direct movement, the Player does not take notice of the NavMesh – they are instead blocked by Colliders, which act as invisible walls to prevent them from clipping through the set.

**PROTIP:** The drag direction is shown as a simple line by default, but this can be disabled in favour of your own UI through custom events. An example script that displays an on-screen joystick (as common with mobile games) can be found in the AC wiki here: adventure-creator.wikia.com/wiki/Mobile_joystick_example
2.2.5. Straight-to-cursor movement

Straight-to-cursor control causes the Player to move towards the cursor whenever the mouse button (or tap, for Touch Screens) is held down. The InteractionA input button can be used as well.

If a non-zero Pathfinding update time is set in the Settings Manager, then the player will pathfind to the cursor by this frequency. Otherwise, no pathfinding will occur, and the player will move directly towards the cursor every frame.

The Run threshold determines how far away the Player must be to start running, and how closely the Player will follow the cursor – use higher values if the Player starts circling the cursor continuously.

With the Single-clicking also moves Player? option, you can also determine whether or not a single-click will cause the Player to move – much like regular Point-and-click movement. The Click/hold separation slider determines how long a click must be held before it is recognised as a “hold” and the Player will stop moving when released.

If your Player does not move via pathfinding, they will only ever move in a straight line. Therefore, unless you want pathfinding in Cutscenes or for NPCs, you do not need to set up a Pathfinding method for your scenes. You simply need a Collider that is able to "receive" the cursor clicks on the floor. A Box Collider or Collision Cube, that marks out the floor and placed on the Default layer, will suffice.
2.2.6. Ultimate FPS integration

![NOTE: This section refers to the legacy UFPS asset. For integration with Opsive's Ultimate FPS asset, see this page on the AC wiki.]

Adventure Creator can work with Ultimate FPS, which is a separate package available on the Unity Asset Store, and a popular choice for those making first-person games.

As Ultimate FPS is a Complete Project asset, it will overwrite your Inputs, Tags and Layers settings when you import it. Since it has more changes to make than Adventure Creator, it is advised to import it first, let it overwrite your settings, and then install Adventure Creator.

Integrating UFPS with Adventure Creator comes down to five key steps:

- Set your game's Movement method (in the Settings Manager) to First Person.
- Add the UltimateFPSIsPresent scripting define symbol.
- Add the UltimateFPSIntegration component to your UFPS character. This script will add other components it requires automatically.
- Untag the FPS Camera object, so that it is no longer tagged as MainCamera. The component added in step #3 will re-tag it at runtime.
- Attach AC's First Person Camera component to a child of the character's root. This is only necessary for controlling the camera's pitch angle via the Character: Face object Action.

Alternatively, ready-made player prefabs are available online.

Just as with regular first-person movement, the mouse cursor can locked to allowing free-aiming, and unlocked to allow menu navigation. For more, see Cursor locking.

PROTIP: The integration provided between AC and UFPS allows for a general link between the two assets. However, the specific needs for such a link may vary from game to game. The integration, therefore, is designed to be easily modified through custom scripting. The provided integration is isolated to the UltimateFPSIntegration.cs script, meaning you can copy it and amend it to suit your specific needs.

UFPS integration is also covered as part of the Making a first-person game video tutorial.
2.3. Input methods

Adventure Creator provides three methods of input:

**Mouse and keyboard**
Which allows for mouse control, with optional keyboard control for movement.

**Keyboard or controller**
Which allows for strict keyboard or gamepad control, with no mouse.

**Touch-screen**
Which allows for control on mobile devices.

The **Input method** is chosen in the Settings Manager, under **Interface settings**:

![Interface settings](image)

A list of available inputs can also be found in the Settings Manager. For details on what each input is used for, see **Input descriptions**.

It is not generally necessary to change this value during gameplay, but – like any Manager field – it can be changed through code – see **Custom scripting**.

**NOTE:** Inputs don’t necessarily need to be mapped to Unity’s Input Manager – they can also be simulated via **Menu Button** clicks, and through **script**. Scripting can also be used to remap inputs at any time – see **Remapping inputs**.
2.3.1. Mouse and keyboard input

This is the most common input type for traditional adventure games on PC.

A game with this input can be completely mouse-driven, or share input duties with the keyboard. For example, a Direct movement game can rely on the mouse for interacting, and the keyboard for movement.

With this type, interaction is automatically mapped to the mouse buttons – with the left mouse button used to interact with Hotspots and Inventory items, begin point-and-click movement, and click Menu buttons. When using Context sensitive interactions, the right mouse button is used to examine.

Double-clicking can be used to run to Hotspots or instantly run their interactions. To tweak the speed that clicks register, locate the scene’s GameEngine object and adjust the PlayerInput component’s Click Delay and Double Click Delay values:

![Player Input Component](image)

Click behaviour can also be achieved by invoking Input buttons named InteractionA and InteractionB respectively. You can rely on this instead of the default mouse behaviour by unchecking Left and right mouse clicks have default functionality? in the Settings Manager.
2.3.2. Keyboard or controller input

This input type is necessary if you want to do without a mouse, and rely solely on either a keyboard or a gamepad for input.

With this type, interaction is handled via Input buttons named InteractionA and InteractionB. InteractionA is used to interact with Hotspots and Inventory items, begin point-and-click movement, and click Menu buttons. When using Context sensitive interactions, InteractionB is used to examine.

Just because this input type does not use the mouse, you can still control a simulated cursor (provided that it is unlocked, see Cursor locking). To move the cursor, use Input axes named CursorHorizontal and CursorVertical. The speed of the cursor can be adjusted within the scene’s GameEngine object, via the PlayerInput component’s Cursor Move Speed value:

Options are provided at the top of the Menu Manager to let you dictate how Menus are navigated when the game is paused or a Conversation is active. By default, they are navigated with the Horizontal and Vertical inputs, as opposed to the cursor:

If you wish to navigate Menus directly during normal gameplay, use the Engine: Manage systems Action to unlock this ability – otherwise, a cursor will be necessary. For more, see Navigating menus directly.

NOTE: Enabling direct Menu navigation during gameplay doesn’t disable Player movement automatically. This should generally be done in conjunction with the Player: Constrain Action so that you only control either Menus or the Player at any one time.
2.3.3. Touch-screen input

This input method is used to enable AC-made games to work on iOS and Android.

Choosing touch-screen input will adapt your game’s Movement method if necessary. Direct movement will now work by dragging a finger across the screen. First Person movement can work a number of ways – for example, one touch moves while two touches turns. If one is required, a drag line can be drawn to indicate the direction and size of the drag, using the fields in Movement settings in the Settings Manager:

![Movement settings](image)

**PROTIP:** The “drag line” can be replaced with custom graphics by using the OnUpdateDragLine Custom event. An example script that replaces this line with a joystick can be found in the AC wiki: [http://adventure-creator.wikia.com/wiki/Mobile_joystick_example](http://adventure-creator.wikia.com/wiki/Mobile_joystick_example)

Further touch-screen–related options can be found under the Touch Screen settings:

![Touch-screen settings](image)

**NOTE:** By default, Hotspots are activated with two taps – one to highlight them, and another to interact. This is so that the player doesn’t use a Hotspot by mistake. This behaviour can be replaced with a single–tap interface, however, by unchecking Activate Hotspots with double–tap?.

In Context sensitive mode, objects are examined by placing a second finger down on the screen while the first finger is still touching. You can simulate this effect in the Unity Editor by right–clicking on a Hotspot while the left mouse button is held down.

In Choose Hotspot Then Interaction mode, a game can make use of an Interaction menu that appears once a Hotspot is selected, which contains a list of Interaction icons. By default, selecting a Hotspot and then an Interaction icon requires two separate taps, but this can be reduced to a tap, hold, and release by checking Trigger interactions by releasing tap?.

The Moving touch drags cursor? option causes cursor to be dragged, as opposed to being at the position of the touch at all times.
If your game is in *First Person*, an additional **First-person movement** field will show – allowing you to choose how movement on a touch-screen is conducted. If set to **Custom Input**, then movement will be controlled by overriding (or simulating) the **Horizontal** and **Vertical** axes, and free-aiming by overriding the **FreeAimDelegate**. For more, see *Remapping inputs*.

Similarly, if your game uses **Direct movement**, an additional **Direct movement** field will show. By default, this is set to **Drag Based**, which means the Player is moved by dragging across the screen. However, if set to **Custom Input**, then movement will be controlled by overriding (or simulating) the Horizontal and Vertical axes. For more, see *Remapping inputs*.

**PROTIP:** By default, AC will limit its display area to the mobile device's "safe area". This prevents UI or gameplay elements from being obscured by e.g. a phone's notches, if present. This can be disabled, however, by unchecking **Limit display to 'safe area'?** in the *Settings Manager*. 
2.4. Pathfinding methods

Point-and-click movement relies on pathfinding to navigate the Player. Pathfinding is also used whenever a character – NPC or Player – is instructed to move during a cutscene.

Adventure Creator provides three methods of pathfinding:

Unity Navigation
Which uses Unity’s NavMesh baking tools. This is the default for 3D games.

Mesh Collider
Which relies on a custom mesh collider for the NavMesh’s shape.

Polygon Collider
Which uses Unity’s Polygon Collider 2D component, and is used for all 2D games.

Additionally, a custom pathfinding algorithm can be implemented through scripting – see Custom pathfinding.

The pathfinding method is set on a per-scene basis within the Scene Manager:

Be mindful of your game’s scale – the default settings work best when using a scale of 1 Unity unit = 1 metre. If your scale is very different, you may have to adjust the Destination accuracy slider in the Settings Manager. Larger art should have a lower value, and smaller art should have a higher one. More more on accurate pathfinding, see Precision movement.

By default, characters will make one path calculation before moving to a set point in the scene. However, the Settings Manager’s Pathfinding update time (s) value can be used to enforce regular recalculations as they move. This may necessary if your game features NPCs moving around, so that the Player can avoid them dynamically.
2.4.1. Unity Navigation pathfinding


**PROTIP:** For a tutorial on creating NavMeshes with this method, see [here](#).

Once a NavMesh is baked, characters will rely on it when pathfinding. However, point-and-click movement requires an additional step: the floor collider must be on the NavMesh layer, and marked as Navigation Static.

**PROTIP:** Characters have their own motion system, but you can use NavMeshAgent components if you prefer. To do this, simply add the component together with the Nav Mesh Agent Integration script. This script can be duplicated and amended to suit your own needs.
2.4.2. Mesh Collider pathfinding

Mesh Collider–based pathfinding is the default pathfinding method, and involves creating custom 3D meshes to mark out the area over which characters can walk. Such a mesh can be created in an external modelling tool such as Blender:

![Mesh Collider example](image)

Because of the need for mesh creation, it can take more time to set up than Unity Navigation, but is dynamic – different NavMeshes can be swapped out when the layout of the scene changes.

Once the Pathfinding method field in the Scene Manager has been set to Mesh Collider, the Navigation panel will allow you to create a NavMesh prefab:

![Navigation panel](image)

This prefab type features a Mesh Collider component. Assign your custom mesh as this component’s Mesh field:

![Mesh component](image)

The mesh will now show up in green in the scene. Position the object so that it marks out the floor, and assign it in the Scene Manager’s Default NavMesh field. This places the NavMesh on the correct layer during gameplay.
You can use the **Scene: Change setting** Action to change the active NavMesh at runtime. The **3D Demo** game does this when the barrel is tipped over. Click on each object, with the Mesh Collider component open, to see the difference between the two.

Navigation Meshes can be made visible when not selected via the Scene Manager’s **Visibility** panel. Provided your scene has an active NavMesh with a Mesh Renderer component, it can be shown and hidden using the On and Off buttons.

**NOTE:** This method does not allow for other objects to dynamically affect pathfinding. If the NavMesh connects two rooms, but the door between them is closed, characters will attempt to walk through the door. You can get around this by swapping your NavMesh for another when your scene layout changes.
2.4.3. Polygon Collider pathfinding

Polygon Collider–based pathfinding is only a valid option when making a 2D game. It involves using the shape of Unity's Polygon Collider component as a NavMesh, and can be modified during gameplay.

Once the **Pathfinding method** field in the Scene Manager has been set to **Polygon Collider**, the Navigation panel will allow you to create a NavMesh2D prefab:

![Navigation Panel](image)

It will appear in your scene as a pentagon. You can use its Polygon Collider component to reshape it to fit the scene's walkable area:

![Pentagon in Scene](image)

**NOTE:** Keep the number of points to its bare minimum, as the speed of the algorithm is dependent on how complex the shape is.

One adjusted, assign it in the Scene Manager’s Default **NavMesh** field. This places it on the correct layer during gameplay.

Holes in your NavMesh can be created with other Polygon Colliders. Attach a Polygon Collider 2D to an empty GameObject, shape it as a hole, and then add it to the **Navigation Mesh** component after increasing the **Number of holes** value by 1. When the game begins, the hole will be incorporated into the NavMesh:
This method can also be used to add walkable areas together – if the “hole” Polygon Collider overlaps the boundary of the original NavMesh, then it will be added onto the NavMesh instead – rather than being subtracted.

**PROTIP:** To improve scene startup time, NavMesh holes can be “baked” into the NavMesh. Just click “Bake” in the NavMesh’s Inspector, then disable the hole objects.

The active NavMesh, and the number of holes it has, can be changed during gameplay with the Scene: Change setting Action. This can be used to e.g. allow the player to walk where a removed object was once placed in the scene.

**NOTE:** This method does not allow for other objects to dynamically affect pathfinding. If the NavMesh connects two rooms, but the door between them is closed, characters will attempt to walk through the door. You can get around this by changing the NavMesh when your scene layout changes.

You can also add additional Polygon Collider 2D components onto the same NavMesh GameObject to create separate regions that cannot be accessed directly. This is useful if you want to have NPCs walking around, without the player being able to move to them:

These additional colliders must have **Is Trigger** checked, and be kept separate from one another. Note that character evasion and NavMesh hole features will only apply to the first collider on the NavMesh.
Be aware that you may encounter problems if your NavMesh’s scale is too small, which may be the case if you are using a low-resolution (e.g. 320x240) art style. You can tell if your scale is wrong by either comparing your graphics to that of the included 2D Demo, or by looking at the white squares that break up a Character's path when pathfinding – they should be tiny dots in the Scene window compared with the rest of the scene:

If they are overly large, your scene is likely too small and you will have to scale up your geometry. You can scale up your scene sprites by reducing the Pixels Per Unit value in sprites’ Texture import settings.

The Navigation Mesh component features a number of options related to character-evasion. For performance reasons, this defaults to Only Stationary Characters – but can be made to affect all characters if desired. In order for a character be evaded, they must have a Circle Collider 2D component at their feet on their root object.

**NOTE:** For completely dynamic pathfinding around moving characters, be sure to set a non-zero Pathfind update time value in the Settings Manager. This will force a recalculation of a character’s path while on the move, so that they can account for any changes in the scene.

**PROTIP:** For a performance boost, you can lower the Accuracy slider. The optimal value of this slider will depend on your game’s scale, NavMesh size, and target platform, but should generally only be set below 1 if you experience slowdown when pathfinding. For more performance tricks, see Performance and optimisation.
2.4.4. Custom pathfinding

Each pathfinding method is written in a separate script, which are all subclasses of the NavigationEngine ScriptableObject class. Which script is used in a scene is determined by the Pathfinding method option in the Scene Manager.

To integrate a new pathfinding script, set the Pathfinding method to Custom, and then enter the name of your NavigationEngine subclass into the box that appears beneath:

![Scene settings interface with Pathfinding method set to Custom and Script name set to MyCustomAlgorithm]

Writing a new pathfinding method involves overriding the functions within NavigationEngine with your own.

The only essential function is GetPointsArray, which takes two Vector3s as inputs and returns a Vector3 array that describes the path. Other functions, such as SetVisibility and SceneSettingsGUI can be used to better integrate the method into your workflow, but are not necessary.

For the script to be useable when working with Unity's 2D view (i.e. make use of Physics2D raycasts), the is2D boolean must be set to True. This can be done within the OnReset function, which is called when the scene begins.
2.5. Cursor locking

While most games rely on a cursor (mouse-driven or otherwise), you can prevent it from moving by locking it. Locking the cursor allows you to give total input control to e.g. a gamepad, and is necessary for aiming in first-person movement.

The default locked state of the cursor can be set under Interface settings in the Settings Manager, with Lock cursor in screen's centre when game begins? You can optionally choose to hide the cursor and prevent interactions when it is locked.

The player can unlock the cursor at any time by invoking an input button named ToggleCursor. This allows you to create two distinct gameplay modes – one for movement, and another for interactivity.

Alternatively, the state of the cursor can be enforced using the Player: Constrain Action.

If mouse and keyboard input is enabled, the cursor is automatically unlocked when a Menu pauses the game. If you wish to rely on a completely cursor–free input, switch to Keyboard Or Controller input instead. Disabling free–aiming while in first–person will also unlock the cursor.

**PROTIP:** A practical example of how cursor locking can be used is given when creating a custom inventory interface in the Making a first–person game video tutorial.

**PROTIP:** It is also possible to limit the software cursor’s range of movement to the boundary of a Menu. This can be done by setting the PlayerCursor script’s LimitCursorToMenu property through script.
2.6. Active inputs

Active Inputs are a series of pre-defined Input buttons that trigger ActionList assets when pressed. Typical examples of their use include:

- Opening either a “title” or a “pause” Menu, depending on the current scene
- Backing out of a close-up of a set of interactive objects

To access the Active Inputs Editor window, choose Adventure Creator -> Editors -> Active Inputs from the top toolbar:

Each Active Input requires an Input button or axis name, an ActionList asset to run, and the conditions that it runs under. These conditions can be any of four values:

**Normal**
The state during normal gameplay

**Cutscene**
The state while the game is in a gameplay-blocking cutscene

**Paused**
The state while the game is paused

**DialogOptions**
The state while a Conversation is active, and dialogue options are displayed on-screen

If an active input references an axis, then an **Axis threshold** value must be set. If this is positive, then the ActionList will run only when the input exceeds this value. If negative, then the same will be true but in the negative direction.

**NOTE:** The Input button field must match the name of the input as listed in Unity’s Input Manager, not the button itself.

If you wish for an Active Input to work during multiple game states (i.e. during both gameplay and cutscenes) you must define two separate Inputs – one for each state. Multiple Active Inputs can share the same ActionList asset, however.

Active Inputs can be enabled and disabled at runtime using the Input: Toggle active Action.
NOTE: Active Inputs are stored within the Settings Manager asset. If you change your Settings Manager, any Active Inputs previously defined will no longer be present.
2.7. Input descriptions

Adventure Creator makes use of a number of different inputs that need to be defined in Unity's Input Manager (Edit -> Project settings -> Input). What inputs will be used, however, depends on how your game is played, and what settings you've chosen.

A full list of inputs available to your game can use can be found within the Settings Manager. The following is a list of each possible input, and what it is used for:

**Horizontal (Axis)**
Moves the player when using Direct or First-person movement, as well as navigate menus with a keyboard/controller.

**Vertical (Axis)**
Moves the player when using Direct or First-person movement, as well as navigate menus with a keyboard/controller.

**InteractionA (Button)**
Acts in the same way as a left-click. It is used to interact with on Hotspots, Menus and NavMeshes.

**InteractionB (Button)**
Acts in the same way as a right-click. It is used to examine Hotspots when in Context sensitive mode.

**CursorHorizontal (Axis)**
Moves the cursor along the screen's X-axis when using First-person movement or Keyboard or controller input.

**CursorVertical (Axis)**
Moves the cursor along the screen's Y-axis when using First-person movement or Keyboard or controller input.

**ToggleCursor (Button)**
Toggles the cursor's "locked" state on and off during gameplay. When the cursor is locked, it is placed in the centre of the screen and cannot be moved. When used in a First-person game, locking the cursor allows the player to free-aim. For more, see Cursor locking.

**Run (Button/Axis)**
When held down during Direct or First-person movement, causes the player to run when moving.
**ToggleRun** (Button)
When pressed during Direct or First-person movement, toggles the player’s ability to run.

**Jump** (Button)
Causes a 3D Player to jump, if used with Direct or First-person movement. The Player must have either a Rigidbody or Character Controller attached.

**Mouse ScrollWheel** (Axis)
Zooms a First-person camera in and out.

**CycleHotspots** (Axis)
Cycles the highlighted Hotspot when the **Hotspot detection method** is set to Player Vicinity.

**CycleHotspotsLeft** (Button)
Cycles the highlighted Hotspot left when the **Hotspot detection method** is set to Player Vicinity.

**CycleHotspotsRight** (Button)
Cycles the highlighted Hotspot right when the **Hotspot detection method** is set to Player Vicinity.

**CycleInteractions** (Axis)
Cycles the highlighted Interaction when the **Interaction method** is Choose Hotspot Then Interaction.

**CycleInteractionsLeft** (Button)
Cycles the highlighted Interaction left when the **Interaction method** is Choose Hotspot Then Interaction.

**CycleInteractionsRight** (Button)
Cycles the highlighted Interaction right when the **Interaction method** is Choose Hotspot Then Interaction.

**CycleCursors** (Button)
Cycles through the next available cursor type when the game allows for it. This is either when the **Interaction method** is Choose Interaction Then Hotspot, or when it's Choose Hotspot Then Interaction and Select interactions by is set to Cycling Cursor And Clicking Hotspot.

**CycleCursorsBack** (Button)
Cycles through the previous available cursor type when the **Interaction method** is **Choose Interaction Then Hotspot**, or when it's **Choose Hotspot Then Interaction** and **Select interactions by** is set to **Cycling Cursor And Clicking Hotspot**.

- **DefaultInteraction**
  If the **Interaction method** is **Choose Interaction Then Hotspot**, invokes the active Hotspot or Inventory item’s first-enabled interaction. Note that either **Set first ‘Use’ Hotspot interaction as default?** or **Set first ‘Standard’ Inventory integration as default?** must be checked in the Settings Manager – the latter of which is only displayed if **Inventory interactions** is set to **Multiple**.

- **FlashHotspots (Button)**
  Briefly flashes all **Hotspots** in the scene, provided that they have a **Highlight** component correctly assigned. This can be used to make the player aware of all interactive objects in a scene.

- **SkipSpeech (Button)**
  Skips the current speech or subtitle. Depending on the choices made in the **Speech Manager**, this can instead advance a scrolling–subtitle to the end first.

- **EndCutscene (Button)**
  Skips the current set of gameplay–blocking ActionLists – see **Skipping cutscenes**.

- **EndConversation (Button)**
  Ends the current **Conversation**. Note that this will not result in any "exiting" sequence, such as the player saying goodbye.

- **DialogueOption[1–9] (Button)**
  Chooses a dialogue option, when a **Conversation** is active. Each option is mapped to a separate input: DialogueOption1, DialogueOption2, etc.

- **ThrowMoveable (Button)**
  Throws the current **PickUp** object, if it allows for it. Holding down this button will increase the throwing force when released.

- **RotateMoveable (Button)**
  Rotates the current **PickUp** object, if it allows for it. Rotation will be possible while this button is held down.

- **RotateMoveableToggle (Button)**
  Rotates the current **PickUp** object, if it allows for it. This button will toggle the ability to rotate on and off.
ZoomMoveable (Axis)
Zooms the current PickUp object towards or away from the camera, if it allows for it.

The list of available inputs will also include any Active inputs, and inputs mapped to Menus with an Appear type of On Input Key.

**NOTE:** Inputs don’t necessarily need to be mapped to Unity’s Input Manager – they can also be simulated via Menu Button clicks, and through script. Scripting can also be used to remap inputs at any time – see Remapping inputs.
2.8. Remapping inputs

The GameEngine’s PlayerInput script uses custom functions to detect input, which are called throughout AC in place of Unity’s standard functions, such as Input.GetButtonDown.

These functions can also be overridden using delegates, meaning your game’s control scheme can be changed on the fly, or integrated with a third-party input manager asset.

**PROTIP:** A tutorial on using these delegates in practice can be found online. The World Space Cursor Example component uses them to override the cursor position.

The following table shows the available functions that can be overridden using delegates:

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<th>Unity function</th>
<th>PlayerInput function</th>
<th>Delegate override</th>
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<tbody>
<tr>
<td>bool Input.GetButtonDown (string name)</td>
<td>bool InputGetButtonDown (string name)</td>
<td>bool InputGetButtonDownDelegate (string name)</td>
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<td>bool Input.GetButtonUp (string name)</td>
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<td>float Input.GetAxis (string name)</td>
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<td>Vector2 Input.mousePosition</td>
<td>Vector2 InputMousePosition (bool cursorIsLocked)</td>
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<td>Vector2 Input.GetTouch (int index).position</td>
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<td>bool Input.GetMouseButtonDown (int button)</td>
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<td>bool Input.GetMouseButton (int button)</td>
<td>bool InputGetMouseButton (int button)</td>
<td>bool InputGetMouseButtonDelegate (int button)</td>
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</tbody>
</table>
When moving in First person, the free-aim vector is normally calculated by combining both the CursorHorizontal and CursorVertical axis values into a 2D vector. However, this too can be overridden with the InputGetFreeAimDelegate override.

Delegates are mapped to function within your own script to override them. For example, the cursor position can be overridden with:

```csharp
void Start ()
{
    AC.KickStarter.playerInput.InputMousePositionDelegate = CustomMousePosition;
}

Vector2 CustomMousePosition (bool cursorIsLocked)
{
    return Input.mousePosition;
}
```

**NOTE:** Delegates are assigned per-scene. Such code must be run in each scene you wish to override input in. The OnAfterChangeScene custom event can be used for this.
3. Characters
3.1. Creating characters

A game can feature two types of characters: Players and NPCs.

The steps involved to create either type is largely similar, and the differences are detailed in the sections linked above. This section will cover the elements that all characters have.

The quickest way to get characters into your game is to use the Character wizard, which adds the necessary scripts and components onto a model or sprite.

NPCs require the NPC script, while Players require the Player script – each attached to its root GameObject.

PROTIP: A character’s type cannot be changed at runtime, but can be converted between an NPC and Player while in Edit mode via the Inspector’s cog menu.

NOTE: In the case of 2D characters, the main sprite must be a child in their hierarchy, with the Player/NPC component on the root object. The sprite must then be assigned as the Sprite child inside this component. This is automatic when using the wizard.

The inspectors for both the Player and NPC scripts are identical, and have fields grouped into sub–panels:

Animation settings

The first field you should set for any new character is its Animation engine. The Motion control setting allows you to disable AC’s own movement code in favour of a custom motion controller. The Animation engine chosen will determine the contents of the panel beneath. For more information about this panel, refer to the section on your chosen engine.
Movement settings

This panel stores motion options and speed values.

**PROTIP:** If you are making a low-resolution 2D game and want pixel-perfect pathfinding, consider Retro movement.

Physics settings

This panel stores physics and Rigidbody options, provided one is attached. The Move with Rigidbody? option allows you to decide if a character is moved by applying forces to their Rigidbody, or have their transform set directly. If a character is found to be sliding on slopes, the Freeze Rigidbody when Idle? checkbox can help prevent this.

**NOTE:** If a character relies on a Rigidbody (3D or 2D) for movement, their rotation will automatically frozen at all times. If Freeze Rigidbody when Idle? is checked, then their position will also be frozen when standing still. Otherwise, you are free to freeze individual position axes – though this is not recommended for characters who rely on pathfinding.

**NOTE:** Characters can still move without a Rigidbody, which can be processor-intensive if your game features many of them. Consider removing them from NPCs, and Players that do not need to pass through Triggers, or move vertically in the scene. You can also use a Character Controller in place of a Rigidbody and Capsule Collider, giving you the ability to limit a Player's slope limit, for example.

2D characters in 2D games work with a Rigidbody2D component instead – but this too is optional depending on your requirements. In Unity 5.6 and later, if your character relies on Point and click control, best performance is achieved by setting the Body Type field to Kinematic. If instead you are using Direct control, unchecking Turn root object in 3D? will reduce jittering.
Audio clips

This panel allows you to quickly assign walk and run sounds the character, provided that they have an SFX Sound child (just a child GameObject with the Sound component). If no Speech AudioSource is defined, the AudioSource on the root object will be used for speech.

**PROTIP:** For greater control over a character’s movement sounds, unset the Walk sound / Run sound fields and make use of the Footstep sounds component instead.
Dialogue settings

This panel allows you to configure the appearance of Subtitle Menus, provided that they are set up to make use of them – for example, a Portrait graphic will only be shown if the Subtitles Menu has a Graphic element that's set to display character portraits.

In addition to the Player/NPC components, characters also require:

**Audio Source**
For speech audio. No audio clip is required, as this is added dynamically.

**Collider**
A Capsule Collider works best for 3D, and a Circle Collider 2D for 2D. The Circle Collider 2D should be placed at the character’s feet, with Is Trigger? checked.

**Rigidbody / Rigidbody 2D**
For enabling collisions and, in the case of 3D characters, gravity effects. If Move with Rigidbody? is set, Interpolation should be enabled for smooth movement.

**Paths**
For pathfinding. If not present, it will be added automatically at runtime.
3.1.1. The Character wizard

The Character wizard is used to automatically assign the key components to a model or sprite to allow it to become a character. It can be opened from the top toolbar, under Adventure Creator → Editors → Character wizard.

The first page asks you if you are making a Player or an NPC, and to supply a base GameObject. This should be your character’s model if working in 3D, or sprite if working in 2D. This object must be in the scene’s Hierarchy to be accepted.

PROTIP: Graphics are not strictly required to be on the supplied base GameObject – an empty one will still work, which may be all you need if making a first-person game.

You will then need to decide on an animation engine to rely on – see Character animation. Once complete, the wizard will add the necessary scripts and components onto your supplied GameObject, and tag it if required.

NOTE: The added components will still require tweaking – for example, the size of the collider, or the position of a first-person camera. The Character wizard is more focused on preparing your character with the correct components over fine-tuning.
3.1.2. Players

A Player is necessary if you want your game to have an on-screen avatar. If you don’t need one, you can set your Movement method to None and skip this step.

To create a Player, either use the Character wizard or add the Player component to a GameObject and follow the steps outlined in Creating characters.

A Player can be used in a scene by one of two ways:

1. By assigning his prefab under Character settings in the Settings Manager, so that he is automatically added to the scene at runtime. This is the usual method.
2. By having him saved within the scene file itself. This can be useful if you need to attach scripts that refer to local objects.

If you have a Player saved in the scene, and a prefab assigned in the Settings Manager, then the one in the scene will override the prefab for that scene only.

**PROTIP:** Players are normally non-interactive, in that you can’t click on them directly. You can add interactivity, however, by adding a Hotspot component and trigger-Collider onto him, and placing it on the Default layer, as you can with an NPC. If your Player is a prefab added at runtime, be sure to set the Hotspot’s Actions source field to Asset File, so that his interactions can run in any scene.

A game can have one Player, or make use of multiple – see Player switching.

3D Players that move under Direct or First-person control can also jump when the Jump input button is pressed – see Input descriptions. Jumping requires that a Player has a RigidBody and Collider, or a Character Controller. If using a Collider, ensure that this is not placed on the same layer as the Ground-check layer(s) defined in the Player Inspector.
3.1.3. Player switching

Though AC only supports single-player games, you can switch between multiple Players at any time. This can be enabled in the Settings Manager by setting the Player switching field to Allow:

You can then assign as many Player character prefabs as you like. To choose which Player is the game’s default, click the cog icon beside them and choose Set as default.

To set the starting position of your non-default Players, choose Edit start data… from this same icon. This will bring up the Player start data window, from where you can define that character’s starting scene and position.

NOTE: The use of local Players (i.e. those saved in the scene file) are disallowed when player-switching is enabled. If you need to rely on different Player objects throughout your game, use one one method or the other.

To switch Player at runtime, use the Player: Switch Action. The previously-active Player will remain in the scene – all inactive Players are saved and loaded in by AC automatically.

Inactive Players will behave like NPCs, meaning they can be made to move, talk, or follow other characters. To teleport an inactive Player to a new scene, use the Player: Teleport inactive Action. Other Actions that have Is Player? fields in them will also be updated to let you choose specifically which Player it effects.

PROTIP: If your Player prefab has a Hotspot component in their Hierarchy, the Auto-sync Hotspot state? option can be used to enable it only when the Player is inactive – preventing the Player from being clickable while being controlled.
3.1.4. NPCs

NPCs are characters that are only controlled by issuing commands to them via Actions or scripting, and can be interacted with by the player. They can move, speak, and animate just as a Player can.

To create an NPC, either use the Character wizard or add the NPC component to a GameObject and follow the steps outlined in Creating characters.

It is a good idea to make your NPC a prefab, so that it can be re-used in other scenes.

If you intend to make them interactive, you'll need to add the Hotspot component, as well as a Collider component.

**NOTE:** If your NPC is sprite-based, these components should be placed on the sprite itself and check Is Trigger on the collider. If your NPC is a 3D model, they should instead be placed on the root object. In both cases, it is necessary to place the Hotspot object onto the Default layer.

For more on Hotspot and interactions, see Hotspots.

You can use Actions to give the NPCs instructions during gameplay. To have your NPC perform a task when the scene begins, place such Actions in your OnStart cutscene – see The Scene Manager.

When a scene features NPCs – particularly ones that move around – the player may occasionally find themselves stuck because an NPC is in their way. To prevent this, NPCs can be made to keep away from the player if they get too close. In the NPC inspector, check Keep out of Player's way?, and set the minimum distance that they should keep between themselves and the player. If you are using Polygon Collider pathfinding, you can also make use of character-evasion.
### 3.2. Character tracking

AC features a robust **Player-switching** system, in which any Player character defined in the **Settings Manager** has their position and scene tracked as they move around a game. Such characters are automatically spawned into, and removed from a scene as necessary.

However, because inactive Players behave like **NPCs**, this system can also be used to keep track of characters that are never actually controlled by the Player. So long as a character has a Player – not an NPC – component, they can be listed in the Settings Manager and have their position data automatically saved.

This is particularly useful if you have characters – playable or not – that appear in different scenes throughout the course of the game. To move an inactive character to a different scene, use the **Player: Teleport inactive** Action.

**PROTIP:** Such characters do not require a **Remember NPC** component in order to be saved – such data is handled automatically.
3.3. Character movement

Actions can be used to move a character, and in the case of the Player – restrict movement.

Characters can both walk and run. The Minimum run distance on a Player / NPC Inspector controls the minimum distance between the character and its target required for running to be possible.

Characters can move in two ways:

1. By dynamically pathfinding their way between two points
2. By following a pre-determined route designed in the Scene view.

For pathfinding to work, a scene must contain an active NavMesh – see Pathfinding methods. A character can then be made to pathfind (i.e. move dynamically to a location) with the Character: Move to point Action. If a character wants to pathfind but no NavMesh is set, they will simply move in a straight line directly to their destination.

To make a character move along a pre-set path, you first need to create that path as a separate object. From the Scene Manager, click Path under the Navigation prefabs panel.

You should see a blue circle appear, which represents the starting point of your path. The Paths Inspector can be used to create path nodes, which can be repositioned in the Scene window:

Note that the elevation of a path’s nodes are unimportant unless you check the Override gravity? box in the Inspector. Doing so will cause the character to move to each node’s point on the Y-axis, as well as the X and Z. This is useful if you want a character to fly, for example.

You can also make the character walking along this path wait for a time at each node, by supplying a Wait time (s). For greater control, you can also run a Cutscene or ActionList.
When a character reaches each node, the character involved can be sent as a parameter to this ActionList if it contains a GameObject parameter—see ActionList parameters. Once you have set up your pre-determined path, you can use the Character: Move along path Action to move a character along it.

**PROTIP:** Pre-determined paths can also be used to restrict player movement during gameplay. You can use the Player: Constrain Action to assign a Paths object to the Player, which will mean they can only move along that path. Note that this feature only works with the Direct and First-person movement.

Because object scaling varies from game to game, you may need to adjust the Destination accuracy slider in the Settings Manager. This slider determines how “close is close enough” when it comes to determining if a Character has reached their destination. This is visualised as a yellow sphere gizmo by the Character's feet in the Scene window.

**PROTIP:** If you are making a low-resolution 2D game and want pixel-perfect pathfinding, consider using Retro movement.
3.3.1. Retro movement

"Retro movement" is a special mode that emulates the pixel-perfect character motion of classic 2D adventure games such as Monkey Island and Thimbleweed Park. It works best when making low-resolution 2D games, but will also work for 3D games. Note that this movement only changes pathfinding motion – not when a Player character is under e.g. Direct control.

The mode is enabled by checking Retro-style movement? under a character's Movement settings:

When enabled, characters will then move by the following rules:

- Deceleration values are ignored, they will move at a constant speed and will reach their intended destination precisely.
- Rigidbodies are not used, but 2D NavMesh evasion settings are still accounted for.
- Turning while walking is instantaneous.
- They will turn before walking, and will turn to face the camera when turning more than 180 degrees (Unity 2D only).

For a further retro-effect with 2D characters, there is also the Only move when sprite changes? option.
3.3.2. Precision movement

When characters in Adventure Creator move along a path, they'll determine whether their destination is reached or not according to their distance from it. If they are within a preset threshold, then they'll be considered "close enough" and will stop moving. This is typical of 3D game engines, where it is often impossible to attain an "absolute zero" difference between the character and their intended destination.

You can amend this threshold via the **Destination accuracy** slider in the Settings Manager, under **Movement settings**. Lower values will allow characters to stop farther from their targets, and higher values will require them to be closer. The larger your game's scale is (compared to Unity's base scale), the lower you'll generally want this value to be. You may need to experiment a little to get the right value, but the default of 0.8 is generally fine if 1 Unity unit is close to 1 metre.

If you require more precise in your movement, you will need to raise this value. Be aware, however, that this may bring about "overshooting" if this is too high – especially if your character's deceleration value is too low (meaning they take too long to slow down).

If you ramp this value all the way up to 1, however, you can enable the **Attempt to be super-accurate?** setting. This will force characters to land on the exact point they are supposed to, but will come with a "sliding" effect that may be obvious under certain circumstances. The list below outlines some steps you can try to reduce this effect and attain more natural, precise movement:

- If you are using **Root Motion**, then use a **Blend Tree** to scale movement speed with animation speed. This will allow the character to slow down more naturally as they approach their target.

- If a character overshoots when running, increase their **Minimum run distance** value. If a character is running this far from their target, they'll slow to a walk.

- The **Deceleration** value affects at what point a character begins to slow down – lower values will cause them to slow down sooner. If you find that the character slows down so prematurely that they can't reach their destination, try raising this value. A value of zero will cause it to copy the **Acceleration** value.

- Enabling a character's **Retro-style movement?** option will make characters reach their targets precisely, but this option is best suited to 2D – see **Retro movement**.
3.3.3. Custom motion controllers

By default, a character’s motion is handled automatically. However, you can also set their Motion control field to Just Turning or Manual:

When set to either, AC will leave the character’s positioning to a separate motion controller. When set to Just Turning, the character will be rotated by AC when idle. In either case, Adventure Creator will still calculate what the character’s position and rotation “should” be – which custom animation controllers can make use of.

The intended position and rotation of a character can then be read at any time by accessing the public functions and methods in the Player or NPC component:

```csharp
bool isRunning
bool isTalking
Vector3 GetTargetPosition ()
Quaternion GetTargetRotation ()
float GetTargetSpeed ()
```

Additionally, the messages OnTeleport and OnSnapRotate are called on the character’s GameObject when AC moves a character instantly – this is useful when initialising a character after e.g. a scene change or loading a save game file.

This feature is made use of by the included NavMeshAgent Integration script, which is an example of how an AC character can move using a NavMeshAgent component instead.

A tutorial on writing a “bridge script” to another motion control system can be found online. An example script that links AC with Unity’s Third Person Controller can also be found in the AC wiki.

![Custom motion controllers](image)

**PROTIP:** A full list of the variables and functions available in NPC and Player scripts can also be found online.

When it comes to using custom controllers (e.g. a dedicated platform controller) with Player characters, it is generally much easier to have control duties shared by AC and the custom script depending on the game’s current state. For example, a custom controller can control the player’s motion during gameplay, while AC can control it during cutscenes.

This can be achieved by manipulating the Motion control field through script, based on the value of the StateHandler script’s IsInGameplay() method, i.e.:
if (AC.KickStarter.stateHandler.IsInGameplay ()
{
    AC.KickStarter.player.motionControl = AC.MotionControl.Manual;
    // Also allow custom script to take control
} else
{
    AC.KickStarter.player.motionControl = AC.MotionControl.Automatic;
    // Also prevent custom script from taking control
}

Such a check should be made every frame in an Update method. Alternatively, the
OnEnterGameState custom event can be used to make necessary changes only when the
state of the game is changed – see Interaction scripting.
3.4. Character animation

Characters have the following animation engine options:

**Mecanim**
Unity's standard animation engine, and the one recommended for 3D characters.

**Sprites Unity**
A simplified engine for 2D characters that plays animations automatically.

**Sprites Unity Complex**
A more complex engine for 2D characters that need layered animation.

**Legacy**
Unity's old animation system for 3D characters.

**Sprites 2D Toolkit**
An engine that integrates with 2D Toolkit.

**Custom**
Allows for other systems to be integrated through script.

A character's animation engine is chosen at the top of their Player/NPC Inspector:

Characters are not limited by the game's perspective – 3D games can feature 2D Sprites Unity characters, for example.
3.4.1. Character animation (Mecanim)

The Mecanim engine is intended for designers who wish for greater control over their animation than that which Legacy provides. While Legacy animation allows designers to simply assign animations to a list of fields and have them play automatically, Mecanim leaves the handling of animations up to the designer, while giving up control over certain parameters in the Controller.

Mecanim is required if you want more refined animation, such as turning while walking, use of Root Motion, and multiple layers.

**PROTIP:** The 3D Demo’s player prefab, Tin Pot, uses this engine – so you can refer to him as a practical example. He can be found in AdventureCreator/Demo/Resources.

Characters that use this engine must have an Animator component. This should generally be placed on the root GameObject, but it can be assigned to a child object if necessary. When selected, two new panels will appear in their Inspectors:

**Mecanim parameters**

![Mecanim parameters panel]

This panel is where you define the names of your Animation parameters that AC can control. AC will control any named parameters at all times:

**Move speed float**
The current horizontal speed. Will become the Walk speed scale when walking, and the Run speed scale when running.

**Turn float**
This is set to –1 when turning left, 0 when not turning, and +1 when turning right

**Talk bool**
This is set to True when talking

**Phoneme integer**
The current phoneme index, when using with Lip syncing.
Normalised phoneme float
The current phoneme index, as a factor of the total number of phonemes, when using with Lip syncing.

Head yaw float
The yaw angle of the head, when looking around

Head pitch float
The pitch angle of the head, when looking around

Vertical movement float
The current vertical speed, allowing for falling and landing animations.

Jump bool
Set to True in the one frame that a jump is initiated (Players only)

‘Is grounded’ bool
Set to True if the character is currently touching the ground.

It is up to you to decide how these parameters should be used by your Controller – you could make use of Blend Trees, for example, or have simple Transitions between various states.

Mecanim settings

This panel is where the Animator component is assigned (if not on the root GameObject), and where other Mecanim–related options are set. Head and mouth layers can be provided if you choose to play facial animations by name with the Dialogue: Play speech Action. If your character is a Humanoid, **IK head–turning?** will automatically rely on IK when head–turning instead of supplying angle parameters.

![Mecanim settings panel](image)

**NOTE:** For IK head–turning to work, two additional steps are necessary:

1. The Animator’s Base layer must have **IK Pass** enabled in its properties.
2. The character must have a **Neck bone** assigned in their Inspector, or a **Capsule Collider** must be placed on their root.
For added realism when moving, Slow movement near walls? will have the character slow down as they approach a scene's walls. This is most suited for Direct-controlled Players.

**PROTIP:** AC will auto-detect the state of your Animator's Apply Root Motion field. When set, AC will no longer move the character – which will then be dependent on the animation itself to move. You can choose how much control AC has over turning: when the Root motion turning slider is set to one, then all turning will be expected to be performed by the controller.
Bone transforms

This panel is where bones are assigned so that they can head-turn and hold things with the **Character: Hold object** Action.

During gameplay, the **Character: Animate** Action can be used by such characters to change the value of any parameter in their Controller. It can also be used to change expected parameter names, making it possible to “redirect” the Controller to play different “standard” animations, such as Walking and Talking.

This engine also supports numerous methods for facial animation – see **Lip syncing**.
3.4.2. Character animation (Sprites Unity)

The Sprites Unity engine is a convenient way of working with 2D characters because it plays animations according to a naming convention, as opposed to transitions or parameters. If you have a character that can animate in all eight directions, this can be very time-consuming.

PROTIP: The 2D Demo’s player prefab, Brain2D, uses this engine – so you can refer to him as a practical example. He can be found in AdventureCreator/2D Demo/Resources.

When selected, a new panel will appear in the Inspector:

![Standard 2D animations panel]

You will first need to ensure that the character’s sprite is a child in their Hierarchy (with their NPC/Player component on their root), and that this is assigned as the Sprite child. An Animator is also required, which should be placed on either the sprite or the root.

The standard animations (idle, walk, run and talk) are all played automatically, based on the animation type followed by a directional suffix. For example, the character above will play Walk_D when walking downward, and Idle_R when idle while facing right. The following suffixes are understood:

- _R → Right
- _L → Left
- _U → Up
- _D → Down
- _UR → Up-right
- _UL → Up-left
- _DR → Down-right
- _DL → Down-left
If **Head on separate layer?** is checked, then an additional **Head layer** index field will appear and head animations (idle and talk) can be moved to a separate layer in the Animator component. The head sprite must also be separated from the body as a child component, but this allows for a character to talk while moving, and look at objects without turning their body. For more, see **Head turning**.

Characters will face up to eight directions, depending on the **Facing directions** field. If set to **Four**, then the character can face up, down, left and right. If set to **Eight**, they can also face diagonally. If set to **Custom**, you can select exactly which directions they can face. If set to **None**, the directional suffix will be ignored completely. Clicking **List expected animations** will reveal a list of all the animations that a character’s Animator is expected to have.

These animations need to be placed in the character's Animator Controller. As AC refers to these by state name, you do not need to incorporate transitions between them.

If your left- and right-facing sprites are merely mirror images of each other, you only need supply one or the other. Set the **Frame flipping** value to **Left Mirrors Right** to only rely on right-facing animations, or **Right Mirrors Left** for the opposite. By default, this option will only affect standard animations, such as Idle, Walk and Run – to make it affect custom animations as well, check **Flip custom animations**?

If your animation clips rely on sprite transforms, rather than swapping out frames, you can use the **Crossfade animations?** checkbox to smooth transitions.

**NOTE:** A 2D character’s animations should all pivot around their feet.

If you are going for a retro effect, you can use the **Only move when sprite changes?** checkbox so that the character's movement is less smooth – which can be useful when working with low-resolution sprites. This is equivalent to Adventure Game Studio’s “Anti-glide mode”. **Note that this feature ignores collisions** – so should not be used for **Players under Direct control**.

The **Character: Animation** Action can be used to change standard animation names, or play custom clips temporarily. Note that when playing non-standard animations, you may need to add **Transitions** to your Controller to control how the animation finishes playing.

The **Dialogue: Play speech** Action is given additional animation options, allowing playback of animations on varying layers.

To handle collision, add a **Circle Collider 2D** at the base of the character’s root object (covering the feet), and unchecking **Is Trigger**. If you are making an interactive NPC, add a second collider, a **Box Collider 2D**, onto the sprite child, as well as the **Hotspot** script.
3.4.3. Character animation (Sprites Unity Complex)

The Sprites Unity Complex engine allows for more control over how 2D animations are played back than Sprites Unity. While it can take more effort to fine-tune, it allows for smooth transitions between animations - such as Broken Sword-style animated transitions while changing direction while walking.

Rather than requiring the names of animation clips for Adventure Creator to automatically call upon, Sprites Unity Complex works by giving AC control over certain parameters in the character’s Animator Controller - this allows the designer to make use of them however they like.

**PROTIP:** A variant of the 2D Demo’s player, Brain2D_SpritesUnityComplex, uses this engine – so you can refer to him as a practical example. He can be found in AdventureCreator/2D Demo/Resources.

When selected, a new panel will appear in the Inspector:

![Mecanim parameters](image)

You will first need to ensure that the character’s sprite is a child in their Hierarchy (with their NPC/Player component on their root), and that this is assigned as the Sprite child. An Animator is also required, which should be placed on either the sprite or the root.

This panel is where you define the names of your Animation parameters that AC can control. AC will control any named parameters at all times:

**Move speed float**
The current speed. Will become the Walk speed scale when walking, and the Run speed scale when running.
Turn float
Set to -1 when turning left, +1 when turning right, and 0 when not turning or moving.

Direction integer
The current facing direction, as a whole number. Note that diagonal directions are only used if Diagonal sprites? is checked:

0 -> Down
1 -> Left
2 -> Right
3 -> Up
4 -> Down–left
5 -> Down–right
6 -> Up–left
7 -> Up–right

Body angle float
The current facing direction, as an angle in degrees. This is zero when the character faces down, and increases to 360 (non–inclusive) as the Character rotates clockwise.

Head angle float
The head’s facing direction, as an angle in degrees. This uses the same angle system as Body angle float, above. See Head turning.

Angle snapping
This field allows you to snap the Body angle float and Head angle float parameters to the nearest 45 or 90 degrees. This is useful if using these parameters in Blend Trees, and you wish to remove interpolated blend effects.

Talk bool
Set to True when talking

Phoneme integer
The current phoneme index, when using talking with Lip syncing.

Vertical movement float
The current vertical speed, allowing for falling and landing animations.

It is up to you to decide how these parameters should be used by your Controller – you could make use of Blend Trees, for example, or have simple Transitions between various states.
For added realism when moving, **Slow movement near walls?** will have the character slow down as they approach a scene's walls. This is most suited for **Direct-controlled Players**.

If you are going for a retro effect, you can use the **Only move when sprite changes?** checkbox so that the character's movement is less smooth – which can be useful when working with low-resolution sprites. This is equivalent to **Adventure Game Studio’s “Anti-glide mode”**.

**NOTE:** This engine does not have a Frame-flipping option like **Sprites Unity**. If you want to flip the sprite so that left-facing animations can be recycled for right (or vice-versa), you can make use of a simple script. A sample is provided in the **AC wiki**.

**NOTE:** A 2D character's animations should all pivot around their feet.
### 3.4.4. Character animation (Legacy)

The Legacy engine is a much more simple way of animating 3D characters than Mecanim, as it involves supplying the required animations directly within the Inspector, so that AC can play them automatically. It is referred to as Legacy because it uses Unity’s old animation tools that pre-date the Mecanim / Animator tools.

**PROTIP:** The 3D Demo’s NPC character, Brain, uses this engine – so you can refer to him as a practical example. He can be found in AdventureCreator/Demo/NPCs.

Characters that use this engine must have an **Animation** component on the root GameObject, but it can be assigned to a child object if necessary.

**NOTE:** In order to play back an animation, make sure it is marked as Legacy in its import Inspector.

When selected, two new panels will appear in the character’s Inspector:

**Standard 3D animations**

![Standard 3D animations panel]

This panel is where standard animations such as walking and talking are assigned. These will be played automatically when appropriate – they do not need to be assigned in the Animation component.

When **Talk animation style** is set to **Custom Face**, facial animation clips are assigned directly within each **Dialogue: Play speech Action** as opposed to a singular talking animation.
**Bone transforms**

This panel is where a few of the character’s rig bones are assigned. This is necessary so that AC knows which bones to isolate when e.g. animating the head while the character is looking around.

Custom animations can be played in-game with the **Character: Animate** Action. When doing so, you define an animation layer for it to be played on, from the **Base** layer at the bottom, to the **Mouth** layer at the top. By keeping your animations on separate layers, you can mix them together to create new animations.

The demo provides a good example of this when Brain talks to the player while in his chair. He is playing his idle animation on the Base layer, turning his head left on the Neck layer, bobbing his head on the Head layer, changing his expression on the Face layer, and moving his lips on the Mouth layer. It’s generally a good idea to only play one animation per layer at any one time.

You can also choose if that animation is blended with or added on top of existing animations. If you are having trouble getting an additive animation to play properly, make sure that all keyframed bones in that animation start from their rest position.

The **Character: Animate** Action can also stop animations, change the standard animations, and reset a character to idle.

The **Dialogue: Play speech** Action also allows for two more animations: **Head** and **Mouth**. These fields act as shortcuts to play custom animations in the correct way. The Head animation is used to vary a character’s head motion as they say a line, for example a nod if they are agreeing with something. This is an Additive animation played once on the Head layer. The Mouth animation is used to let the character animate their lips as they talk. You can either supply a generic “talking” animation, or a line–specific lip–sync animation. This is a Blend animation played once on the Mouth layer.

Adventure Creator also features a number of ways to animate your lip-syncing, including making use of **FaceFX**.

To animate expressions on characters by using blend shapes, attach a **Shapeable** component to your **Skinned Mesh Renderer** and use it to define your expression shapes. You can then use either the **Object: Blend shape** Action to control which shape is active, or define Expressions in the character Inspector so that the `[expression:name]` tag can be used – see Text tokens.
3.4.5. Character animation (Sprites 2D Toolkit)

2D Toolkit is a separate Unity asset that provides sprite functionality, and is available for purchase at www.unikronsoftware.com/2dtoolkit. Support for it can be enabled via the Animation engine field in the Player and NPC Inspectors. You will then be prompted to define the “tk2DIsPresent” Scripting Define Symbol.

NOTE: A 2D character's animations should all have an Anchor of Lower Center.

When selected, a new panel will appear in the Inspector:

![Standard 2D animations panel](image)

You will first need to ensure that the character’s animated sprite is a child in their Hierarchy (with their NPC/Player component on their root), and that this is assigned as the Sprite child.

The standard animations idle, walk, run and talk are all played automatically, based on the animation type followed by a directional suffix. For example, the character above will play Walk_D when walking downward, and Idle_R when idle while facing right. The following suffixes are understood:

- _R → Right
- _L → Left
- _U → Up
- _D → Down
- _UR → Up–right
- _UL → Up–left
- _DR → Down–right
- _DL → Down–left

Characters will face either four directions or eight, if Diagonal sprites? is checked. The directional suffix will be ignored completely if Multiple directions? is unchecked. Clicking List expected animations will reveal a list of all the animations that a character's Animator is expected to have.
These animations need to be placed in the character's Animator Controller. As AC refers to these by state name, you do not need to incorporate transitions between them.

If your left- and right-facing sprites are merely mirror images of each other, you only need supply one or the other. Set the Frame flipping value to Left Mirrors Right to only rely on right-facing animations, or Right Mirrors Left for the opposite. By default, this option will only affect standard animations, such as Idle, Walk and Run – to make it affect custom animations as well, check Flip custom animations?
3.4.6. Custom animation engines

Each of the provided animation engines are self-contained scripts in the `AdventureCreator/Scripts/Animation` folder.

To implement a custom animation engine, create a C# subclass of the `AnimEngine` `ScriptableObject`. Then within your character’s Inspector, set the `Animation engine` field to `Custom`, and supply the name of your new C# script as the `Script name`:

![Image of Character Inspector with Animation engine set to Custom](image.png)

Animation engines work by overriding functions within the `AnimEngine` class whenever a character must be animated. For example, when a character walks, the script’s `PlayWalk` function is called every frame.

The functions below can be overridden in a custom animation script. Its character variable can be used to access the character’s NPC/Player script properties.

The following are called every frame, depending on what the character is doing:

- `PlayIdle ()`
- `PlayWalk ()`
- `PlayRun ()`
- `PlayTalk ()`
- `PlayJump ()`
- `PlayTurnLeft ()`
- `PlayTurnRight ()`

The following can also be overridden:

- `CharSettingsGUI ()`  
  Used to display any additional GUI settings the character’s Inspector may require

- `ActionCharAnimGUI (ActionCharAnim action)`  
  Used to display the “Character: Animate” Action’s GUI

- `ActionCharAnimRun (ActionCharAnim action)`  
  Called when the “Character: Animate” Action is run

- `ActionCharAnimSkip (ActionCharAnim action)`  
  Called when the “Character: Animate” Action is skipped

**PROTIP:** A full list of the variables and functions available in NPC and Player scripts can be found [online](https://example.com).
3.5. Head animation

With a little configuration, characters can turn their heads to specific objects – rather than turning their entire bodies. Sprite-based characters can also separate their head and body animations, so that they can talk while moving without the need for full-body “talking and walking” animations.

PROTIP: Example prefabs that demonstrate sprite-based characters with independent head animation are available on AC’s Downloads page.

A character can face an object by using the Character: Face object Action, and setting Face with to Head. A character will continue to face the object until the Action is run again with Stop looking? checked.

The Player can also be made to face the active Hotspot – from the Settings Manager, check Player turns head to active? underneath Hotspot settings. This can be disabled mid-game using the Player: Constrain Action. The Player will face the Hotpot’s centre, unless a Centre point (override) is assigned for it.

The method of configuring a character to allow for this depends on their animation engine:

Mecanim

If a character has a Humanoid rig, then you can make use of automatic IK head turning – just check IK head-turning? within the character's Inspector. If the character has a Capsule Collider or Character Controller, it will be used to estimate their height – but you can set this explicitly by defining a Neck bone transform.

Otherwise, you will need to supply four animation clips for full rotation – one each for looking up, down, left, and right. You can update your Animator Controller with two float parameters that determine the head’s yaw (left–and–right) and pitch (up–and–down). Enter these parameter names into the character’s Inspector, and their values will update during gameplay. Ideally, these are used to control a 2D Blend Tree.

PROTIP: The 3D Demo’s Player prefab, Tin Pot, can turn his head this way. If you want to see how he works, find him in /Assets/AdventureCreator/Demo/Resources. Example Player prefabs for 2D games can be downloaded from the AC website.
Legacy

Head-turning animation clips can be assigned directly in the character's Inspector. They should all only animate the head, start in the base position and finish in the extreme position. A **Neck bone** should also be supplied.

Sprites Unity Complex

A 2D character can only move their head sideways – not up and down.

If defined, the **Head angle float** parameter will take the angle of the direction that the head should be facing. When the head is not facing an object, this will be the same value as the **Body angle float** parameter. This parameter will be affected by the **Angle snapping** value.

Head animations that rely on this parameter will need to be placed in a sub-layer so that they can be controlled independently of those placed on the Base layer.

Sprites Unity

A 2D character can only move their head sideways – not up and down.

Head turning with this engine is only available if **Head on separate layer?** is checked in their Inspector. When checked, a separate **Head layer** field is then exposed, and additional animation names will appear in the **List expected animations?** foldout. This lists expected animation names, as well as the layer index they must appear on.

This method works by playing idle and talk animations on the head, isolated from the body. Therefore, the character's head should be both a separate sprite, and a separate GameObject – a child of the main body sprite GameObject. The head animations will need to be placed in a sub-layer so that they can be controlled independently of those placed on the Base layer.

An additional "HiddenHead" animation is also listed – this should be a single-frame animation in which the head is removed from view, typically by replacing it with an invisible sprite. This is a convenient way of returning to a single-sprite system when a special full-body animation is required, and will be played automatically when using the Character: Animate Action and **Hide head?** is checked.

**NOTE:** When head-turning in 2D games, the object a character faces is assumed to be on the ground, i.e. at the same level as the characters feet. If a character faces a **Hotspot** that is tall, you may need to define a **Look-at override** for that Hotspot, and place the override on the ground to get the intended effect.
3.6. Footstep sounds

Character footstep sounds can be played by one of two ways:

Inspector audio clips

This is the quickest method to set up but has no controls. Clips are assigned underneath Audio Clips in the Player/NPC Inspector, under Audio clips.

To change these sounds during gameplay, use the Character: Animate Action and set the Method to Set Standard.

**NOTE:** To save changes to movement sounds using this method, place all audio clips (including the originals) in a Resources folder and give them unique filenames.

Footstep Sounds component

This is a special component used to play sounds more accurately. It is added, together with a Sound component, on a child object of the character.

Multiple walk and run sounds can be assigned within the Inspector, and one will be played at random each time.

You can choose if they are played via Animation Events, or Automatically according to user-defined separation times. If using Animation Events, you must call the component’s PlayFootstep function to trigger the audio.

To change these sounds during gameplay, use the Sound: Change footsteps Action.

**NOTE:** To save changes to movement sounds using this method, attach the Remember Footstep Sounds component, and place all audio clips (including the originals) in a Resources folder and give them unique filenames.
3.7. Character scripting

Characters make use of either the Player or NPC script components. Both are subclasses of the Char script.

The current Player can be retrieved with:

```
KickStarter.player;
```

The available Players in a game that allows player-switching can be retrieved with:

```
KickStarter.settingsManager.players;
```

A character can be made to move or turn with:

```
myCharacter.MoveToPoint (Vector3 destination);
myCharacter.SetLookDirection (Vector2 lookDirection, bool isInstant);
myCharacter.Halt ();
```

Character scripts output their intended destination, rotation, and other parameters. These are useful when building custom motion controllers:

```
myCharacter.GetTargetSpeed ();
myCharacter.GetTargetNode ();
myCharacter.GetTargetDistance ();
myCharacter.GetTargetPosition ();
myCharacter.GetTargetRotation ();
myCharacter.GetAngleDifference ();
myCharacter.isTalking;
myCharacter.IsTurning ();
myCharacter.IsMovingAlongPath ();
```

The character system has the following events:

```
OnSetPlayer (Player player);
OnPlayerSpawn (Player player);
OnPlayerRemove (Player player);
OnPlayerJump (Player player);
OnSetHeadTurnTarget (AC.Char character, Transform headTurnTarget, Vector3 targetOffset, bool isInstant);
OnClearHeadTurnTarget (AC.Char character, bool isInstant);
OnCharacterSetPath (AC.Char character, Paths path);
OnCharacterEndPath (AC.Char character, Paths path);
OnCharacterReachNode (AC.Char character, Paths path, int nodeIndex);
OnCharacterSetExpression (AC.Char character, Expression expression);
OnSetLookDirection (AC.Char character, Vector3 direction, bool isInstant);
OnOccupyPlayerStart (Player player, PlayerStart playerStart);
OnCharacterTeleport (AC.Char character, Vector3 position, Quaternion rotation);
OnPlayFootstepSound (AC.Char character, FootstepSounds footstepSounds, AudioSource audioSource, AudioClip audioClip);
```
4. Camera perspectives
4.1. Cameras overview

As you create your game, you will place many cameras in your scene. Most of these will be GameCameras, which are never used directly to view your game from, but rather are used as “reference points” for the MainCamera. The MainCamera attaches itself to whichever GameCamera is currently active, and copies its position, rotation, field of view, orthographic type and other camera properties.

The active camera can be changed in-game by using the Camera: Switch, Camera: Crossfade and Camera: Split-screen Actions. In the Editor, you can also switch camera via the component’s cog menu during runtime.

**NOTE:** Since GameCameras are merely used for the MainCamera's reference, and do no rendering themselves, any image effect scripts you want to make use of must be added to the MainCamera GameObject in your scene. For more, see Camera effects.

You can add new GameCameras to your scene from the Camera prefabs section of the Scene Manager. What camera types are available based on your Settings Manager's Camera perspective setting.

You can still use any type of GameCamera in your game, regardless of the perspective setting you've chosen – just drag them manually from AdventureCreator → Prefabs → Cameras into your scene hierarchy.

AC also provides widescreen and letterboxing support. The Aspect ratio setting allows you to enforce either a fixed or an enforced minimum/maximum aspect ratio, regardless of the resolution.

**PROTIP:** The Camera perspective setting will be the default setting for your game, but this can be overridden on a per-scene basis – see Overriding perspective.
4.2. Camera types

The following camera types are listed in the Scene Manager, depending on the Camera perspective setting:

### 3D

- **GameCamera**
  The standard camera type for 3D games, which can track a moving target.

- **GameCamera Animated**
  A camera that either plays an animation when made active, or positions itself along a timeline as a target moves along a path.

- **GameCamera Third-person**
  A camera that follows a target by keeping the same distance from it at all times, with the ability to rotate.

- **SimpleCamera**
  A camera that has no controls and doesn't move by itself, but can be attached to a custom camera script to make it compatible with AC.

### 2.5D

- **GameCamera 2.5D**
  The standard camera type for 2.5D games, which allows for background images to be placed behind 3D objects.

### 2D

- **GameCamera 2D**
  The standard camera type for 2D games, which can track a moving target.

- **GameCamera 2D Drag**
  A camera that can be dragged around using the mouse.
4.2.1. GameCamera

The GameCamera is the default camera type when working in 3D. Position, spin, pitch and field of view can all be controlled independently by unchecking the Lock? toggle beside each:

When at least one axis is unlocked, a panel to affect the camera's target appears. By default, this is the Player, but other GameObjects can be used instead if the Target is player? checkbox is unchecked. The speed at which the camera follows its target can also be controlled.

When an axis becomes unlocked, the method by which that axis is affected can be set. For example, the X-axis movement can be based on the target's X-axis position, Z-axis position, position across the viewport or position away from it. The way in which this “input” results in the axis' final position depends on the Influence and Offset values, and limits can be set using the Constrain panel.

The Side Scrolling option allows the camera to behave like a more traditional 2D adventure game camera, in which the camera only moves when the player nears the edge of the screen.
The **Spin rotation** panel has an additional option: **Look At Target**, which is a simple way of ensuring the camera is always centred on the target:

![Spin rotation panel](image)

The **Cursor influence** panel allows the camera to appear to subtly “follow” the cursor as it moves around the screen.

![Cursor influence panel](image)

To determine the best values for a GameCamera's Inspector, it is often easier to tweak them while the game is running, copy their values (via the cog icon to the top-right of the inspector), and paste them back in once the game has been stopped:

![Game Camera (Script) panel](image)

Though their default projection is **Perspective**, GameCameras can also be set to **Orthographic**. It is important, however, that the scene's Navigation Mesh is always visible to the camera if you are making a point-and-click game – if you are making one with Orthographic camera, be sure to rotate them downward so that the NavMesh is in view.

GameCameras have a **Depth of field** setting that you can call upon in such post-processing scripts. The focal distance can either be set manually, or tied to the camera's target object. When the MainCamera is attached to a GameCamera, it can return the current focal distance with this command:

```csharp
AC.Kickstarter.mainCamera.GetFocalDistance();
```
4.2.2. GameCamera Animated

The **GameCamera Animated** prefab can play back a Unity-made animation when made active. This allows for more dynamic and interesting camerawork during Cutscenes, for example. As this works with the Animation component, any animations involved must be marked as Legacy.

However, the real use of this camera type is that it be made to play a fixed frame from an animation based on its target's point along a Path, which is possible when the **Animated camera type** is set to **Sync With Target Movement**:

![Configuration Panel]

A **Path** is a prefab that describes a series of nodes – see **Character movement**. When the camera's target is at the start of the assigned Path, the camera will play the first frame of the animation. When the target is at the end of the Path, the Camera will play the last frame. In-between frames will be interpolated. This allows for more controlled camerawork as the Player moves along a specific section of the scene.

Do be aware, however, that such Paths must be kept to one side of the target at all times, and the nodes must be positioned such that the reflex angles (> 180 degrees) between them must face the Target. If the Path were to be used for a corner, for example, the bird's eye view should look like this:

![Diagram]
4.2.3. GameCamera Third-person

The GameCamera Third-person camera type allows for more traditional, over-the-shoulder, behaviour when following the player.

PROTIP: This camera type can be found in the 3D Demo, though it is not activated by default. To activate it, load the 3D Demo game and go into the Variables Manager. In the list of Local variables, set the value of Third person camera to True.

This camera type can be rotated horizontally (Spin) and vertically (Pitch), with each axis having independent settings and limits. When pitch rotation is enabled, the camera's position can be defined by Top, Middle and Bottom regions. Each region has Distance and Height offset values, allowing you to adjust the camera's position as the Player controls the pitch angle.

It is also possible to have the camera adjust its rotation and distance according to the movement of its Target (by default, the Player). This makes it possible to have the camera smoothly follow a Player in all directions without having the user having to control it directly.

Because the camera can be moved freely, enabling Do collisions? is often necessary as this prevents the camera from being able to travel through colliders placed on a specified layer.

Zooming can also be enabled: either with an input button controlling FOV when pressed, or with an input axis controlling distance to the target.

The Initial direction field determines how the camera's orientation is first set. If Set initial direction when active? is checked, then this direction will be set whenever the camera is made active (e.g. via the Camera: Switch) Action.

You can also set the rotation by using the Camera: Rotate third-person Action. This allows you to turn the camera manually as part of a cutscene, it you want to focus the player's attention on something.

Like GameCameras, this type has a Depth of field setting that you can call upon in such post-processing scripts. The focal distance can either be set manually, or tied to the camera's target object. When the MainCamera is attached this camera type, it can return the current focal distance with this command:

AC.Kickstarter.mainCamera.GetFocalDistance ();
4.2.4. SimpleCamera

A SimpleCamera is the least processor-intensive of all camera types. It cannot be moved in-game, but if you use it purely for still shots, then it will save more memory than the regular GameCamera type.
### 4.2.5. GameCamera 2.5D

The **GameCamera 25D** camera type facilitates the development of games that use a mixture of pre-rendered (or photographic) backgrounds and 3D characters.

This camera type cannot move, but this limitation allows each one to be associated with a particular background image. This background image is displayed underneath the rest of the scene's geometry, and is not a physical object in the scene itself. This means that a scene can have many cameras and backgrounds without it becoming unmanageable.

**NOTE:** If you require scrolling, you can still use the **GameCamera 2D** camera type in combination with sprite-based backgrounds. The **GameCamera2D** prefab can be found in `/AdventureCreator/Prefabs/Camera`. A tutorial can be found online.

Each background image must be stored within its own **Background Image** prefab. This can be created from the Scene Manager, or from the camera itself:

A **BackgroundCamera** prefab must also be present in the scene – but this will be added automatically when creating a 2.5D scene. This prefab's Culling Mask needs to be set to the **BackgroundImage** layer, and the MainCamera's Culling Mask needs to omit this – but this should be automatic.

The BackgroundImage is where the background image Texture is assigned:

**NOTE:** Using URP? Unity's Universal Render Pipeline uses its own technique to overlay cameras, so you'll need this wiki script to have it work with AC's 2.5D cameras.

The assigned texture can either be a single Texture, or a **VideoClip** asset file, which will play on a loop when the background is made active. When the **Background type** is set to **Video Clip**, both Texture and VideoClip fields will be made available. The assigned
Texture is treated as a placeholder while the VideoClip is loaded into memory, or when previewing its associated camera in the Editor.

Once a GameCamera25D has been assigned a BackgroundImage prefab, a button labelled **Set as active** appears in its inspector. Clicking this allows you to preview its view, plus the background image, in the Game Window when the scene is not running:

![Image of a camera and background image](image-url)

**PROTIP:** It is strongly recommended to set the **Aspect ratio** option in the **Settings Manager** to **Fixed** when working with background images, as this will ensure that they are proportionally correct. Also be sure to have your Game Window’s perspective set to match your chosen aspect ratio.

For more on 2.5D games, see **Preparing a 2.5D scene.**
4.2.6. GameCamera 2D

This camera type emulates the behaviour of traditional 2D adventure game cameras, and can move horizontally and vertically as it follows a target. While this camera type only moves along the X and Y axes, it can still be used in 3D scenes provided that it looks down the Z axis.

**NOTE:** GameCamera 2Ds do not physically move, but instead just change their projection matrices to give a scrolling effect. This is also the case when the camera’s Projection is set to Perspective – meaning you’ll get a Ken Burns effect even in 3D.

A GameCamera 2D can move horizontally and vertically, or be locked in either direction. When at least one axis is unlocked, options to control the camera's target will appear:

The **Track freedom** variable determines how far, in Unity co-ordinates, the target must move from the camera's screen–centre before the camera begins to follow. A freedom of zero will keep the target in the centre of the screen at all times.

The **Target direction factor** allows you to influence the camera’s position based on the target’s facing direction – so that if the target faces left, the camera pans further left.

The **Cursor influence** panel allows the camera to appear to subtly “follow” the cursor as it moves around the screen.
As with the GameCamera, the movement in either direction can be constrained and offset. To determine the best values for a GameCamera 2D’s Inspector, it is often easier to tweak them while the game is running, copy their values (via the cog icon to the top-right of the inspector), and paste them back in once the game has been stopped:

![GameCamera Inspector](image)

It is possible to make other objects scroll as the camera does – though at different speeds – to achieve a depth effect. To do this, attach a Parallax2D script to any other GameObject you want to scroll. For more, see Parallax 2D.
4.2.7. GameCamera 2D Drag

This 2D camera has no “target”, but is instead panned horizontally or vertically by dragging with a mouse (or finger on a touch-screen). Movement in the X and Y directions can be controlled independently:

As clicks will still be used to initiate player movement, this camera type is recommended for games that do not make use of point-and-click movement.
4.3. Adding custom cameras

Although a variety of camera types are provided, it may be that you require or prefer to use other types – whether it be another camera asset from Unity’s Asset Store, or your own script.

To make such a camera visible to AC’s camera system, simply add the Adventure Creator -> Cameras -> Basic Camera component from the Inspector’s Add Component menu:

Adding this component will mean that it can be used in AC’s various Camera Actions and be made the Default camera in the Scene Manager.

If the camera is for a 2D game, check the box in its Inspector:

![Camera Settings](image)

**NOTE:** As explained in Cameras overview, the only active Camera in your scene should be the MainCamera – and this is true even when custom cameras are involved. Be sure to disable your custom camera’s Camera component – Adventure Creator will still read its values, but there won’t be a conflict in rendering.

Like GameCameras, this type has a Depth of field setting that you can call upon in such post-processing scripts. The focal distance can either be set manually, or tied to the camera’s target object. When the MainCamera is attached this camera type, it can return the current focal distance with this command:

```csharp
AC.Kickstarter.mainCamera.GetFocalDistance();
```
4.4. Working with VR

While Adventure Creator isn't geared towards VR experiences, it's still possible to allow a scene to be viewed in VR.

Replace the scene's MainCamera with the **MainCameraVR** prefab found in `AdventureCreator/Prefabs/Camera`. This will allow for VR movement while also being able to use AC's camera system.

**PROTIP:** Certain operations in AC, such as **Direct-controlling** the Player relative to the camera, rely on knowing which direction the camera is facing. This is typically the same direction as that of the MainCamera – but in the case of the MainCameraVR prefab, these two components are on separate GameObjects. The MainCamera Inspector's **Facing direction** field can be set to either have such operations refer to the MainCamera, or the Camera.

When **Virtual Reality Supported** is enabled in Unity's Player Settings, the Main Camera Inspector will display an option to restore its Transform when loading save games. Leaving this as unchecked may help compatibility when working with VR projects.

It is common for VR games to incorporate a 3D cursor into your game, as opposed to an icon-based one. You can do this by overriding the mouse position with an **InputMousePositionDelegate** – see [Remapping inputs](#).  

**PROTIP:** An example 3D cursor script is already included – add a mesh GameObject to the scene, and add the **World Space Cursor Example** component. It is fully documented and can be modified to suit the needs of your own game.

If you wish to make a VR game that can be played completely with the camera (i.e. with no cursor clicks), you can use custom events to detect when the mouse is over Hotspots and Menus, and interact with them through script if it remains over them for a set time.

**PROTIP:** Such a script is also included – add a new GameObject to the scene, and add the **Click By Hovering Cursor Example** component. This can be used in conjunction with the **World Space Cursor Example** mentioned above.

**NOTE:** When loading a **save-game file** in VR, you may wish for the MainCamera to not restore its position depending on how you've set your game up. If **Virtual Reality Supported** is checked in Unity's **Player Settings**, this is made optional within the MainCamera Inspector.
4.5. Working with Cinemachine

Cinemachine is a free Unity asset that allows for dynamic camera movement and cinematic shot composition. It can be downloaded from the Unity Asset Store.

Adventure Creator and Cinemachine both share the concept of using multiple cameras as references, with only one main camera that performs the rendering. AC's MainCamera and GameCamera are comparable to Cinemachine's CinemachineBrain and VirtualCamera.

Cinemachine can be used in conjunction with AC's own camera system by attaching the Basic Camera component onto the Cinemachine Brain (see Adding custom cameras):

As only one can be allowed in the scene, you should also remove the Cinemachine Brain's AudioSource component.

It will then become available as an option when assigning the Scene Manager's Default Camera field, as well as the various Camera Actions.

When the MainCamera is attached to the Cinemachine Brain, you can then switch Virtual camera as you would in any other Cinemachine project – as well as continue to use AC's own cameras when desired.

**NOTE:** Since the above technique requires the MainCamera to copy the CinemachineBrain's camera values each frames, AC will need to update after Cinemachine. To do this, set AC's StateHandler script's Execution Order to a value larger than the CinemachineBrain script.
4.6. Overriding perspective

While the game's regular Camera perspective is defined in the Settings Manager (see Cameras overview), scenes can be made to override this on a per-scene basis. This is useful if you want isolated sections of your game to make use of different gameplay – for example, a 2D map screen in an otherwise 3D game.

NOTE: This feature is not available for First Person games.

Before a scene's objects have been organised, you have the option to Override the default camera perspective?

Checking this box brings up further options to choose what kind of camera perspective the scene will have. Once the Organise scene objects process has run, these options will disappear.

If the scene overrides the default camera perspective, then you must ensure that your Player is equipped to work in it. Both 2D and 3D players are able to work in 2D and 3D scenes if they have no Collider or Rigidbody components, but this is not always ideal. In most cases, it is recommended to rely on player-switching (see Players) so that scenes that override the camera perspective rely on their own Players.

NOTE: A few components and Actions (such as Player: Constrain) vary slightly based on the current camera perspective. If a scene that overrides the global setting is open, such fields will update to reflect the overriding scene. Therefore, you should only have such scenes open when you are specifically working on them, and not unrelated objects.
4.7. Camera effects

As explained in Cameras overview, only the MainCamera is normally rendered at runtime – other cameras are used merely as reference points for the MainCamera to make use of.

Because of this, special considerations must be made with it comes to camera effects, as they will only work when placed on the MainCamera object.

While most effects are necessary to be shown at all times, some effects may only need showing when particular cameras are active. For example, a "VHS video" effect may be necessary when switching to a POV shot of a security camera.

We can achieve this by enabling the effect only when the MainCamera is attached to the security camera. To do this, we can use the OnSwitchCamera event, which is called whenever the MainCamera attaches itself to a new camera, and includes information about the change.

NOTE: Custom events are a powerful way of injecting custom code into common AC functions. For more information, see Custom events.

The following code registers its own OnSwitchCamera function to the EventManager and changes the state of an example "CustomEffect" script on the MainCamera according to the name of the new camera.

```csharp
private void OnEnable ()
{
    EventManager.OnSwitchCamera += SwitchCamera;
}

private void OnDisable ()
{
    EventManager.OnSwitchCamera -= SwitchCamera;
}

private void SwitchCamera (_Camera oldCam, _Camera newCam, float time)
{
    bool isSecurityCam = (newCam.gameObject.name == "SecurityCamera");
    Camera.main.GetComponent <CustomEffect>().enabled = isSecurityCam;
}
```

The event function also includes a transition time, if the camera switch is not instant and the effect needs to be changed over time.
A common camera effect is one that provides a **Depth of field** effect. Such an effect often requires a Focal length value to work. AC’s GameCamera and GameCamera Third-person camera types can set this value from within their Inspectors:

A custom script can read the focal length at any time with:

```csharp
KickStarter.mainCamera.GetFocalDistance();
```

This can be incorporated into a custom event, or called in an Update function, and sent to the Depth of field effect’s script component.

**PROTIP:** A script that synchronises Unity’s Post Processing Stack depth-of-field with AC’s camera values can be found in the AC wiki.
4.8. Disabling the MainCamera

As explained in Camera overview, AC’s MainCamera is the only one that does any rendering in a typical AC scene – while GameCameras are used only for reference.

Also, Custom cameras covers how to make use of custom camera scripts in conjunction with AC.

This will cover you for most cases of camera customisation. However, it may be necessary to temporarily disable the MainCamera while some other asset or script runs. For example, while playing a Director Timeline, or using a third-party transition effect script.

In these cases, the MainCamera can be disabled with the following code:

```csharp
AC.KickStarter.mainCamera.Disable();
```

And subsequently re–enabled with:

```csharp
AC.KickStarter.mainCamera.Enable();
```

**NOTE:** The MainCamera should never be disabled during gameplay – only as part of a cutscene – because AC relies on the MainCamera for things like interaction and movement raycasting. The state of the MainCamera will also not be stored in save game files, so you should always make sure that the MainCamera is re–enabled whenever the player can save.
4.9. Camera scripting

The MainCamera can be retrieved with:

```
KickStarter.mainCamera;
```

And the camera that the MainCamera is attached to can be retrieved with:

```
KickStarter.mainCamera.attachedCamera;
```

The current focal distance, based on the settings of the attached camera, can be read with:

```
KickStarter.mainCamera.GetFocalDistance ();
```

To disable, and then re-enable, the MainCamera at runtime, use:

```
KickStarter.mainCamera.Disable ();
KickStarter.mainCamera.Enable ();
```

If the MainCamera component’s Draw fade? option is unchecked, then it is down to a custom script to render any full-screen fade effects. The intensity and texture that the MainCamera would otherwise use can be read with:

```
KickStarter.mainCamera.GetFadeAlpha ();
KickStarter.mainCamera.GetFadeTexture ();
```

The camera system has the following events:

```
OnSwitchCamera (_Camera fromCamera, _Camera toCamera, float transitionTime);
OnShakeCamera (float intensity, float duration);
```
5. Interactions
5.1. Interaction methods

At their core, adventure games are played by clicking on interactive objects and getting responses back. Interactive objects in AC are called **Hotspots**, and can apply to both objects and NPCs in the scene. The response that a Hotspot can have is called an **Interaction**.

A Hotspot can have many Interactions, and how which Interaction is decided when clicking a Hotspot is dependent on the game's **Interaction method**. The Interaction method is a critical setting of the game, as it affects not only how the game is played, but also how it is built.

The Interaction method is set within the **Settings Manager's Interface** settings:

![Interface settings](image)

It can have one of four values:

**Context Sensitive**
Allows the player to run simple "use" and "examine" interactions with a single mouse clicks.

**Choose Interaction Then Hotspot**
Allows the player to select from a range of interaction icons, and then click on a Hotspot.

**Choose Hotspot Then Interaction**
Allows the player to click on a Hotspot, and then select from a range of interaction icons.

**Custom Script**
Allows the designer to create their own interaction system with custom scripting.

Changing this value will alter the Inspectors of Hotspots, and may require you to build an Interaction Menu. Therefore, you should choose a value early in your game's development rather than decide later on.

---

**PROTIP:** The 3D Demo uses Context Sensitive mode, while the 2D Demo uses Choose Hotspot Then Interaction. For an example of Choose Interaction Then Hotspot, see the Nine verbs UI template available on the website's Downloads page.
5.1.1. Context sensitive mode

In this mode, each Hotspot has a single "Use" interaction, and (optionally) a single "Examine" interaction.

- When using Mouse And Keyboard input, "Use" is mapped to the left mouse button and the InteractionA input button, while "Examine" is mapped to the right mouse button and the InteractionB input button.
- When using Keyboard Or Controller input, "Use" is mapped to the InteractionA input button, while "Examine" is mapped to the InteractionB input button.
- When using Touch Screen input, "Use" is mapped to single-finger touches, while "Examine" is mapped to two-finger touches.

**PROTIP:** The 3D Demo uses this interaction method – see Running the demo games.

Interactions are defined in a Hotspot's Inspector:

Hotspots can have multiple "Use" interactions defined, but only the first enabled one can be triggered. The Hotspot: Change interaction Action can be used to disable and enable interactions during gameplay.

For more on Hotspots and interactions, see Hotspots.

Each "Use" interaction is assigned an icon defined in the Cursor Manager, which can be used to inform the player of the type of interaction clicking a Hotspot will perform. For example, hovering the mouse over an NPC might reveal the words "Talk to" along with a speech bubble icon. How the UI reacts when hovering over a Hotspot is set within the Cursor Manager, in the Interaction icons panel:
All Hotspot "Examine" interactions share the same icon, which set at the bottom of the Interaction icons panel:

![Examine Icon](image)

This panel is also used to decide the behaviour of the UI when a Hotspot features both a "Use" and "Examine" interaction.

**PROTIP:** Take care to not get confused between "Look at", and "Examine". "Look at" is one of the default cursor icons, and can be mapped to any "Use" interaction in the Hotspot. To create an interaction that responds to right-clicks, define an "Examine" interaction underneath instead,

Each icon has a name and a texture. The texture can be a simple graphic, or animated if it consists of multiple frames.

Inventory items are handled in a similar way – the Inventory Manager will allow you to define a single “Use” and “Examine” ActionList asset for each item. An item's "Use" ActionList asset will override the default behaviour of selecting the item when clicked – though you can still incorporate that with the Inventory: Select Action.

When an inventory item is selected, it can be used on other items or on Hotspots by clicking on them.
5.1.2. Choose Interaction Then Hotspot

This mode allows for classic adventure-game interfaces used by the old LucasArts and Sierra games, in which the cursor icon (or "verb") is chosen by the player before choosing a Hotspot to interact with:

![Diagram of a character choosing a Hotspot with various interaction options like Give, Pick up, Use, Open, Look at, Push, Close, Talk to, Pull, and Push Tyre swing.]  

In this mode, a Hotspot can have as many "Use" interactions as you wish:

![Image of the Cursor Manager's Interaction icons section with options to enable and disable interactions.]  

Each interaction is associated with a different icon defined in the Cursor Manager's Interaction icons section. While Context Sensitive mode leaves this association as purely visual, here an icon is used to determine which interaction will run. For example, a Hotspot's "Look at" interaction will only be run if it is clicked while the "Look at" icon is selected.

**PROTIP:** If Set first 'Use' Hotspot interaction as default? is checked in the Settings Manager, invoking the DefaultInteraction input will cause the active Hotspot's first-enabled "Use" interaction to be run regardless of the active icon. This allows for the "right-click secondary mode" seen in the classic SCUMM games. The same feature is also available for inventory items via the Set first 'Standard' Inventory interaction as default? option.

The Hotspot: Change interaction Action can be used to disable and enable interactions during gameplay.
Icons can be selected in three ways:

- By pressing either the right-mouse button or an input button named **CycleCursors** to cycle through the available icons. (The last-selected Inventory item can also optionally be included). Backward-cycling can be performed by pressing an input button named **CycleCursorsBack**.
- By pressing an input button mapped to the icon directly, provided that **Set Interaction with specific inputs?** is checked in the Cursor Manager. Each icon’s associated input will then be listed beneath.
- By clicking on an Interaction menu element associated with that icon.

The first and third methods combined allow for the same interface used by Kings Quest V and Sam & Max Hit The Road, while the second and third allow for the same interface used by Monkey Island 1 and 2 (classic editions).

**PROTIP:** This mode can be demonstrated within the 2D Demo by changing the Interaction method to **Choose Interaction Then Hotspot**. A classic "nine-verb" interface example is available on AC’s Downloads page.

You can enable the right-mouse button cycling of cursor icons in the Cursor Manager:

The **Leave out of Cursor cycle?** option for each icon allows you to have individual icons ignored when cycling.

Additionally, each icon has an associated **Input button** name that, when clicked, will cause it to be selected:

To associate an icon with an Interaction menu element, change the element's **Cursor** field in its list of properties:
Because it is possible to select icons that a Hotspot does not have an associated interaction for, this mode introduces **Unhandled interactions**, which are "fallback" interactions that run when no other more specific one can be found. Each icon has its own unhandled interaction slot, which again is defined in the Cursor Manager:

You can choose if Inventory items are used the same way as Hotspots via the **Inventory interactions** field in the Settings Manager’s **Inventory settings** panel:

Choosing **Multiple** will allow you to create multiple interactions for items as well, while **Single** will cause them to have "one-click behaviour" as seen in **Context Sensitive** mode. For more on this option, see **Inventory interactions**.

**NOTE:** You can revert back to **Context Sensitive** mode on a per–Hotspot basis with a Hotspot’s **Single 'Use' interaction?** checkbox. When checked, that Hotspot will behave like all do in Context Sensitive mode, causing it to run the same interaction regardless of the current cursor mode. This is useful if you want to create "room exit" Hotspots that only ever need to be used in a single way.
5.1.3. Choose Hotspot Then Interaction

This mode is the most complex of the three, but has the most room for customisation. In this mode, a Hotspot can have as many "Use" interactions, however the interaction that gets run is chosen after the Hotspot. The advantage is that the player only has to see a list of interactions that are relevant to each Hotspot – those that don’t make sense can be omitted.

**PROTIP:** The 2D Demo uses this interaction method – see Running the demo games.

A Hotspot can have as many "Use" interactions as you like:

![Use interactions](image)

Each interaction is associated with a different icon defined in the Cursor Manager’s Interaction icons section. While Context Sensitive mode leaves this association as purely visual, here an icon is used to determine which interaction will run.

The Hotspot: Change interaction Action can be used to disable and enable interactions during gameplay.
The Select Interactions by field under Interface settings in the Settings Manager determines how the interaction to run is chosen once a Hotspot is clicked:

<table>
<thead>
<tr>
<th>Interface settings</th>
<th>Movement method:</th>
<th>Point And Click</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input method:</td>
<td>Mouse And Keyboard</td>
<td></td>
</tr>
<tr>
<td>select interactions by:</td>
<td>Cycling Menu And Clicking Hotspot</td>
<td></td>
</tr>
<tr>
<td>See Interactions with:</td>
<td>Click On Hotspot</td>
<td></td>
</tr>
</tbody>
</table>

It has the following options:

**Clicking Menu**
Which involves clicking an icon from a Menu that pops up

**Cycling Menu And Clicking Hotspot**
Which involves using input buttons to cycle through icons in a Menu that pops up

**Cycling Cursor And Clicking Hotspot**
Which involves using input buttons to change the cursor's icon

**Clicking Menu**

In this mode, an Interaction Menu appears when a Hotspot is clicked on – and the user clicks on an icon inside it. An Interaction Menu is one with an **Appear type of On Interaction**, and contains a selection of Interaction menu elements – each one associated with a particular Cursor icon:

Further options in the Settings Manager allow you to choose when this Menu is turned on and off, as well include inventory items in it:

For inventory items to show, the Interaction Menu must also have an InventoryBox element with an **Inventory box type of Hotspot Based**.
Cycling Menu And Clicking Hotspot

This mode is similar to the previous, only the player presses Input buttons to select and trigger an icon inside an Interaction Menu.

The buttons CycleInteractionsLeft and CycleInteractionRight (or an axis named CycleInteractions), are used to change the selected icon, while the left-mouse / InteractionA button is used to run the interaction.

**NOTE:** As the interaction icons are not clicked directly in the Menu, the Menu should be set to Ignore cursor clicks? to avoid conflict.

Cycling Cursor And Clicking Hotspot

This option removes the need for a Menu, and simply changes the cursor icon to represent the selected interaction. The right-mouse–button, or CycleCursors input button, can be used to cycle through the various interactions (and CycleCursorsBack will cycle in reverse). Optionally, the cursor can be cycled automatically once an Interaction is run. The interaction itself is run by pressing either the left–mouse button or a button named InteractionA.

**PROTIP:** If interactions are displayed in an Interaction Menu, only those that are relevant to the active Hotspot will be shown by default. This can be amended by unchecking Auto–hide Interaction icons based on Hotspot? in the Settings Manager. If unchecked, “Unhandled” interactions for each cursor icon can then be set in the Cursor Manager – similar Choose Interaction Then Hotspot mode.

You can choose if Inventory items are used the same way as Hotspots via the Inventory interactions field in the Settings Manager's Inventory settings panel:

Choosing Multiple will allow you to create multiple interactions for items as well, while Single will cause them to have "one–click behaviour" as seen in Context Sensitive mode. For more on this option, see Inventory interactions.
NOTE: You can revert back to Context Sensitive mode on a per–Hotspot basis with a Hotspot's Single 'Use' interaction? checkbox. When checked, that Hotspot will behave like all do in Context Sensitive mode, causing it to run the same interaction regardless of the current cursor mode. This is useful if you want to create "room exit" Hotspots that only ever need to be used in a single way.
5.1.4. Custom interaction systems

While Adventure Creator has a range of options that can be used to recreate many popular adventure game interfaces, it's possible to create a completely custom one through scripting. If your Settings Manager's Interaction method is set to Custom Script, then Hotspots will only be selectable by calling script functions.

**PROTIP:** Included with AC is the Custom Interaction System Example script, which demonstrates how Hotspots and inventory items can be selected and interacted with from a GUI, bypassing AC's internal interface.

The Hotspot script component contains the following functions, that can be used to trigger its various interactions:

- **RunUseInteraction (int iconID = -1)**
  Runs the Hotspot's 'Use' interaction. If no icon ID is supplied (as defined in the Cursor Manager), then the first–available use interaction will be run.

- **RunExamineInteraction ()**
  Runs the Hotspot's 'Examine' interaction.

- **RunInventoryInteraction (InvItem invItem = null)**
  Runs the Hotspot's 'Use with inventory' interaction. If no inventory item is supplied, then the currently–selected inventory item will be run.

- **ShowInteractionMenus ()**
  Shows any Interaction menus (i.e. with an Appear type of On Interaction), connected to the Hotspot.

- **ShowInteractionMenu (Menu menu, bool includeInventoryItems)**
  Shows a specific Interaction menus, connected to the Hotspot. This menu need not have an Appear type of On Interaction.

It also contains functions to retrieve a use and inventory interaction based on the interaction’s ID and inventory item ID respectively. They both return a Button class, which contains the interaction data:

- **GetUseButton (int iconID)**
- **GetInvButton (int invID)**

The currently–active Hotspot can be read with:

```
AC.Kickstarter.playerInteraction.getActiveHotspot ();
```
Even with a custom interaction system, Hotspots are still detected according to the Hotspot detection method. Therefore, if you wish to control how Hotspots are first selected, this must be set to Custom Script as well. You can then select any Hotspot (updating the "Hotspot label" and highlighting it in the scene) with:

```csharp
AC.KickStarter.playerInteraction.SetActiveHotspot (Hotspot hotspot);
```

Note that a Hotspot does not need to be selected or highlighted in order to have its interactions triggered through script.

When it comes to inventory interactions, the above settings do not affect the way InventoryBox elements behave – you can still use, select and combine items as normal. In order to change the way an InventoryBox menu element works, you can set its Inventory box type setting to Custom Script to disable regular behaviour, and then use the OnMenuElementClick custom event to run your own code as appropriate.

A typical event reads as:

```csharp
private void MyElementClick (AC.Menu _menu, MenuElement _element, int _slot, int _buttonPressed)
{
    Debug.Log ("Menu: " + _menu.title + ", Element: " + _element + ", Slot: " + _slot + ", MouseState: " + _buttonPressed);
}
```

For more, see Custom events.

Either by using custom events or otherwise, Inventory items (InvItem class) can have their interactions triggered in a manner similar to that of Hotspots:

```csharp
RunUseInteraction (int iconID = -1)
```

Runs the Inventory item's 'Use' interaction. An icon ID (as defined in the Cursor Manager) can be supplied if the Settings Manager's Inventory interactions field is set to Multiple.

```csharp
RunExamineInteraction ()
```

Runs the Inventory item's 'Examine' interaction, if the Settings Manager's Inventory interactions field is set to Single.

```csharp
CombineWithItem (InvItem otherInvItem)
```

Combines the Inventory item with another

```csharp
Select ()
```

Selects the inventory item, but does not use it

```csharp
ShowInteractionMenus ()
```

Shows any Interaction menus (i.e. with an Appear type of On Interaction), connected to the item.
ShowInteractionMenu (Menu menu, bool includeInventoryItems)
Shows a specific Interaction menus, connected to the item. This menu need not have an
Appear type of On Interaction.

A List of all inventory items defined by your game can be found with:

AC.KickStarter.inventoryManager.items

A List of all inventory items carried by the player can be found with:

AC.KickStarter.runtimeInventory.localItems
The currently-selected inventory item can be read with:

```java
AC.KickStarter.runtimeInventory.SelectedItem;
```

And can be deselected with:

```java
AC.KickStarter.runtimeInventory.SetNull ();
```

Finally, if your interaction system involves mouse-clicks on the screen, you may need to “reset” the mouse click afterwards in order to prevent any of AC’s other systems (such as point-and-click pathfinding) from making use of it. Do to that, just call:

```java
AC.KickStarter.playerInput.ResetMouseClick ();
```

NOTE: Entries in this List can be null – therefore you should always do a null check when reading entries in this List.
5.2. Actions and ActionLists

At the core of AC’s visual-scripting system is the **Action**. An Action is a code block that performs a specific task. Actions come in two types:

**An instruction**
For example, adding an item to the player’s **Inventory**.

**A query**
For example, checking the value of a **Variable**.

Actions are chained together to form **ActionLists**, which can be used to create cutscenes, process logic, and more. There are five types of ActionList:

**Cutscene**
Present in the scene, and run when the scene begins or when called by another ActionList.

**Interaction**
Present in the scene, and run when the player clicks on a Hotspot. See **Interaction methods**.

**Trigger**
Present in the scene, and run when the player or some other object passes through a volume in the scene.

**DialogOption**
Present in the scene, and run when the player chooses an option from a Conversation.

**ActionList asset**
An asset file, and run whenever something scene-independent is needed – for example, when examining an inventory item.

| PROTIP: Custom Actions are a powerful way of extending functionality, as they allow you to run your own code within any ActionList. A series of tutorials on writing them can be found [online]. |

| NOTE: Actions cannot exist in prefabs. If you want an ActionList to exist outside of a scene, use an **ActionList asset**. |

ActionLists can be run from logic objects (such as **Hotspots**), when a scene starts via the Scene Manager, when the game begins via the Settings Manager’s **ActionList on start game** field. They can also be run from custom scripts, by invoking their **Interact** method – this is true for both scene-based lists and asset files.
Each ActionList type has its own set of properties, which can be viewed and set at the top of their Inspector:

![Cutscene (Script) Inspector](image)

**NOTE:** If the **Actions source** field is changed to **Asset File**, then the Actions will be pulled from an **ActionList asset**. This is useful when collaborating in team projects, so that Actions can be modified outside of scene files. It is also recommended to do this when working with prefabs, since Actions themselves cannot exist in prefabs.

An ActionList's Actions are shown beneath its properties:

![Dialogue and Sound Actions](image)

“Instruction” Actions have an **After running** field. With this, you can choose what happens after an Action has been performed. You can stop the ActionList, skip to another Action within that ActionList, or run a different Cutscene. “Query” Actions allow you to perform a different task depending on its outcome – allowing you to create branching gameplay and puzzle logic.

**PROTIP:** To have an ActionList call another and wait until it has finished running, use the **ActionList: Run** Action. To run multiple Actions and ActionLists in parallel, use the **ActionList: Run in parallel** Action.
To aid testing, ActionLists can be run at any time while the game is running – just click Run now at the top of the Inspector. Actions can also be set to pause the Unity Editor just before they are run – allowing you to debug any problems more easily. This is done via the Toggle breakpoint option in an Action's context menu:

Actions can be created and modified in the Inspector. However, as ActionLists can quickly become complex, it is recommended to instead use on the ActionList Editor.
5.2.1. Standard Actions

AC comes included with over 100 Actions, and more can be added by writing custom Actions or downloading them from the AC wiki.

Actions are sorted into the following categories:

- ActionList
- Camera
- Character
- Container
- Dialogue
- Document
- Engine
- Hotspot
- Input
- Inventory
- Menu
- Moveable
- Object
- Objective
- Player
- Save
- Scene
- Sound
- ThirdParty
- Variable

All Actions available to use are listed in the Actions Manager. The following are present in all AC games:
ActionList

These Actions deal with the playback and management of ActionLists.

Check running
Queries whether or not a supplied ActionList is currently running. By looping the If condition is not met field back onto itself, this will effectively “wait” until the supplied ActionList has completed before continuing. Can also query if the ActionList this is placed in is currently being skipped – see Skipping cutscenes.

Check parameter
Queries the value of a parameter sent to either the parent ActionList, or a supplied one, by the ActionList: Run and ActionList: Set parameter Actions. For more, see ActionList parameters.

Comment
Stores text for editor display only, which is useful for keeping track of complex lists. The comment text can optionally be sent to the Console window when the Action is run, either as a log, warning, or error message.

PROTIP: Any Action can be assigned a comment when using the ActionList Editor window – and printed in the Console via the Settings Manager's Print Action comments in Console? option.

Kill
Instantly stops a scene or asset-based ActionList from running.

NOTE: Killing an ActionList will stop Actions from running, but will not stop the effects that Actions have already made on them. For example, if a character is mid-speech due to the Dialogue: Play speech Action, killing the list will not stop them from speaking. This must be done separately with e.g. the Dialogue: Stop speech Action.

Pause or resume
Pauses or resumes an ActionList. When instructed to pause, any currently-running Actions will first be completed.

PROTIP: The triggering of Actions is what pauses – not the Actions themselves. Actions that are running mid at the time of the call to pause will first be completed. However these Actions can optionally be re-run when the ActionList is resumed.
Run
Runs any ActionList, either from the beginning or from a particular Action. If the new 
ActionList to be run has parameters (see ActionList parameters), then their values can be 
set within this Action – and without actually running the ActionList, if desired.

Run in parallel
Runs up to ten subsequent Actions (whether in the same list or in a new one) 
simultaneously. This is useful when making complex cutscenes that require timing to be 
exact.

Set parameter
Sets the value of a single parameter of an ActionList. The new value can be set manually, 
copy from another parameter, or by copying the value of a Global Variable. Integer, 
boolean, and float parameters can also be given random values. To set the value of all 
parameters at once, use the ActionList: Run Action. For more, see ActionList parameters.

PROTIP: By setting a parameter's value, and running Actions that use it, multiple times 
in a sequence, it can behave similar to an array of values.

PROTIP: This Action can be used to set an Inventory Item parameter's value from a 
Global Integer variable that references its ID, or a Global String variable that references 
its name.

Wait for preceding
Triggers its After running command only when all Actions that can run it have done so. 
This allows for multiple chains of Actions created by the ActionList: Run in parallel 
Action to wait for one another before continuing – and is useful if the duration of each 
chain is dynamic or unknown.

NOTE: To save the pause–state of a scene–based ActionList, you must add a Constant 
ID component – see Saving scene objects. To save the pause–state of an ActionList 
asset, you must give it a unique name and place it in a Resources folder – see Saving 
asset references.
Camera

These Actions deal with the camera system – see Cameras overview for more.

**Crossfade**
Crossfades to a new camera, over a specified time.

**Fade**
Fades the camera in or out. The fade speed can be adjusted, as can the overlay texture.

**Rotate third-person**
Rotates the GameCamera Third Person to a fixed angle – either in World Space or relative to its target.

**Shake**
Causes the camera to shake, giving an earthquake screen effect. The camera can translate, rotate, or both.

**Split-screen**
Displays two cameras on the screen at once, arranged either horizontally, vertically, or with one overlaid on top of the other. When arranged side by side, you can choose which camera responds to mouse clicks. When one is overlaid atop the other, only the former will respond to clicks.

**Switch**
Switches to a specified camera – either instantly or over time.
Character

These Actions deal with modifying or instructing Players and NPCs.

Animate
Can play or stop a custom animation, change a standard animation (idle, walk, run or talk), change a footstep sound, or revert the character to idle. The exact functionality of this Action depends on the character’s Animation engine.

NOTE: In order to record a change in a character’s footstep sounds, you must instead rely on the Sound: Change footsteps Action.

Change rendering
Overrides a character’s scale, sorting order, sprite direction, or Sorting Map. It can also be used to redefine which directions a character can face. This is primarily intended for 2D games.

Face direction
Makes a character turn, either instantly or over time, to face a direction relative to either the camera or themselves – i.e. up, down, left or right.

Face object
Makes a character turn, either instantly or over time, to another object or copy an object’s rotation. A character can turn with their body, or look with their head – see Head turning. If a First-person Player is being affected, the camera can optionally be tilted as well.

Hold object
Places an object in a character's hand – either by parenting the object to the character’s hand transform (as set in their Inspector), or by using IK to move the character’s hand itself. If the GameObject is a prefab, and not present in the scene at runtime, it will first be instantiated. This action only works with the Mecanim and Legacy animation engines.

NOTE: To save the object’s parentage, attach the Remember Transform component, check Save change in Parent?, and add Remember NPC to the character if an NPC.

Move along path
Moves the character along a pre-determined Path – see Character movement. Will adhere to the speed setting selected in the relevant Paths object. Can also be used to stop a character from moving, or resume moving along a path if it was previously stopped.
Move to point
Moves a character to a given Marker – Pathfinding methods. If Wait until finish is checked, then a time limit can be applied. If the time taken to move exceeds this limit, then the character can be made to either teleport or stop moving.

**PROTIP:** If the walk-to point is set by a GameObject parameter, and the GameObject is a Hotspot, then the character will move to that Hotspot's Walk-to Marker.

NPC follow
Makes an NPC follow another NPC or the Player. If they exceed a maximum distance from their target, they will run towards them. Optionally, they can be made to move to random points around the character they are following, as opposed to simply getting close. If the NPC is an inactive Player (see Player switching), they have the option of following the active Player across scenes.

**NOTE:** Making an NPC move with another Action will stop them from following anyone.

Rename
Changes the display name of a character when subtitles are used.

Switch portrait
Changes the “speaking” graphic used by characters. To display this graphic in a Menu, place a Graphic element of type Dialogue Portrait in a Menu with an Appear type of When Speech Plays.

**NOTE:** To save a character’s change in portrait graphic, you must attach the Remember Portrait component – available on the AC wiki.
Container

These Actions deal with reading and changing the contents of Containers.

Add or remove
Adds or removes inventory items from a Container, and optionally transferring it to the Player’s Inventory or another Container.

Check
Checks if a container is carrying a given inventory item, or if it is carrying a given number of items.

Open
Opens a Container, causing any Menu with an Appear type of On Container to open. To close the Container, close the Menu with the Menu: Change state Action.

Alternatively, a Container can be mapped to a specific InventoryBox element inside a Menu, allowing multiple Containers to be open simultaneously.
Dialogue

These Actions deal with the playback of character speech and Conversations.

**Play speech**
Makes a character speak. If no character is specified, the speech line will be considered to be narration. A “thinking” effect can be produced by opting to not play any animation. For speech to be shown, an appropriate Subtitles Menu with an **Appear type** of **When Speech Plays** must be present in the Menu Manager. If **Run in background**? is checked, the Action will not wait for the line to finish and the ActionList will continue instantly. If the Wait time offset is greater than zero, then the ActionList will wait for that amount of time once the speech has finished. To insert dynamic elements in speech text, see Text **tokens**. Text can also make use of Unity’s Rich Text tags.

**PROTIP:** Even with a Subtitles Menu, speech will only be shown if the Subtitles option is enabled. To set the default state of the Subtitles option, click **Reset Options data** in the Setting Manager and check/uncheck the Show subtitles? box.

**NOTE:** If the ActionList that runs this Action has a **When running** value of **Run In Background**, then the speech line will be considered background regardless of its own **Run in background**? setting. Background and blocking speech can be displayed in separate **Subtitle menus** by altering the Menu’s **For speech of type** field.

**Rename option**
Renames a conversation’s dialogue option label.

**Start conversation**
Runs a conversation, and displays its available dialogue options via a Conversation Menu, which is a Menu with an **Appear Type** of **During Conversation** and a **DialogList** element.

**NOTE:** By default, this Action ceases its ActionList and a conversation's DialogOptions run when an option is chosen. Checking **Override options**?, however, allows you to keep the resulting Actions all within the same ActionList. For an example of this, see the **PlayIntroConv** Cutscene in the 3D Demo scene, “Basement”.

**Stop speech**
Ends any currently-playing speech instantly, whether it be background, blocking, or both. Can be limited to stop speech spoken by specific characters, as well as narration.

**Wait for speech**
 Waits until a particular character has finished speaking. This is most useful when the line in question has been set to play in the background.
**Toggle option**

Sets the display of a Conversation’s dialogue option. If an option is locked, it cannot be shown again until it is unlocked.
Document

These Actions deal with the manipulation of Documents.

**Add or remove**
Adds, removes, or clears all Documents held by the Player. A list of all held Documents can be displayed with an InventoryBox element.

**Check**
Queries whether or not a particular Document is being held by the Player.

**Open**
Activates a Document for viewing via a Menu with an Appear type of On View Document. When such a Menu is closed, the Document is considered closed.
Engine

These Actions deal with game-wide and scene-independent behaviours.

**Change timescale**
Changes the playback speed of gameplay to a value between 0 and 1. This allows for slow-motion effects.

**Check platform**
Queries the platform that the game is running on or being built for, which is useful when creating platform-specific content.

**Control Timeline**
Controls the playback of Timelines used by Playable Director components, by allowing the user to play and stop them at runtime. The Timeline asset can be changed, and the track bindings can also be modified to allow different GameObjects each track.

The MainCamera can be optionally disabled while it runs, to allow the Timeline to have camera control. Note that this is only for Unity 2017 or later.

**End game**
Ends the current game, either by loading an autosave, resetting the scene, restarting or quitting the game executable. If restarting, a new scene to switch to must be specified.

**Manage systems**
Enables and disables individual systems within Adventure Creator, such as Interactions. Disabling systems allows other assets to take over control. Can also be used to change the **Movement method**, as set in the Settings Manager, but note that this change will not be recorded in save games.

**Wait**
Waits a set time before continuing. If a negative time, the Action will wait for one frame.

---

NOTE: To record the playback state of a Playable Director in save games, attach the **Remember Timeline** script to it.

NOTE: To record the playback state of a Playable Director in save games, attach the **Remember Timeline** script to it.

**PROTIP:** If the ActionList's **When running** field is set to **Run In Background**, this will act as a background timer – otherwise, it will pause the game.
Play movie clip
Controls playback of a Video Player component. The loaded video clip asset can optionally be changed. On WebGL, this is done by supplying a url to download the video from.

**NOTE:** To record the playback state of a Video Player component in save games, attach the Remember Video Player script to it.
Hotspot

These Actions deal with the reading and modification of Hotspots.

**Change interaction**
Enables and disables specific Interactions on a Hotspot.

**Check interaction enabled**
Checks if a specific Interaction on a Hotspot is currently enabled.

**Enable or disable**
Turns a Hotspot on or off.

![NOTE: To record the enabled state of a Hotspot in save games, attach the Remember Hotspot script to it.]

**Rename**
Renames a Hotspot, or an NPC with a Hotspot component.
Input

These Actions deal with the reading of inputs.

Check
Checks to see if the player is pressing a mouse key, touching the screen, or pushing a button/axis as defined in Unity's Input Manager at the time it is run.

NOTE: If you need to check continuously for an input, use Active inputs instead of looping this on itself.

QTE
Initiates a Quick-time event for a set duration. The QTE type can either be a single key-press, holding a button down, or button-mashing. The Input button must be defined in Unity's Input Manager.

PROTIP: When relying on Touch-screen input, leaving the Input button name field will allow touches anywhere on the screen to be valid.

Toggle active
Enables or disables an Active Input.
Inventory

These Actions deal with the reading and manipulation of the player's Inventory items.

Add or remove
Adds or removes an item from the player's inventory. Items are defined in the Inventory Manager. If the player can carry multiple amounts of the item, the exact number added or removed can be set. If the game supports player-switching, the inventory of inactive players can also be modified.

Change interaction
Enables and disables specific Interactions on an Inventory item. If Multiple Inventory interactions are enabled, this includes Standard as well as Combine Interactions. Otherwise, only Combine Interactions can be affected.

NOTE: Interactions can only be changed for items that are currently held by the Player. If the Player is carrying multiple instances of the specified item, all will be affected.

Check
Queries whether or not the player is carrying an item, or how many items in total they currently hold. If categories are defined, the query can also be limited to a specific category.

Check selected
Queries whether or not the chosen item, or no item, is currently selected. Note that when used in a gameplay-blocking ActionList, the active item is automatically deselected. Therefore, this Action also allows you to query the last-selected item. If Inventory categories are defined, this Action can also be used to query which category the currently-selected item is in.

Crafting
Either clears the current arrangement of crafting ingredients, or evaluates them to create an appropriate result (if this is not done automatically by the recipe itself). See Crafting.

Property to Variable
Converts an item's property value to a Variable, which can then be read by the Variable: Check Action or displayed in a Menu using Text tokens. The item in question can either be a specific one, or the one currently selected by the Player. If a specific one is chosen, you have the option to read the “live” values of the item if the Player is carrying it – as opposed to the default values supplied in the Inventory Manager. This is because the property values of items held by the Player can be modified through script.

Select
Selects a chosen inventory item, as though the player clicked on it in the Inventory menu. Will optionally add the specified item to the inventory if it is not currently held.
Menu

These Actions deal with the reading and manipulation of Menus.

**Change state**
Provides various options to show and hide both menus and menu elements. Menus can also be locked, which will prevent them from opening even if their **Appear type** matches the current conditions. Can also add or remove a **Journal** element's pages.

![PROTIP: Some elements have multiple slots – for example, the DialogList element has a different slot for each displayed Conversation option. Individual slots cannot be hidden, since they are controlled by the system they are linked to. To show or hide individual slots, instead manipulate the linked data. For example, Conversation options are shown and hidden using the Dialogue: Toggle option Action.]

![NOTE: To record new pages added to a Journal in save games, they must be added to the Speech Manager – see Gathering game text.]

**Check num slots**
Queries the number of slots that a given menu element has. This can be used on an **InventoryBox** element, for example, to determine how many Inventory items the player is carrying.

**Check state**
Queries the visibility of menu elements, and the enabled or locked state of menus.

**Select element**
Selects either a supplied element, or the first-available, within a given menu. Note that this only works if the menu can be directly-controlled – see Navigating menus directly. This works best when placed as the first Action in the menu’s **ActionList** when turn on asset.

**Set Input Box text**
Alters the text within an **Input** element. The new text can either be entered within the Action itself, or taken from a String **Variable**.

**Set Journal page**
Changes a Journal’s selected page to a specific index.
Moveable

These Actions deal with the reading and manipulation of Draggable and PickUp objects.

**Check held by player**
Queries whether or not a Draggable or PickUp object is currently being manipulated.

**Check track position**
Queries how far a Draggable object is along its track.

**Set track position**
Moves a Draggable object along its track automatically to a specific point, provided that its Drag Mode is set to Lock To Track. The effect will be disabled once the object reaches the intended point, or the Action is run again with the speed value set as a negative number. It is also possible to use this Action to change which track it is attached to.

**Toggle Track region**
A Drag track can be assigned regions, that mark areas along it that can be detected or snapped towards. This Action disables and enables them.
These Actions deal with scene objects and miscellaneous scripts.

**Add or remove**
Instantiates or deletes GameObjects within the current scene.

**Animate**
Causes a GameObject to play or stop an animation, or modify a Blend Shape. The available options will differ depending on the chosen animation engine.

**Blend shape**
Animates a Skinned Mesh Renderer's blend shape by a chosen amount. If the Shapeable component attached to the renderer has grouped multiple shapes into a group, all other shapes in that group will be deactivated.

**Call event**
Invokes a public function present on another GameObject.

**Change material**
Changes the material on any scene-based mesh object.

**Change Tint map**
Changes which Tint map a Follow Tint Map component uses, and the intensity of the effect. For more, see Tint maps.

**Check presence**
Use to determine if a particular GameObject or prefab is present in the current scene.

**PROTIP:** If the project uses Addressables, you can optionally reference the object to spawn by their Addressable name. To allow this, you will need to make sure that AddressableIsPresent is listed in your project's Scripting Define Symbols.

**NOTE:** To record the state of added GameObjects in save games, follow the steps outlined in Saving asset references.

**NOTE:** To record modified materials in save games, place both the new and the original materials in a Resources asset folder, and give the affected GameObject the Remember Material component – see Saving asset references.
Check tag
Use to determine if a GameObject or prefab has a particular tag.

Check visibility
Use to determine if a particular GameObject is visible, either at all in the current scene, or within the view of the currently-active camera. If the GameObject has a Sprite Fader component attached, then this will also be accounted for.

Fade sprite
Fades a sprite in out out over a set time. The sprite in question must have the Sprite Fader component attached to it.

**NOTE:** To record the state of a sprite's fade in save games, attach the Remember Visibility component.

Highlight
Gives a glow or continuous pulse effect to any mesh object with a Highlight component. Can also be used to make inventory items glow, making it useful for tutorial sections.

Record transform
Allows the position, rotation, or scale of a GameObject to be recorded in a Vector3 Variable, both in World and Local space.

Send message
Sends a given message to a GameObject. Can be either a message commonly-used by Adventure Creator (Interact, TurnOn, etc) or a custom one, with an integer argument.

**PROTIP:** Many of AC's logic components respond to the common messages provided. A Trigger can be disabled, for example, by passing the Turn Off message.

Set parent
Parent one GameObject to another. Can also set the child's local position and rotation.

**NOTE:** To record an object's parentage in save games, attach the Remember Transform component and check Save change in Parent? – see Saving asset references. All possible parent objects must also have a Constant ID component.
**Teleport**
Moves a GameObject to a Marker instantly. Can also copy the Marker's rotation. The final position can optionally be made relative to the active camera, the player, a Vector3, or any GameObject in the scene. For example, if the Marker's position is (0, 0, 1) and **Position relative to** is set to **Relative To Active Camera**, then the object will be teleported in front of the camera.

If no Marker is set, but a relative Vector3 value is supplied, the GameObject will move by that amount instead.

![NOTE: To record an object's position in save games, attach the Remember Transform component.]

**Transform**
Moves, rotates or scales a GameObject over time, or copies the Transform of a Marker in the scene. The GameObject must have a **Moveable** component attached. Position and rotation changes can be made in either local or world space.

![PROTIP: For finer control over the way an object moves, it is often better to attach an Animator, create animations, and play them with the Object: Animate Action.]

**Visibility**
Hides or shows a GameObject. Can optionally affect the GameObject's children. Can also be used to enable or disable a UI Canvas component.

![NOTE: To record an object's visibility in save games, attach the Remember Visibility component.]

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Objective

These Actions deal with the querying and manipulation of Objectives.

**Set state**
Updates an Objective's current state. The updated Objective can optionally be "selected" for display by Label and Graphic elements.

**Check state**
Queries an Objective's current state.

**Check state type**
Queries whether an Objective's current state is Active, Completed, or Failed.
These Actions deal with reading and manipulating the current Player.

Check
Queries which Player prefab is currently being controlled. This only applies to games for which Player switching has been set to Allow in the Settings Manager.

Constrain
Locks and unlocks various aspects of Player control, such as what direction he can move in, or his ability to run.

Lock to Path
When using Direct or First-person movement, this can be used to restrict the Player’s motion to a specific Path during gameplay. This is useful for controlled gameplay sequences where you only want the Player to move in a certain direction. Additional options allow you to choose which node along the Path to start at, and whether or not the Player can move in both directions along the Path.

Switch
Swaps out the Player prefab mid-game – see Player switching. If the new Player is in a different scene, that scene will be loaded automatically – and its OnLoad cutscene will be triggered, if defined.

Teleport inactive
When multiple Players are defined – see Player switching – this Action can be used to teleport one of the currently-unused Players to a new scene. They can be set to appear at a specific PlayerStart, the scene’s default, or a PlayerStart based on which scene they were previously in.
Save

These Actions relate to the reading and manipulation of save game files – see Saving and loading overview.

Check
Queries whether or not saving is currently possible (to aid in the display of a “Save” Menu Button, for example), whether or not a particular save slot is filled, whether a particular Save profile exists (by name or index), or how many profiles or save game files have been created (to aid in the display of a “Continue game” Button, for example).

Manage profiles
Creates, renames, deletes and switches Save profiles, if enabled. If the ActionList that contains this Action has an integer parameter, then it can be set when called from a Button or ProfilesList menu element.

Manage saves
Renames and deletes save game files, as referenced by the slot index number of a SavesList menu element. If the ActionList that contains this Action has an Integer parameter, then it can be set when called from a Button or SavesList menu element.

Save or load
Allows you to load, continue the last-recorded, or save a save-game file. Note that saving will not be permitted if any gameplay-blocking ActionList other than the one that contains this Action is running, or if a Conversation is active. The Save: Check Action can be used to determine if a save will succeed beforehand. This Action can also be used to optionally load a game selectively, i.e. only certain elements, such as inventory or variables.

Set Option
Allows you to set the state of any default Options data, i.e.: the active language, subtitle display, and audio volumes. These values are normally changed by the user in the default Options menu, but with this you can set them directly. To set the value of Options-linked Variables, use the Variable: Set Action.
Scene

These Actions deal with manipulating the currently-open scene(s).

**Add or remove**
Adds or removes a scene without affecting any other currently-open scenes. If a scene is added, it will be added as a sub-scene and the “active” scene will be unchanged. This is designed to provide the possibility of open-world adventures, and thus the new scene's PlayerStarts will be ignored when it is loaded. If this Action is used to remove the “active” scene, then the first-available sub-scene will become the new active scene.

Any scene added in this way should be configured using the Scene Manager. If not, you will need to attach a SubScene component to an object in it, and configure its Inspector. This will ensure that such changes are recorded in save-game files.

**NOTE:** This Action is not compatible with scenes that use local Players (i.e. Player objects that are stored within the scene file), nor those that override default camera perspective – see **Overriding perspective**.

**NOTE:** When saving, the **active Camera** can only be recorded if it is in the “active” (or main) scene. To save a Camera within a sub-scene, the active scene must be removed so that the sub-scene becomes the new active one.

**Change setting**
Changes any of the following scene parameters: NavMesh, Default PlayerStart, Sorting Map, Tint Map, Cutscene On Load, Cutscene On Start, or Cutscene On Variable Change. When the NavMesh is a **Polygon Collider**, this Action can also be used to add or remove holes from it.

**Check**
Queries either the current scene, or the last one visited. This is useful if you want to run a cutscene that is a continuation of one in a previous scene. If **Player switching** is enabled, you can query the scene visited by a specific Player.

**Check attribute**
Queries the value of any of the pre-defined attributes in the main scene that's open. See **Scene attributes**.

**Switch**
Switches to a new scene, bringing the active **Player** along with it. The scene must be listed in Unity’s **Build Settings**. If asynchronous loading is enabled (see **Loading screens**), this Action can also be used to preload a scene only, so that loading time is reduced when it is next opened.
Switch previous
Switches (or preloads) to the previous scene. If Player switching is enabled, you can choose between the Player's previous scene, or whichever was last loaded.

PROTIP: A crossfade transition between scenes can be achieved by checking Overlay current scene during switch? and fading in with the Camera: Fade Action in the new scene's OnStart cutscene.
Sound

These Actions deal with the playback of Sounds and Music.

**Change footsteps**
Changes the AudioClips used by a character's Footstep Sounds component.

```
NOTE: To record modified footstep sounds in save games, attach the Remember Footstep Sounds component, give both the new and the original sounds unique names, and place them in a Resources asset folder – see Saving asset references.
```

**Change volume**
Alters the 'relative volume' of any Sound object. Be sure to add the RememberSound component to any Sound object whose volume changes you wish to be saved.

```
NOTE: To record changes to a Sound component in save games, attach the Remember Sound component.
```

**Play**
Triggers a Sound object to start playing. Can be used to fade sounds in or out.

**Play ambience**
Handles the playback of an ambience track listed in the Ambience Storage window. See Ambience tracks.

**Play music**
Handles the playback of a music track listed in the Music Storage window. See Music.

**Play one-shot**
Plays an AudioClip once, and without the need for a Sound object or AudioSource component. The sound will be treated as SFX. Sounds triggered with this Action will not be able to fade or be interrupted.

**Set Mixer snapshot**
Transitions to a single or multiple Audio Mixer snapshots.
ThirdParty

These Actions deal with integrations with third-party assets.

**Cinema Director**
Runs a Cutscene built with Cinema Director. Note that Cinema Director is a separate Unity Asset, and the CinemaDirectorIsPresent preprocessor must be defined for this to work.

**PlayMaker**
Calls a specified Event within a Playmaker FSM. Note that PlayMaker is a separate Unity Asset, and the PlayMakerIsPresent preprocessor must be defined for this to work.

⚠️ **NOTE:** Due to the way Playmaker behaves, the call will be ignored if the FSM in question is already in mid-execution at the time that the Action is run.
Variable

These Actions deal with the reading and manipulation of Variables.

**Assign preset**
Bulk-assigns all Global or Local Variables to pre-determined values – see Variable presets. Optionally, Variables linked to Options Data can be ignored.

**Check**
Queries the value of both Global and Local Variables declared in the Variables Manager. Variables can be compared with a fixed value, or with the values of other Variables.

**Check random number**
Picks a number at random between zero and a specified integer – the value of which determines which subsequent Action is run next. Optionally, the last-picked number can be prevented from being chosen – but in order to store this in save games, the Action must be linked to a Global or Local integer Variable.

**Copy**
Copies the value of one Variable to another. This can be between Global and Local Variables, and AC will attempt to convert the value in question if the two Variables are of different types (e.g. Integer to a Float).

**Pop Up switch**
Uses the value of a Pop Up Variable to determine which Action is run next. An option for each possible value the Variable can take will be displayed, allowing for different subsequent Actions to run.

**Run sequence**
Runs a different subsequent Action each time it is run. In order to save the current order in the sequence, it must be linked to a Global or Local integer Variable – however this is not a requirement.

**PROTIP:** This Action is useful when giving the Player different responses each time he examines a Hotspot.

**Set**
Sets the value of both Global and Local Variables. Integers can be set to absolute, incremented or assigned a random value. Strings can also be set to the value of an Input menu element, while Integers, Booleans and Floats can also be set to the value of a Mecanim (Animator) parameter. When setting Integers and Floats, you can also opt to type in a formula (e.g. $2 + 3 \times 4$), which can also include tokens of the form [var:ID] and [localVar:ID] to denote the value of a Variable – see Speech tokens.
### 5.2.2. Custom Actions

As well as the Standard Actions included with AC, it is possible to write custom ones and include them in ActionLists.

Each Action is a self-contained script file. They are added to via the Custom Action scripts panel in the Actions Manager. Once a folder is pointed to via the folder icon, a new field will appear – allowing for multiple folders to be chosen:

![Custom Action scripts panel](image)

**NOTE:** Each selected folder is assumed to only contain Action scripts. No other script or asset type should be contained in them.

Each Action is a subclass of the Action base class, and is a self-contained script that contains both its UI and its functionality.

To be properly visible inside the Actions Manager, a new Action must have overrides set for its Title text property and Category enum property. The number of output sockets an Action has is set by its NumSockets integer property.

To display its own UI, it requires an override of the ShowGUI function. Public variables declared in the script can be exposed here using Unity's standard EditorGUILayout functions so that they can be edited by the user.

For an Action to run, it requires an override of the Run function. This function returns a float which – if positive – is the time that its parent ActionList will wait before running it again. An Action will only be considered complete when:

- Its internal isRunning boolean is set to False
- Its Run function returns zero

If an ActionList is skipped (see Skipping cutscenes), then each Action within that list will have its Skip function (if overridden) invoked. This should command the Action to perform its task instantly – or do nothing at all, if the function is overridden but left blank. If no such function is used, then Run will be called instead.

To assist in the creation of new Actions, annotated "blank" Action script are provided: ActionTemplate.cs, ActionCheckTemplate.cs, and ActionCheckMultipleTemplate.cs. ActionCheckTemplate demonstrates how "check" Actions (i.e. those that have two output sockets) can be created, while ActionCheckMultipleTemplate allows for any number of output sockets.
These scripts can be found in **Assets → AdventureCreator → Scripts → ActionList.**

**PROTIP:** A series of step-by-step tutorial on writing custom Actions can be found online.
5.2.3. The ActionList Editor

The ActionList Editor is a node-based editing tool that visualises the flow of Actions in a much more natural way than the Inspector.

It can be opened in any of the following ways:

- By clicking the **ActionList Editor** Button from an ActionList's Inspector
- By clicking the node icon next to a scene-based ActionList in the Hierarchy
- By double-clicking an ActionList asset file
- From the top toolbar, under **Adventure Creator → Editors → ActionList Editor**

This window is designed to help make ActionLists easier to follow: Actions appear as nodes, which you can re-arrange and re-connect to one another by dragging "wires" from output sockets on the right:

Actions can be collapsed and expanded by clicking their top-left icon:

You can move around the canvas either by panning, using the scrollbars, or by pressing the Page Up / Page Down keys. The Home key will reset the view back to the first Action.
You can marquee-select multiple Actions at a time by dragging a box around them. Holding the Shift key while doing so retains the previous selection. Selected Actions can be manipulated in bulk by right-clicking an empty space to bring up a context menu:

The **Auto-arrange** and **Align** options allow you to arrange Actions more neatly:

Individual Actions can also be assigned a colour, to help differentiate them.
Clicking an Action's cog icon brings up its own context menu, from where you can toggle breakpoints and comments. Comments will be visible even if the Action itself is collapsed, allowing you to get an overview of what an ActionList does even if all the Actions are collapsed:

![ActionList context menu]

Comment boxes support both variable and parameter tokens – see Speech tokens.

Actions can also be favourited via this menu. Up to 10 Actions can be marked as a favourite via the cog icon menu, and then pasted at any time by right-clicking in empty space.

The top of the Actions Manager features a number of editing options when using the ActionList Editor, including the ability to open multiple instances:

![ActionList editing settings]

The ActionList Editor also can be locked to a particular ActionList. Click the yellow padlock icon to the lower-left of the window, and it will lock itself to the ActionList it is currently viewing:

![Locked ActionList]

In the lower-right corner of the window are two further buttons:

**Ping object**

Pings the ActionList being edited in the Hierarchy or Project window, depending on whether it is an asset file or not.

**Show properties**

Toggles the properties of the ActionList, which are also displayed at the top of its Inspector.
### 5.2.4. Generating ActionLists through script

ActionLists are the core of AC's interaction and cutscene system, and are used to trigger dialogue, make characters move, make changes to the inventory, and more.

While any command that an Action performs can be done so in a separate script, one major benefit of them is that they can be queued up and only run when those before it have finished. For example, an ActionList can command an NPC to move to a Marker, and say something once they've reached it.

As well as using the Inspector or ActionList Editor, ActionLists can also be created through script. Some of the benefits of doing this include:

- Pre-populate an ActionList with a standard set of Actions to further work on
- Dynamically generate ActionLists at runtime
- Reduce filesizes and memory usage, since runtime-created ActionLists are not saved in a project

In order to create Actions, we first need to reference an ActionList component in which to store them, i.e.:

```csharp
ActionList actionList = gameObject.GetComponent<ActionList>();
if (actionList == null)
{
    actionList = gameObject.AddComponent<ActionList>();
}
```

The above code, placed in a MonoBehaviour script, will add such a component to the GameObject (if not already present) and create a reference to it.

To create a new instance of an Action, we need to know the name of its class. This can be done by looking it up in the Actions Manager. Looking up the Dialogue: Play speech Action, for example, reveals that its filename is ActionSpeech.cs:

The class name is just the filename without the '.cs' at the end.
To create a new instance of the Action, invoke its **CreateNew** static function. This function's parameters are used to set up the data within it, and it returns an instance of the class. For example:

```csharp
ActionSpeech myNewSpeechAction = ActionSpeech.CreateNew (myCharacter, "My speech text");
```

What parameters are available will depend on the Action. Some Actions which serve multiple purposes have different CreateNew functions – but each is documented in the source code.

![NOTE: Only AC's Standard Actions have CreateNew functions – Custom Actions need their own written.](image)

The returned **Action class** can then be placed within the **ActionList's actions List**:

```csharp
actionList.actions = new List<Action> { myNewSpeechAction };
```

Actions can also be created and placed in a single command:

```csharp
actionList.actions = new List<Action>
{
    ActionSpeech.CreateNew (myCharacter, "My speech text"),
    ActionPause.CreateNew (1f),
    ActionCharPathFind.CreateNew (myCharacter, myMarker),
};
```

The above will make a character (stored in the "myCharacter" Char variable, speak, wait for 1s second, and then walk to a marker (stored in the "myMarker" Marker variable).

Once populated with Actions, an ActionList can be run by simply calling:

```csharp
actionList.Interact ();
```

![PROTIP: The Scripted Action List Example component demonstrates two sample lists generated at runtime. The script itself is commented with instructions and explanations.](image)
5.3. Hotspots

Hotspots are used to create ways for the player to interact with the scene. They are placed over geometry and NPCs, and assigned Interactions run when clicked on.

NOTE: A Hotspot is 'on' when on the Default layer, and 'off' when on Ignore Raycast layer. These can be changed in the Settings Manager's Raycast settings.

To create a Hotspot, open the Scene Manager and click Hotspot under the Logic panel, followed by Add new. A yellow cube will appear at the scene origin, marking the region that the mouse cursor must hover over in order to select it. Reposition it over an object you want to make interactive.

If a scene mesh or sprite is selected when creating a new Hotspot, the option Position over selected mesh? will appear in the Prefabs panel.

PROTIP: The Hotspot prefab is just a convenience tool – any object can be made interactive by attaching the Hotspot component and a collider.

The name of the Hotspot is what will appear as the label when selected, but you can override this with the Label (if not name) field in the Hotspot inspector:
You can make an object glow when the Hotspot is selected by adding a Highlight component to it, and then referring to it from the Hotspot's **Object to highlight** field in its Inspector.

The bottom half of the Hotspot's inspector is where you define its associated interactions. Which interaction types are available will be based on your chosen **Interaction method**. Click the + icon to create a new interaction slot:

Inside each slot, the **Interaction** field is a reference to the **Interaction ActionList** that will run when the player triggers it through gameplay. You can create an Interaction object from the Scene Manager, but it is easier to click **Auto-create** to the right of the Interaction field. Doing so will create, rename, and link a new Interaction object within the scene, which you can then select and modify to define what happens when the Interaction runs – see **The ActionList Editor**.

When creating **Use** interactions, the **Cursor / Icon** field lets you associate the interaction with an interaction icon:

Interaction icons are defined in the **Cursor Manager**. How this icon is used will be dependent on your game's **Interaction method**.

The **Player action** field dictates what the Player character does before the interaction is run. They can do nothing, turn to face the Hotspot, or move towards it. They can also be made to move towards a Marker, provided a **Walk-to Marker** has been assigned at the top of the Inspector.

If in **Context-sensitive mode**, you can also define an **Examine** interaction, which runs when the player right-clicks. You can also have multiple **Inventory interactions**, with each Inventory interaction handling the use of one type of item on the object:
For more, see **Inventory interactions**.

If you want to create a default response (i.e. “I can't use that there!”) to using an inventory item on a hotspot without creating the same interaction multiple times, you can define an **Unhandled Use on Hotspot** event in the **Inventory Manager**.

Hotspots can be turned on and off using the **Hotspot: Enable or disable** Action, and individual interactions with **Hotspot: Change interaction**.

![PROTIP: To set the Hotspot's starting state, attach the Remember Hotspot component and set the Hotspot state on start to Off. This component also records changes made to it in save games.]

You can limit a Hotspot's interactivity by assigning a GameCamera in the Inspector's **Limit to camera** field. When assigned, the Hotspot will only be active if the chosen camera is also active.

If you are creating a game of very large scale, you may find that you need to increase the size of the **Hotspot ray length**, which you can adjust inside the **Settings Manager**.

By default, scene-based Interaction prefabs are used to handle what happens when a Hotspot is clicked on, but there are alternatives. Setting the Hotspot's **Interaction source** to **Asset File** allows you to call ActionList assets instead. This is useful for building game logic when you don't have access to the scene, for example when building a game as part of a team.

This can also be set to **Custom Script**, to allow you to send a message to a GameObject of your choice. This is useful if you wish to hard-code your interactions instead of relying on Actions.

![PROTIP: If an Inventory interaction calls a script function that has a single integer parameter, that parameter will be set to the item’s ID number. This is also the case for Unhandled inventory interactions.]

If the Interaction's ActionList makes use of a **GameObject parameter**, then that parameter can automatically be set to the Hotspot when run. For control over all of an Interaction's parameter values, use the **Set Interaction Parameters** component.
5.4. Hotspot detection

The way in which Hotspots are detected can be modified via the Hotspot detection method, under Hotspot settings in the Settings Manager:

This field has three options:

**Mouse Over**
In which Hotspots are selected by the cursor pointing at them.

**Player Vicinity**
In which Hotspots are selected according to how close they are to the Player.

**Custom Script**
In which Hotspots are selected by only calling custom script functions.

Hotspots can also be assigned an Interactive boundary within their Inspectors. This represents an optional bounding volume that the Player must be within before the Hotspot becomes interactive. This volume is marked by a Box Collider by default, but this can be replaced with any collider component.

**NOTE:** Since the Interactive boundary makes use of Collider triggers, the Player must have both a Rigidbody and a Collider of their own.
5.4.1. Mouse–over detection

**Mouse–over detection** causes Hotspots to become selected when the cursor points at them – with only one being selectable at a time. It is the most common option when using mouse and keyboard input. It is simple to set up because it involves no other settings or additions to the Player prefab.

When using keyboard or controller input, the cursor is not controlled by the mouse – but instead with input axes named **CursorHorizontal** and **CursorVertical**. These can be mapped to either mouse axes, keyboard buttons, or joystick axes in Unity's Input Manager.

When using touch screen input, the cursor is normally wherever the user presses on the touch–screen. However, the **Moving touch drags cursor?** option allows you to drag the cursor without it needing to be in the same place.

**NOTE:** When two Hotspots share the same screen–space, the cursor will detect the one closest to the camera.
5.4.2. Player–vicinity detection

**Player–vicinity detection** causes Hotspots to be highlighted when they enter a Trigger volume attached to the **Player**. With this mode, it is possible to make a game with similar controls to Grim Fandango.

When used with **Direct** or **First-person** movement, an additional field named **Hotspots in vicinity** will also be available:

When this is set to **Cycle Multiple**, the player can press input buttons mapped to **CycleHotspotsLeft** and **CycleHotspotsRight** (or alternatively an axis mapped to **CycleHotspots**) to cycle through available Hotspots near to the Player.

For a Player prefab to be able to detect Hotspots, they must be equipped with a **Hotspot Detector**. To make one, add an empty GameObject to your Player prefab as a child object (and also a child of the sprite if in 2D). Leave it untagged and move it to the **Ignore Raycast** layer.

Then add a collider (in 3D games, this will usually be a **Sphere Collider**; in 2D games, this will be a **Circle Collider 2D**), with **Is Trigger?** checked. Then add a **Detect Hotspot** component, and position it such that its centre is slightly in front of the player, with the radius extending a few feet outward.

**NOTE:** If your Player does not have a **Rigidbody** or **Rigidbody 2D** component on their base, you will need to add one to the Hotspot Detector.

Finally go back to your Player's Inspector and assign this new GameObject as the **Hotspot detector child**.

**NOTE:** If your game has this detection mode enabled, Players created with the Character wizard will automatically be assigned a Hotspot Detector. The 3D Demo game's Player, Tin Pot, is equipped with one – and can be dropped in your own game to experiment with. He can be found in **AdventureCreator/Demo/Resources**.
5.5. Cutscenes

A Cutscene is an ActionList that can be run automatically when a scene begins, as well as by any other Action or ActionList.

**PROTIP:** Don’t let the name confuse you: a Cutscene can be used to create background processes, process logic and more – not just gameplay-blocking sequences.

Cutscenes are created in the Scene Manager. They can either be created by clicking Create beside each of the three Scene cutscene types:

Or by double-clicking the Cutscene prefab button under the Logic panel:

**NOTE:** On start vs On load? On start refers to the scene beginning through natural gameplay – whether it be due to the player entering it from another, or it being the first scene in the game. On load refers to a scene beginning due to a save game file being loaded.

Cutscene objects are invisible and cannot be interacted with directly by the player – their position is unimportant.

The top of the Cutscene's Inspector features the following properties:

The Actions Source field allows you to use the Actions from an ActionList asset, which is useful when collaborating as it keeps the Actions out of the scene file.
The **When running** field allows you to choose if it blocks gameplay, or runs in the background – see [Background logic](#).

The **Is skippable?** checkbox allows you to make it skip to the end instantly when the player presses the **EndCutscene** button – see [Skipping cutscenes](#).

A non-zero **Start delay** causes the Cutscene to wait for a set time before running. If a **Kill** command is sent to it during this time (using the **Object: Send message** Action), it will not run afterwards. This can be a useful way of creating timed sequences, as a delayed Cutscene can play the "fail state" which gets cancelled if the player succeeds in time.

The **Auto-save after?** checkbox will record an autosave once it has completed, provided that no other gameplay–blocking ActionLists are running. For more, see [Autosaving](#).

The **Use parameters?** checkbox allows you to dynamically alter its Actions fields at runtime – see [ActionList parameters](#).

Cutscenes can be converted to **ActionList assets**, and vice–versa, via the cog icon to the top–right of the Inspector.
5.6. Skipping cutscenes

If an ActionList type has an Is skippable? checkbox available in the properties, then checking it means it can be skipped by the player while it is running:

![Is skippable checkbox](image)

To skip an ActionList, the player invokes the EndCutscene input button – this can either be an input listed in Unity's Input Manager, or a Button menu element that simulates it.

Skipping an ActionList still causes it to end instantly, with all Actions within it completed in one go – regardless of the point at which it is skipped. All game logic within it will execute: Variables will still be changed, Inventory items will still be added or removed, and objects will still be moved to their expected "end" position.

Animation Actions, however, may require additional work for the effect to be complete.

Because some animations may be intended to continue playing once the Action finishes – or continue to another FSM state in Mecanim, they must still be played when an ActionList is skipped.

Therefore, it is necessary to end your ActionList with Actions that place your objects and characters in their correct animation state.

For instance, if the Player waves their hand during a cutscene, you should end your ActionList with an additional Character: Animate Action that specifically returns the Player to their Idle animation, even if this happens naturally when the ActionList plays normally.

Additionally, if your ActionList invokes Mecanim Trigger parameters, Unity may run them inadvertently afterwards. Therefore, this is made optional when skipping the Character: Animate and Object: Animate Actions.

**PROTIP:** The 2D Demo's Park scene contains examples of this necessity: the Intro2 Cutscene ends by playing the BirdHide animation on the Bird NPC, even though this animation is played by the FSM when the Cutscene plays uninterrupted. Further explanation is given in the Skipping Cutscenes chapter of the Making a 3D game tutorial.

If you ever want to bypass certain Actions when skipping an ActionList, the ActionList: Check running Action has the ability to check if the ActionList it is placed in is currently skipping.
NOTE: When skipping the ActionList: Run in parallel Action, each chain that stems from it will be skipped in order, with each chain run to completion before the next. Therefore, you should take this into account when ordering your chains.
5.7. Background logic

By default, an ActionList will prevent regular gameplay while it runs – allowing you to build complex cutscenes and interaction responses.

However, any ActionList can instead run alongside gameplay by setting its **When running** property to **Run In Background**:

**PROTIP:** When placed in a "background" ActionList, the **Engine: Wait** Action will act as a simple timer, allowing you to time exactly when background processes occur.

**NOTE:** Running an ActionList in the background will not enforce gameplay: if another ActionList set to **Block Gameplay** is running at the same time, gameplay will still be blocked.
5.8. Triggers

A Trigger is an ActionList that runs when an object passes through it. It can be set to react to the player, or some other object. It is invisible to the player, but can cause events to run as they move around the scene.

**NOTE:** If a Trigger’s Detection method is set to Rigidbody Collision, then the object it is set to detect must have a Rigidbody component (or Rigidbody 2D, for 2D games).

To create one, open the Scene Manager and click Trigger under the Logic panel, followed by Add new. A red cube will appear at the scene origin, marking the region that an object must enter for it to react. Reposition it to the area you want to make interactive.

**PROTIP:** The Trigger prefab is just a convenience tool – any object can be made into one by attaching the AC_Trigger component and a Collider with Is Trigger checked.

The top of the Trigger's Inspector features the following properties:

The Actions source field allows you to use the Actions from an ActionList asset, which is useful when collaborating as it keeps the Actions out of the scene file.
The **When running** field allows you to choose if it blocks gameplay, or runs in the background.

The **Is skippable?** checkbox allows you to make it skip to the end instantly when the player presses the **EndCutscene** button – see Skipping cutscenes.

The **Trigger type** field allows you to choose if the trigger runs when an object enters it, leaves it, or continuously while inside it. Note that the **Continuous** option is the most processor-intensive of the three.

PROTIP: A Trigger can have multiple AC_Trigger components attached, with each given a different Trigger type field. The 3D Demo scene uses this trick to have the camera change when both entering and leaving the **SwitchNavCam** Trigger.

The **Reacts** field allows you to choose when the Trigger reacts. You will normally want to leave this on the default setting of **Only During Gameplay**, so that it does not interfere with cutscenes.

The **Cancels interactions?** checkbox allows you to interrupt an interaction, if the Player moves through it as the result of moving towards a clicked **Hotspot**.

The **Set collider as parameter?** checkbox allows you to dynamically insert the detected object as a GameObject parameter into the Trigger’s Actions. This is useful if you want to manipulate the detected object in some way, but don’t know what the object will be. For more, see ActionList parameters.

The **Detection method** field allows you to choose how incoming objects are detected. When set to **Rigidbody Collision**, then it will react when an object’s Collider touches its own Collider. When set to **Transform Position**, then it will react according to the object’s actual position relative to the Trigger's Collider. This latter option is more useful for 2D games, where precision is needed.

PROTIP: If the **Detection method** is set to **Transform Position**, then objects it is set to detect do not require Rigidbody or Collider components for the Trigger to detect them.

Triggers can be turned on and off using the **Object: Send message** Action. A Trigger is considered off if its Collider component is disabled.

PROTIP: To set the Triggers’s starting state, attach the **Remember Trigger** component and set the **Trigger state on start** to **Off**. This component also records changes made to it in save games.

Triggers can be converted to **ActionList assets** via the cog icon to the top–right of the Inspector.
5.9. Conversations

A Conversation is a way of presenting an array of options on-screen for the player to choose from. They are typically used for allowing the player to choose what to say to an NPC, but can really be used for any situation that requires the player to make a choice.

A Conversation is begun by running the Dialogue: Start conversation Action.

To create one, open the Scene Manager and click Conversation under the Logic panel, followed by Add new. A Conversation object is never physically seen by the player, so its position in 3D space is irrelevant.

The Conversation's Inspector provides you with the tools necessary to create and manage its dialogue options:

![Conversation Editor]

Each option can be assigned a label and a texture, but bear in mind that your Conversation Menu is what determines how they are displayed.

The Only show if carrying a specific item? checkbox allows you to limit an option’s display according to whether or not the player has something in their inventory. This is useful if you want to create options for “asking about X item”. If the DialogList element used to display the Conversation has icons, this icon will automatically set to the item.
When it comes to the Actions that get run when an option is chosen, there are two methods:

1) By running separate a DialogOption ActionList (each option's Interaction field). This is the default method, and takes into account the option's When finished field to determine whether or not the options should be shown again when the Actions are complete.

2) By checking Override defaults? within the Dialogue: Start conversation Action used to initiate it. When checked, its various options will appear as outputs within the Action, allowing you to run subsequent Actions for each response within the same ActionList. To re-show the Conversation after the response, you must re-route back to the original Action:

![Image](image.png)

**PROTIP:** The 3D Demo scene demonstrates both of these methods: BrainConv makes use of DialogOption ActionLists, while IntroConv makes use of overrides in the PlayIntroConv Cutscene.

The top of the Conversation Inspector features the following properties:

The Interactions source field allows you to call ActionList assets instead of in-scene DialogOptions, which is useful when collaborating as it keeps the Actions out of the scene file.

The Auto-play lone option? checkbox allows you to have a lone option run automatically, as opposed to having the player make an arbitrary click.

The Is timed? checkbox allows you to have the Conversation active only for a set duration – a behaviour common to titles by TellTale Games. When checked, one of the options can be marked as the Default to have it run when the timer expires – via the cog menu to the right. If End if timer runs out? is checked, then the Conversation will simply end instead.

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Dialogue options can be enabled and disabled using the Dialogue: Toggle option Action, and renamed with Dialogue: Rename option. If an option is locked, it will ignore subsequent calls to turn on.

**PROTIP:** The ability to re-colour already-chosen options is available in the DialogList menu element – not in the Conversation Inspector.

Particularly if your game is keyboard-controlled, you can make it easier for your player to select options by linking them to numeric keys on your keyboard. Just check **Dialogue options can be selected with number keys?** in the Settings Manager. This option also allows you to trigger options with inputs mapped to `DialogueOptionX`, where 'X' is the index number of the option to trigger – see the Settings Manager's list of available inputs.

Conversations are normally ended by choosing an option that doesn't return to the Conversation after running. However, you can also end a Conversation manually by pressing an input button names **EndConversation.**

**NOTE:** Conversations normally prevent regular player movement and interactions from occurring, so that they can focus on the choice to make. However, this can be changed by checking **Allow regular gameplay during Conversations?** in the Settings Manager. Be mindful that this may create gameplay conflicts (such as allowing a scene-switch to occur mid-Conversation), so it's recommended to use this option with care. To allow only movement and not interactions during this time, use the Engine: Manage systems Action when the Conversation menu is turned on.
5.10. **ActionList assets**

It is often necessary to run a common set of Actions no matter which scene is currently loaded – for example, when examining an Inventory item or handling a Menu's behaviour. When working as a team on a large game, you may also want to be able to create ActionLists for a scene without interfering with anyone else's work.

ActionList assets are able to live as physical files in your Assets folder, outside of scenes. They are created by right-clicking inside the Project window, and choosing Create → Adventure Creator → ActionList:

![ActionList creation](image)

Double-clicking this asset will open it within the ActionList Editor.

**PROTIP:** ActionList assets are mainly used for Inventory interactions, Menu functions, and common tasks that can occur in any scene. For example, the default Pause menu runs the **DeselctInventory** ActionList when it turns on. This de-selects any active Inventory item, making sure the main cursor is always displayed when navigating the Pause menu.

ActionList assets can also manipulate scene objects by referring to them with **Constant ID** numbers. A Constant ID number is a unique identifier held by a scene object, so that it can be found again by the ActionList when the scene is re-opened. Assigning a scene-based GameObject to an ActionList asset's field will cause a Constant ID number to be automatically generated:

![ActionList editor](image)
This number is stored inside the Constant ID component attached to the GameObject – be sure to save the scene after it has been added. If the scene that holds an object referenced by the ActionList is not open, the connection is not broken – what matters is the Constant ID field beneath it. Clicking Search scenes will search all scenes in your game's Build settings for the referenced object.

**PROTIP:** A bonus of this workflow is that an asset-based Action can refer to different objects in different scenes provided that they share the same Constant ID number. Constant IDs can also be manually assigned from within their Inspectors.

For more on Constant IDs, see Saving scene objects.

The top of an ActionList asset's Inspector features the following properties:

**When running**
Allows you to choose if it blocks gameplay, or runs in the background.

**Is skippable?**
Allows you to make it skip to the end instantly when the player presses the EndCutscene button – see Skipping cutscenes.

**Unfreezes 'pause' Menus?**
Allows it to revert the timescale back to non-zero if it is run while the game is paused due to a Menu being on. This is generally only necessary if the ActionList needs to run a scene animation while the game is otherwise paused.

**Can run multiple instances?**
Allows it to be run multiple times simultaneously. If unchecked, calls to run it while already running will result in the first instance being interrupted.

**Can survive scene changes?**
Prevents it from being ended once a scene change occurs through natural gameplay. This option is only available if Is skippable? is unchecked.

**NOTE:** All ActionLists will be ended upon the loading of a save game file. Therefore, care should be taken to account for this when dealing with an ActionList that spans multiple scenes.
Use parameters?
Allows you to dynamically alter its Actions fields at runtime – see ActionList parameters.

The Settings Manager has an ActionList on start game field that you can assign to have an asset that runs before anything else. The ActionList: Run Action can also be used to run an ActionList asset file at any time.

ActionList assets can be converted to a Cutscenes, and vice-versa, via the cog icon to the top-right of the Inspector. As scene-based ActionLists cannot be stored as assets directly, if you want to transfer one to another scene, then it is recommended to convert it to an ActionList asset, and then convert it back to a scene-based ActionList in the new scene.
5.11. Arrow prompts

An Arrow Prompt is an on-screen indicator that the player can perform an action by pushing a directional key. This is similar to the quick-time events that are employed in Telltale’s The Walking Dead series:

![Arrow Prompt Example]

**PROTIP:** Arrow Prompts are used in the 3D Demo when the player uses the barrel – left and right arrows are used to indicate the choices of pushing the barrel and leaving it along respectively.

Arrow Prompts can be clicked on directly, or activated by pressing the **Horizontal** and **Vertical** inputs in the corresponding direction. When relying on **touch-screen** input, you can activate them by swiping in the given direction.

Arrow Prompts are created by clicking **Arrow Prompt** under the **Scene Manager’s Logic** panel, followed by **Add new**. Arrow Prompt objects are invisible and their transforms are unimportant.

You can use the Arrow Prompt inspector to provide any combination of up, down, left and right arrows. You can modify the icon of each arrow, and supply a **Cutscene** that will run when a direction is invoked. The arrows will be disabled automatically once this happens.

While a set of Arrow Prompts are on-screen, the player’s regular movement control is disabled. To make a set of Arrow Prompts appear, its **TurnOn** function must be triggered – which is most easily done using the **Object: Send message** Action.
5.12. Sounds

A Sound object provides AC with the ability to control the volume and playback of Audio Sources. The **Sound: Play** Action relies on the Sound component to work.

**PROTIP:** To easily play an audio clip without the need for a Sound component, use the **Sound: Play one-shot** Action.

Sound objects are created by clicking the **Sound** button under the Scene Manager’s Logic panel followed by **Add new**. You can set up your sound using the Audio Source component as normal, but the Volume field will be overridden. Instead, you can use the **Relative volume** field in the Sound inspector to adjust its sound level. This way, you can adjust the volume relative to other sounds of the same type (e.g. music or SFX).

The **Sound type** pop-up lets you designate which category of sound the object will play:

![Sound type pop-up](image)

This will affect its overall volume, since the game allows the player to choose the volume of **Music**, **SFX** and **Speech** audio from the Options menu. Choosing **Other** will make the Options menu ignore the volume for this object, making it independent from the rest of the game. As speech audio is automatically set to the correct volume without the need for a Sound object, the “Speech” option in the pop-up is only necessary for playing other sounds at the same volume.

The **Scene Manager** has a **Default Sound** field, which is used by **Menus** to play UI sounds:

![Scene settings](image)

Sound objects can connect to Unity’s **Audio Mixer Groups**. Mixer Groups can be set within the Settings Manager, under **Audio Settings**:

![Audio settings](image)
Volume (or attenuation) parameters for each sound type will also need to entered, and created in the Mixer Group – refer to Unity’s own documentation for more on creating these parameters. If an AudioSource has no Audio Mixer Group assigned in its Output field, then it will be assigned automatically based on the Sound type in the Sound component. This is also true for the AudioSource components used by characters.

The Sound: Play Action can control Sound objects by playing, stopping and fading audio. You can also change the sound clip that is being played, but this is not recommended for audio that will likely be looping when the game is saved, since any change in a Sound object’s Audio Clip will not be stored in the save data.

By default, sounds do not carry over when changing scene, but you may wish to have e.g. ambient sounds continue playing as you navigate the game. To have a Sound object survive a scene change, check the Play across scenes? checkbox, and move the prefab into the root of your scene’s hierarchy – it cannot survive a scene load if it has a parent.

Though the Sound object can be used to play music, it is recommended to use the dedicated Music system for music playback.
5.13. Music

Whereas sound effects and speech audio are generally tied to specific GameObjects in a scene, music tracks can be played independently.

By using the Sound: Play music Action, music tracks can be played, queued, looped and stopped at any time. The state of the music, and the queued playlist, is saved automatically.

In order to play music using this Action, a music track must first be listed in the Music Storage window, which is accessed within the Action itself, or via the top toolbar in Adventure Creator -> Editors -> Soundtrack -> Music storage:

This window is used to assign AudioClips to tracks, and adjust their relative volumes - while they’ll be globally affected by the Music volume option. Music can optionally be made to play while the game is paused. Only tracks listed in this window will be available to use in the Action.

**PROTIP:** If Audio Mixer Groups are enabled (see Sounds), each track can optionally be set their own Mixer Group to play from.

**NOTE:** When music tracks are assigned in this window, the associated data is stored in the Settings Manager. Therefore, be aware that if you change your Settings Manager asset file, you will also have to update the Music Storage window with your tracks.
### 5.14. Ambience tracks

Ambience tracks are similar to Music, in that they are played independently of scenes and GameObjects, and their playback states are saved automatically.

By using the **Sound: Play ambience** Action, ambience tracks can be played, queued, looped and stopped at any time.

In order to play ambience using this Action, an ambience track must first be listed in the **Ambience Storage** window, which is accessed within the Action itself, or via the top toolbar in **Adventure Creator -> Editors -> Soundtrack -> Ambience storage:**

![Ambience Storage Window](image)

This window is used to assign AudioClips to tracks, and adjust their relative volumes – while they’ll be globally affected by the **SFX volume option**. Only tracks listed in this window will be available to use in the Action.

**PROTIP:** If Audio Mixer Groups are enabled (see **Sounds**), each track can optionally be set their own Mixer Group to play from.

**NOTE:** When ambience tracks are assigned in this window, the associated data is stored in the **Settings Manager**. Therefore, be aware that if you change your Settings Manager asset file, you will also have to update the **Ambience Storage window**.
5.15. Containers

A Container is a scene-based list of Inventory items which the player can interact with, separate to their own inventory. This allows for gameplay such as treasure chests that the player can loot from, and boxes that the player can store items in for later use:

Containers are created by clicking Container under the Scene Manager’s Logic panel, followed by Add new. Container objects are invisible and their transforms are unimportant – any graphics associated with them will be related to the Hotspot that is used to access them.

In a Container’s Inspector, a list of items it holds by default can be defined. If Can reorder items in menus? is checked in the Settings Manager, then empty slots can be inserted as well.

During gameplay, a Container’s items can be changed either through Actions or through Menus. To “open” a Container, use the Container: Open Action. To add or remove specific items manually, use the Container: Add or remove Action.

To view a Container’s contents, the Menu Manager must include a Menu with an Appear type of On Container, with an InventoryBox element of type Container. The default interface includes a Container menu for you to re-style. Using such a Menu, the player can transfer items between the Container and their own inventory.

PROTIP: Custom events are available when manipulating Containers – see Inventory scripting.

NOTE: If a Container has an item that the player is already carrying, and that item’s Can carry multiple? property is unchecked, the item will not be clickable and the OnContainerRemoveFail event will be invoked.
5.16. ActionList parameters

In a typical game, there'll be times we want to perform the same task multiple times on different objects. For example, whenever the player picks up an item, we'd want its associated Hotspot to be disabled, its scene graphic to be made invisible, and the item to be added to the inventory.

ActionList parameters allow us to alter an Action's fields at runtime – effectively letting us recycle ActionLists to perform the same task in varying ways.

In the example above, parameters could be used to create a single ActionList that disables a Hotspot, hides a GameObject, and adds an item to the inventory. Whenever the player picks up an item, this ActionList would then be called with each of those objects set there and then.

As the name suggests, ActionList parameters behave like function parameters.

Cutscenes, DialogueOptions, Interactions and ActionList assets have a Use parameters? checkbox in their list of properties. Enabling this allows you to define what parameters the ActionList can use:

Each parameter has a name, a type, and a default value. The type is important, as it dictates which of an Action's fields it can override. The available types are:

- Float
- String
- Integer
- Boolean
- Inventory Item
- Global Variable
- Local Variable (scene-based ActionLists only)
- GameObject (e.g. Camera, NPC)
- Unity Object (e.g. Material / AudioClip assets)
- Vector3
- PopUp
- Document
If an Action contains a field that matches a define parameter's type, you can override it with that parameter:

When the Action runs, it will then use the value of that parameter in place of that field.

**PROTIP:** When the game is running, an ActionList's parameter values are listed in its Inspector.

Parameter values are normally set by one of the following ways:

- By using the **ActionList: Run** Action to run an ActionList with parameters to set the values of all parameters at once
- By using the **ActionList: Set parameter** Action to set an individual parameter's value
- By using the **ActionList Starter** component to run an ActionList that uses parameters
- By using the **Set Interaction Parameters** component to set all of a Hotspot Interaction's parameters at once
- By using the **Set Inventory Interaction Parameters** component to set all of an Inventory Item Interaction's parameters at once
- By using the **Set Trigger Parameters** component to set all of a Trigger's parameters at once

**NOTE:** When an ActionList's parameter values are changed, these changes will persist until the game ends. In the case of ActionList assets, however, this is optional – values can be reverted back to their defaults each time the asset is run.

Parameter values can be read with the **ActionList: Check parameter** Action, and their values at runtime are displayed in the Inspectors of ActionLists that use them.

The `[param:X]` and `[paramlabel:X]` tokens can also be used in Action text fields – see **Text tokens** for more.

Values can also be read and written to with scripting: an ActionList's parameters are stored in its parameters List, which can be modified in a script.

Parameters can be set automatically, in special cases:

- A Hotspot can set itself as the **GameObject** parameter of any Interaction
- A Hotspot can set the item as the **Inventory** parameter of an Inventory Interaction
• A **Trigger** can set the detected object as its own **GameObject** parameter
• A **Button** menu element can set the **Integer** parameter of an **ActionList asset** to a user-set value
• A **SavesList** menu element can set the **Integer** parameter of an **ActionList asset** to the clicked save-slot
• A **ProfilesList** menu element can set the **Integer** parameter of an **ActionList asset** to the clicked profile-slot

**NOTE:** Sometimes the function of Actions change based on their field settings. For example, the **Variable: Check** Action checks for True or False when querying a boolean, but a number when querying an integer. When a parameter is assigned to such an Action, it will assume the same UI and functionality that it had before the parameter was set.

When a **Cutscene** sources its Actions from an **ActionList asset** which uses parameters, the Cutscene will also make use of those parameters. You can choose to either use the parameter values from the asset file (**Sync parameter values?**), or the scene object (**Set local parameter values?**).

**PROTIP:** A practical example of parameters is given in the Action parameters chapter of the Making a 3D game tutorial, and a text-based tutorial is available online.
5.17. Draggable objects

Draggable objects are physics objects that can be manipulated by the player in a pre-determined way: for example, a door that turns around a hinge, or a drawer that moves along a rail. As such, they allow for gameplay with a greater sense of immersion than simply clicking Hotspots.

PROTIP: The Physics Demo features cupboards, drawers and tumbler Draggables. A practical guide to creating such a Draggable from scratch can be found in the Making a first-person game tutorial.

To create one, open the Scene Manager and click Draggable under the Moveable panel, followed by Add new. Attach your mesh to it as a child object and adjust the collider – it is a Sphere Collider by default but can be replaced with any collider you wish.

Draggables react to both mouse clicks and touch-screen touches – how close to the screen they must be is determined by the Moveable ray length field under Raycast settings in the Settings Manager.

As set in its Inspector, a Draggable object has three Drag modes:

Move Along Plane
In which it can only move along the axes of a plane, or aligned to the camera.

Rotate Only
In which it can only be rotated and zoomed to and from the camera. This is similar to the PickUp object, only it cannot be moved freely. If Allow zooming? is checked, the zoom factor is controlled by an input axis named ZoomMoveable. In this mode, the Rigidbody is optional.
Lock To Track
In which it can only move along a pre-determined path known as a Track. In this mode, the Rigidbody is optional.
5.17.1. Drag tracks

Tracks are pre-defined paths that Draggable objects can be made to move along. They can also be connected together to form more complex paths – see Track regions, below.

There are three types of track, available in the Scene Manager’s Moveable panel:

![Moveable panel](image)

### Straight Track

A **Straight Track** is used to constrain a Draggable object along a straight line. Rotation effects can also be added, to make the object roll as it moves, or turn in a screw-like motion. Typical use-cases for this type include drawers and threaded nuts.

### Curved Track

A **Curved Track** is used to constrain a Draggable object along a circular line. If the line is looped to form a circle, the number of possible revolutions can also be set.

### Hinge Track

A **Hinge Track** is used to pivot a Draggable object about its centre. Its position is locked, and can only be rotated in a circular motion. Like the Curved Track, it can also be looped. Typical use-cases for this type include doors and levers.

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**NOTE:** Both Straight and Curved tracks can generate colliders at their ends so that a Draggable’s behaviour when reaching them can be set with Physics Materials. If end-colliders are enabled, a Sphere Collider must be placed on the Draggable’s root to correctly position them – but it can be disabled if desired.

**NOTE:** When a Draggable object becomes attached to a track, it adopts that track’s transform – its rotation may become flipped depending on the track’s orientation, for example. This is a necessary requirement of the drag/track system, but can be countered by checking **Maintain original child transforms?** in its Inspector. This will cause any children (which is where models should be placed) of the Draggable to retain their position and rotation after attachment.
When locked to a Track, **ActionLists** can be assigned that run when the object is moved or let go under the player's control. These ActionLists can be scene-based Interactions or asset-files, and a **GameObject** parameter can be optionally assigned to the moved object.

When locked to a track, a Draggable can be moved either automatically via the **Moveable: Set position** Action, or manually through player input. The input style, set by a track's **Movement input** property, has two modes:

**Drag Vector**  
In which the Draggable moves in the direction of cursor movement, provided that this movement is aligned to the Draggable's current position along the track. This mode is best used when tracks are viewed at an angle to the camera (i.e. with perspective).

**Cursor Position**  
In which the Draggable will move as close as it can to the cursor position, while remaining fixed to the track. This mode is best used when tracks are viewed head-on, so that they take up as much screen-space as possible.

If a Draggable has a Rigidbody attached, then its settings will be relied on for speed and acceleration. Objects with a higher Mass value, for example, will move more slowly. Objects with a higher Drag value will take longer to accelerate and decelerate. To change these values while the player is holding them via a custom script, hook into the **OnGrabMoveable** and **OnDropMoveable** custom events.

**Track regions**

Straight and Curved tracks can also have regions defined, which can be used to enable snapping (i.e. have the Draggable automatically move towards their centre when close enough), or to connect a Track to other Tracks that Draggables can move between. When a connection is made, the connecting Track must also have regions defined – and the connection will be made automatically to the nearest region.

The **Moveable: Check position** Action to determine how far along a Draggable is along its Track, or which snap region it is currently in.

Draggables can be turned on and off by using the **Object: Send message** Action on them. They start the scene enabled, but this can be changed with the **Remember Moveable** script, which is attached to the prefab by default.

---

**PROTIP:** As Draggables rely on Unity's Physics system, they are bound by the same settings as any other physics object. Modifying Unity's **Fixed Timestep** and **Solver Iteration Count** variables will affect the accuracy of this system.
Draggable objects can also be assigned an **Interactive boundary** within their Inspectors. This represents an optional bounding volume that the **Player** must be within before the object becomes interactive. This volume is marked by a Box Collider by default, but this can be replaced with any collider component.

**NOTE:** Since the **Interactive boundary** makes use of Collider triggers, the **Player** must have both a Rigidbody and a Collider of their own.
5.18. PickUp objects

PickUp objects are physics objects that can be picked up and moved freely by dragging the cursor. They are not "picked up" in the Inventory sense – instead they are held in 3D space so that the player can examine, move, and throw them from all angles.

PROTIP: The Physics Demo features a rock that can be picked up in this way. A practical guide to creating such a PickUp from scratch can be found in the Making a first-person game tutorial.

To create one, open the Scene Manager and click PickUp under the Moveable panel, followed by Add new. Attach your mesh to it as a child object and adjust the collider – it has a Sphere Collider by default but can be replaced with any collider you wish.

PickUps react to both mouse clicks and touch-screen touches – how close to the screen they must be is determined by the Moveable ray length field under Raycast settings in the Settings Manager.

The PickUp Inspector allows it to be rotated, zoomed to/from the camera, and thrown. These are performed with the Inputs that must be named as follows:

- **RotateMovable** (Button)
  Used to rotate the PickUp while held

- **RotateMoveableToggle** (Button)
  Used to toggle between rotate and move modes

- **ZoomMoveable** (Axis)
  Used to move the PickUp towards and away from the camera

- **ThrowMoveable** (Button)
  Used to "charge up" a throw which occurs when released
The Inspector also allows you to reduce the player's movement when it is being manipulated, which is helpful when creating first-person games.

Key to the way a PickUp behaves is its RigidBody settings. The Drag and Angular Drag values are locked to 20 when it is held, so altering the Mass value will affects how quickly it can move. A Mass of 1 gives a 1:1 relationship between the movement of the mouse or touch and the movement of the object. Higher values will require more movement from the player to move the object, which lower values will require less.

Triggers can be placed in the scene to determine if a PickUp object has been placed in the correct position. A Trigger can be set to detect the PickUp object in question, or all PickUp objects, so that a sequence of Actions will run when the object enters it.

PickUps can be turned on and off by using the Object: Send message Action on them. They start the scene enabled, but this can be changed with the Remember Moveable script, which is attached to the prefab.

**PROTIP:** As PickUps rely on Unity's Physics system, they are bound by the same settings as any other physics object. Modifying Unity's Fixed Timestep and Solver Iteration Count variables will affect the accuracy of this system.

PickUps can also be assigned an Interactive boundary within their Inspectors. This represents an optional bounding volume that the Player must be within before the object becomes interactive. This volume is marked by a Box Collider by default, but this can be replaced with any collider component.

**NOTE:** Since the Interactive boundary makes use of Collider triggers, the Player must have both a Rigidbody and a Collider of their own.
5.19. Custom cursors

The **Cursor Manager** is used to define the Interactions available in your game. You can add, remove and set textures, animate them, as well as define the rules for which cursors appear – such as the ability to display a dedicated “walk” cursor when hovering over a Navigation Mesh.

**PROTIP:** Interaction icons also accept **Render Textures**, allowing you to create an interface with 3D effects.

The Cursor Manager can also be used to determine if cursors are rendered in **Software**, **Hardware** or **Unity UI** mode. Software mode, the default, hides the system cursor and displays the correct cursor as a texture. While it can be slower on older systems, it enjoys wider support on more platforms. Hardware mode, on the other hand, replaces the system's hardware cursor completely, and can often be faster. Unity UI mode hides the system cursor and relies on a Unity UI prefab that uses its own script to handle the cursor’s position – see **Unity UI Cursor rendering**. A default script and CursorUI prefab is provided as part of the default interface, allowing for more control over animations – but this can be replaced if desired.

**NOTE:** If Hardware rendering is used to draw cursors, the cursor graphic assets must have their **Texture type** fields set to **Cursor** in order to correctly display.

The “click offset” can also be set for each cursor. In Software mode, this offset represents how far the click point is from the cursor's centre, as a decimal of its size. In Hardware mode, the offset represents how far the click point is from the cursor’s top–left, in exact pixels.

Cursors defined under the **Interaction icons** panel can also be referenced both by **Interaction elements** (see also: **Choose Hotspot Then Interaction** mode), as well as **Hotspots**.

To have a cursor be animated, the supplied graphic must include all of the animation frames, arranged in a grid:
When **Animate?** is checked in the Cursor Manager, further fields will then appear – allowing you to enter in the number of frames, rows and columns that the image has, as well as the speed of the animation:

- **Frames: 6**
- **Rows: 2**
- **Columns: 3**
- **Animation speed: 10**
- **End on last frame?**

**NOTE:** So that the image can be separated into individual frames, the **Read/Write Enabled** setting must be checked in the image’s Inspector, under **Advanced**.
5.19.1. Unity UI Cursor rendering

The Cursor Manager's **Unity UI** rendering option delegates cursor display to a Unity UI Canvas prefab. This allows for easier control over its size and appearance, as well as animated effects.

**NOTE:** This option should only be used alongside **Unity UI menus**. **Adventure Creator menus** will always be drawn on top of this cursor, as they use Unity's OnGUI system.

The default Unity UI cursor prefab, **CursorUI**, can be found in **Assets/AdventureCreator/UI**.

The prefab's behaviour can be set from its Unity UI cursor component. The cursor's appearance can be controlled by direct manipulation of a RawImage component, through Animation, or both.

If the **RawImage to control** field is assigned, then that Image's texture will be set to the appropriate textures defined in the **Cursor Manager**, similar to other cursor rendering modes.

If the **RectTransform to position** field is assigned, then that RectTransform's position will be set to the cursor's intended on-screen position.

If the optional **Animator** field is assigned, then an additional list of parameter fields will then be displayed. These allow the UI's appearance to be controlled through animation transitions, based on the current cursor ID, selected item ID, cursor visibility and click state. Not all of these parameter fields need to be set, but those that are will need to have a matching parameter defined in the assigned Animator.
5.20. Quick-time events

Quick-time events, also known as QTEs, are isolated moments of gameplay that require the player to press a key, or a combination of keys, within a time limit. The event is considered "won" if the keys are pressed correctly, and "lost" otherwise. Such events can be created with the Input: QTE Action. When this Action is run, regular gameplay is disabled, and the Action waits until the player has either won or lost.

QTEs can have several "win" requirements: a single button-press, an axis movement, a button held down for a set time, a thumbstick rotated, or a button pressed repeatedly (i.e. "button mashing"). The button name defined in the Action must correspond to an Input button defined in Unity's Input Manager. What happens when the player wins or loses is dictated by the Action's If condition is met and If conditions is not met fields respectively.

**PROTIP:** When relying on Touch-screen input, leaving the Input button name field will allow touches anywhere on the screen to be valid.

A Menu name can also be supplied to the Action. So long as this Menu's Appear type is set to Manual, then it will be displayed automatically for the duration of the QTE – making it suitable to act as a "button prompt" to tell the player what to do. Timer menu elements are useful here: the Timer type can be set to either Quick Time Event Remaining (how long longer the QTE will last) or Quick Time Event Progress (how much progress the player has made). If such a Timer is visible when a QTE is active, then it will represent that QTE.

**NOTE:** If you wish to use these values in your own scripts, you can read them with:

```csharp
AC.KickStarter.playerQTE.GetProgress ();
AC.KickStarter.playerQTE.GetRemainingTimeFactor ();
```

If the Menu is linked to Unity UI, then it can also be animated when the player wins, loses, or presses a correct button. To prepare a Unity UI-linked Menu for animating, attach an Animator component to the base Canvas component. Adventure Creator requires that three animation states be present:

- **Win**
- **Lose**
- **Hold** or **Hit** (the Action will describe which states it requires).

If not all animations are required (e.g. Win but not Lose), then empty states of the same name can be used instead.

A series of QTE tutorials can be found online.
5.21. Interaction scripting

When an ActionList whose When running field is set to Block Gameplay is run, it will be considered a non–interactive sequence and gameplay cannot occur for that time.

To place the game in and out of Cutscene and Pause modes through script, use:

```csharp
Kickstarter.stateHandler.EnforceCutsceneMode
Kickstarter.stateHandler.EnforcePauseMode
```

Scene–based ActionLists and ActionList assets can both be run with:

```csharp
myActionList.Interact();
myActionListAsset.Interact();
```

And ended with:

```csharp
myActionList.Kill();
myActionListAsset.KillAllInstances();
```

If an ActionList uses Parameters (each an instance of the ActionParameter class), then can be retrieved with:

```csharp
myActionList.GetParameter(int parameterID);
myActionList.GetParameter(string parameterLabel);
myActionList.GetParameters();
```

Parameters can then be modified without the need to use the ActionList: Run or ActionList: Set parameter Actions.

Gameplay–blocking ActionLists can be skipped with:

```csharp
AC.Kickstarter.actionListManager.EndCutscene();
```

Conversations can be triggered with:

```csharp
myConversation.Interact();
```

And ended with:

```csharp
Kickstarter.playerInput.EndConversation();
```

The currently–selected Hotspot can be retrieved with:

```csharp
Kickstarter.playerInteraction.GetActiveHotspot();
```
Interactions involves the following events:

- `OnEnterGameState (GameState gameState);`
- `OnExitGameState (GameState gameState);`
- `OnHotspotSelect (Hotspot hotspot);`
- `OnHotspotDeselect (Hotspot hotspot);`
- `OnHotspotInteract (Hotspot hotspot, AC.Button button);`
- `OnDoubleClickHotspot (Hotspot hotspot, AC.Button button);`
- `OnHotspotReach (Hotspot hotspot, AC.Button button);`
- `OnHotspotTurnOn (Hotspot hotspot);`
- `OnHotspotTurnOff (Hotspot hotspot);`
- `OnHotspotStopMovingTo (Hotspot hotspot);`
- `OnHotspotSetInteractionState (Hotspot hotspot, AC.Button button, bool state);`
- `OnRunTrigger (AC_Trigger trigger, GameObject collidingObject);`
- `OnEnableInteractionMenus (Hotspot hotspot, InvItem invItem);`
- `OnPointAndClick (Vector3[] pointArray, bool run);`
- `OnBeginActionList (ActionList actionList, ActionListAsset actionListAsset, int startingIndex, bool isSkipping);`
- `OnEndActionList (ActionList actionList, ActionListAsset actionListAsset, bool isSkipping);`
- `OnPauseActionList (ActionList actionList);`
- `OnResumeActionList (ActionList actionList);`
- `OnSkipCutscene ();`
- `OnGrabMoveable (DragBase moveable);`
- `OnDropMoveable (DragBase moveable);`
- `OnDraggableSnap (DragBase moveable, DragTrack track, int snapID);`
- `OnPickUpThrow (PickUp pickUp);`
- `OnStartConversation (Conversation conversation);`
- `OnClickConversation (Conversation conversation, optionID);`
- `OnPlayMusic (int trackID, bool loop, float fadeTime, int startingSample);`
- `OnPlayAmbience (int trackID, bool loop, float fadeTime, int startingSample);`
- `OnStopMusic (float fadeTime);`
- `OnStopAmbience (float fadeTime);`
- `OnPlaySound (Sound sound, AudioSource audioSource, AudioClip audioClip, float fadeTime);`
- `OnStopSound (Sound sound, AudioSource audioSource, AudioClip audioClip, float fadeTime);`
- `OnModifyHotspotDetectorCollection (DetectHotspot hotspotDetector, List<Hotspot> hotspots);`
- `OnBeforeChangeScene (string nextSceneName);`
- `OnAfterChangeScene (LoadingGame loadingGame);`
- `OnCompleteScenePreload (int preloadSceneName);`
- `OnStartScene ();`
OnChangeCursorMode (int cursorID);
OnSetHardwareCursor (Texture2D texture, Vector2 clickOffset);

OnQTEBegin (QTEType qteType, string inputName, float duration);
OnQTEWin (QTEType qteType);
OnQTELose (QTEType qteType);
6. Inventory
6.1. **Inventory items overview**

The inventory is a staple of many adventure games, and refers to a collection of items that the player character can carry around with them as they explore the game world. These items can be examined, interacted with, and combined with other items or Hotspots. This is the foundation for many puzzles and gameplay mechanics.

![Image of an inventory item](image)

**PROTIP:** Inventory items don't need to be "items" in the physical sense – they can also refer to things like spells or abilities that the player can possess.

What the player is carrying can be modified at runtime – see Managing inventory in-game.

A game's inventory is defined in the **Items** tab of the Inventory Manager. Here, items can be created and modified to be used throughout the game.

When an item is selected in the Editor, further properties will be displayed:

![Inventory item 'Prop sword' settings](settings)

**Name**
The item's internal label, and display label if **Label (if not name)** is left blank.
Label (if not name)
The item's display label, if it should not be the the same as Name field above.

Name is pronoun?
If unchecked, the first letter of the item’s display name will be lower-cased if placed in the middle of a sentence.

Category
Which category the item appears in, if any are defined in the Categories tab.

Carry on start?
If checked, the item will be present in the player's inventory when the game begins.

Can carry multiple?
If checked, multiple instances of the item can be carried. This is good for consumables, e.g. currency.

Slot capacity
Appears only if Can carry multiple? is enabled. This sets the maximum number of items that can be placed in a single slot.

Selection mode
Appears only if Can carry multiple? is enabled and Slot capacity is greater than one. This sets the behaviour when selecting an item that has multiple instances in a single slot – you can select all, select only one, or stack the selection with each click.

Override 'Use' syntax
When any item is selected and hovering over another item or Hotspot, the Hotspot menu label will take the form "Use (item) on (Hotspot)" – the exact words are defined in the Cursor Manager. Checking this box allows you to override this syntax for this particular item – which allows for item-dependent labels such as "Spray (paint) on (Hotspot)".

Linked prefab
This field allows you to associate a prefab object with the item, which is useful if you want to extend the inventory system through custom scripting. An example use-case would be to associate a 3D model with the item, so that a "item close-up" mechanic can be scripted. While this is primarily intended to be accessed via scripting, it can also be spawned in the scene using the Object: Add or remove Action, and overriding the Object to add field with an Inventory parameter.

PROTIP: To get an API reference to the linked prefab, right-click on the field's label and click Copy script variable. This same can be done for all Manager fields.
Main graphic
The item's default texture, which can either be a 2D texture or a Render Texture. This is used when the item is displayed in the inventory but not being interacted with.

Active graphic
The item's "active" texture, which can either be a 2D texture or a Render Texture. This is used when the cursor hovers over the item, or the item is selected.

Selected graphic
The item's "selected" texture, which can either be a 2D texture or a Render Texture. This is used when the item is selected, provided that the Settings Manager's Selected item's display option is set to Show Selected Graphic.

Cursor
The graphic that is used by the cursor when the item is selected. The supplied graphic should be imported as a Cursor type in Unity's Texture import settings. If one is not supplied, the Main graphic will be used instead.

Properties
If Inventory properties are used, then their per–item values can be set here.

Additionally, each item can be assigned a number of Interactions that run when it is used, examine, or combined. Which interactions are available will be based on your chosen Interaction method – see Inventory interactions.

PROTIP: A list of all Inventory items being carried by the active Player can be found in their Inspector while the game is running.
6.2. Inventory interactions

How items are interacted with depends on your game's Inventory interactions field, which appears under the Inventory settings panel of the Settings Manager:

![Inventory settings panel](image)

**NOTE:** When in Context sensitive mode, this field is hidden and set to Single – see below.

This field has two options: Single and Multiple.

**Single**

In this mode, items are selected by left-clicking on them in an InventoryBox element, and examined by right-clicking them.

**NOTE:** When using Touch-screen input, this is done by single-finger and two-finger tapping. When using Keyboard or controller input, this is done by pressing buttons mapped to InteractionA and InteractionB.

Each item's Standard interactions panel in the Inventory Manager allows you to define a “Use” and an “Examine” ActionList asset:

![Standard interactions panel](image)

If an item has a “Use” interaction, then left-clicking the item will run that instead of selecting it. If you wish to select the item as part of the ActionList, you can use the Inventory: Select Action.

**Multiple**

In this mode, items behave like Hotspots – which in turn behave differently according to your game's Interaction method. Items are interacted by clicking them in an InventoryBox element.

Each item's Standard interactions panel in the Inventory Manager allows you to define multiple “Use” ActionList asset – with each one associated with a different Interaction icon defined in the Cursor Manager:
The checkbox to the left of each line allows you to disable an Interaction by default.

The **Select item if Interaction is unhandled?** option in the Settings Manager allows you to have an item become selected when a particular icon is used on it, provided that no matching interaction is defined.

Regardless of option: once an item is selected, the interface can be changed according to the **Cursor Manager's When inventory selected** option:

**NOTE:** If you wish to instead signify an item's selection via a static icon, you can create an **InventoryBox element** of the type **Display Selected**. This technique is covered in the **Custom inventory interface** section of the **First-person tutorial**.

**PROTIP:** Clicking or tapping again will cause the item to become de-selected. However, this can be changed to releasing the initial click or tap by checking **Drag and drop Inventory interface?**, under **Inventory settings** in the Settings Manager.

A selected item can then be used on other items, or **Hotspots**. Interactions between items are defined in the **Combine interactions** section of an item's properties in the **Inventory Manager**:
Interactions with Hotspots are defined in the Hotspot Inspector:

![Image of Hotspot Inspector]

NOTE: If you are using Choose Hotspot Then Interaction or Choose Interaction Then Hotspot mode, and items can be selected normally, above), you can distinguish between "using" an item on an NPC and "giving" it. If the Hotspot has an NPC component attached, an additional field will appear for each inventory interaction.

Items can also have “Un handled” interactions – which are fallback interactions that are run if no more suitable interaction is defined. These are available per-Hotspot, per-item, and globally at the top of the Inventory Manager.

PROTIP: The 3D Demo's Prop sword item uses an unhandled interaction so that the Player character can say "I can't cut that" when attempting to use it on Hotspots that don't have an interaction for it.

One special case arises if your interaction system relies on Interaction menus (see Choose Hotspot Then Interaction mode), and Include Inventory items in Hotspot Interaction menus? is checked in the Settings Manager. This allows you to run inventory interactions without selecting them – as they instead appear in a Hotspot / item's Interaction menu along with the interaction icons:

![Image of Worm on Bench]

In order for them to show, the Interaction menu must include an InventoryBox element of type Hotspot Based – though this is true of the default.

PROTIP: The 2D Demo makes use of this feature. The worm item cannot be selected by clicking it in the top inventory bar – instead it is used on Hotspots by clicking it in the game’s Interaction Menu.
6.3. Managing inventory at runtime

During gameplay, the Player's Inventory items are shown inside the InventoryBox menu element. The default interface includes an Inventory menu that appears when the mouse hovers over the top of the screen – see the default Inventory menu.

If items are categorised (see Inventory items overview), then InventoryBox elements can also be used to limit what kind of items are shown. For example, a "regular" inventory could be shown for items, while another could be shown for spells.

Items can be added to and removed from the Player's Inventory by using the Inventory: Add or remove Action. If multiple units of the same item can be carried, then this Action will also allow you to affect the number of units that the player is carrying. For example, a "gold currency" item could be reduced by 50 when the player buys something from a shop.

PROTIP: The cog icon to the right of an item's label in the Inventory Manager can be used to find all references made to that item in the project.

The Inventory: Check Action is used to perform different Actions based on what the player is carrying. Again, if multiple units of the same item can be carried, this Action will allow you to make a specific query about how many units of that item the player is carrying. Returning to our shop example, we can use this Action to determine if the player has enough gold to buy an item, and issue a response accordingly.

NOTE: If you wish to access the inventory through script, you can do so with:

AC.KickStarter.runtimeInventory.localItems;
6.4. Crafting

Combining items together typically involves using one item on another. However, AC also allows for "recipes", in which many items can be combined at once to create a new item. This mechanic is known as **crafting**, as made popular by games such as Minecraft.

To perform crafting in game, an **InventoryBox** and a **Crafting** element must be made available to the player so that they can transfer items between them. Such a Menu is already provided in the default interface – see the default Crafting Menu.

Recipes are managed in the **Crafting** tab of the **Inventory Manager**:

![Crafting Menu]

Each recipe requires a number of "ingredient" items, and a resulting item that is produced when the ingredients are combined.

**PROTIP:** Recipes can optionally be made to require a specific crafting pattern – that is, each ingredient must be placed in a specific position within the Crafting element.

If an ingredient's Item has **Can carry multiple**? checked, you can also determine the number of instances of this item required. For example, a recipe to create a working flashlight may require one empty flashlight and two batteries.

The Crafting element has two types: **Ingredients** and **Output**. When the correct arrangement of items are placed in a Crafting box of the Ingredient type, the resulting item can be selected from a Crafting element of the Output type. Whether the resealing item is displayed automatically or not depends on the **Crafting** element.

**NOTE:** The **default Crafting Menu** has an **Appear type** of Manual, meaning it will not open unless it is told to with the **Menu: Change state** Action.
6.5. Inventory properties

Inventory properties are a way of giving Inventory items "stats", such as weight or value. They are similar to Variables, only they are attached to Inventory items – with each item having its own value.

They can be managed within the Properties tab of the Inventory Manager:

A property can be one of five types:

**Boolean**
A simple True/False flag

**Integer**
A whole number

**String**
A piece of text

**Float**
A number with a decimal point

**Pop Up**
One of a set of pre-defined labels

Properties can also be limited to items of a specific category, should any be defined in the Categories tab.
Property values can then be assigned to each item at the bottom of that item's Settings panel, in the **Items** tab:

<table>
<thead>
<tr>
<th>Properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Value:</td>
<td>10</td>
</tr>
<tr>
<td>Weight:</td>
<td>13.5</td>
</tr>
<tr>
<td>Can be sold?:</td>
<td>True</td>
</tr>
</tbody>
</table>

Property values can be displayed in a **Label** element, and can be converted to **Variables** via the **Inventory: Property to Variable** Action.

Through scripting, the **InvItem** class's **GetProperty** function can be used to retrieve or modify a property, allowing you to display them in custom UI elements or perform different code depending on it.

**PROTIP:** To get an API reference to an item's property, right-click on the property's label and click **Copy script variable**. This is true for all Manager fields.
6.6. Exporting inventory data

It is possible to export a game's inventory item data as a CSV file, so that you and other team members can keep track of them outside of the Editor.

To export them, go to the Inventory Manager’s Items tab, click on the cog icon to the right of the Create new item button and choose Export items...:

This will bring up the Inventory item export wizard, which you can use to choose what data is exported:
It is also possible to import data from the same cog icon – clicking **Import items**... will bring up the **Inventory item import wizard**: 

![Inventory item import wizard](image)

Only certain data can be imported, and the wizard is used to match each column with the data to import. Note that the first column must be a list of ID numbers, with each ID number associated with a specific item.

**NOTE:** The existing inventory data won’t be cleared by this process, but data for items that have matching ID numbers will be overwritten. Therefore, you should back up your project before attempting this process.
6.7. Documents

Documents allow the Player to read signs, notes and diary pages that they find as they explore the game world, and can also be collected by the Player as they would their regular Inventory items.

A Document consists of a title, multiple pages of text, and a graphic – and can be viewed in a Menu with an **Appear type** of **On View Document**. Such a Menu is included in the Default interface – see **The default Document Menu**.

Documents can be defined in the **Inventory Manager**, under the **Documents** tab:

![Inventory Manager](image)

Here, they can be given a title, page text, and a texture. A category can also be assigned, if created in the **Categories** tab.

A Document can optionally be carried by the Player when the game begins, and the last page that was previously open can be remembered next time. To read and manipulate Documents, use the **Document: Open** and **Document: Add or remove** Actions respectively.

A list of collected Documents can be viewed via an **InventoryBox element** with an **Inventory box type** value of **Collected Documents**. If inventory categories exist, then this list can be filtered by category.

To view a Document when using the Document: Open Action, you must rely on a Menu with an **Appear type** value of **On View Document**. To view the Document in full, the following Elements within that Menu must be present:

- A **Label element** with a **Label type** of **Document Title**
- A **Journal element** with a **Journal type** of **Display Active Document**
- A **Graphic element** with a **Graphic type** of **Document Texture**
If a Document consists of multiple pages, you can create Buttons with Click type values of Offset Journal to allow the Player to flick between pages.
6.8. Objectives

Particularly in long or multi-branching games, Objectives are a way of reminding the player on their current tasks and puzzles. These can be broken up into multiple steps - or states. For example, the Objective "Slay the dragon" may have the states "Get the sword", "Find the lair", and "Defeat the dragon". As the player's progress in this task, the Objective's state is updated accordingly.

**NOTE:** Objectives are purely a way of conveying a task's status to the player, and do not have any "logic" associated with them.

Objectives can be defined in the Inventory Manager, under the Objectives tab:

![Objectives](image)

An Objective can be given a name, description, an associated texture, and a number of "states". As a minimum, an Objective must have both a "Started" and "Completed" state. Additional states, including "Fail" states, can be defined in the Editor:

When the game begins, all Objectives are considered to be inactive. The Objective Actions allow you to set and query the current state. If Player-switching is enabled, an Objective's current state can either be unique to each Player, or shared by all.

InventoryBox menu elements can be used to display a list of Objectives, while Label and Graphic elements can be used to display more information about the selected Objective. The use of these elements are demonstrated in the default Objectives menu.

**PROTIP:** Through scripting, Objectives can be made to depend on one another, and displayed in a custom format. An example that uses these techniques to provide a "quest" system can be found on the AC wiki.
6.9. Inventory scripting

Inventory item data is stored in the `InvItem` class. At runtime, items are referenced by `InvInstance` classes, which can be generated from an `InvItem`, its name, or its ID:

```java
InvInstance invInstance = new InvInstance (invItem);
InvInstance invInstance = new InvInstance (itemName);
InvInstance invInstance = new InvInstance (itemID);
```

If you have an `InvInstance` class, you can get its associated item with:

```java
invInstance.InvItem;
```

Items can be interacted with using functions within `InvInstance`:

```java
invInstance.Select ();
invInstance.Deselect ();
invInstance.Use ();
invInstance.Use (int iconID);
invInstance.Examine ();
invInstance.Combine (InvInstance otherInvInstance);
```

Inventory properties can be modified per-instance at runtime, and can be accessed with:

```java
invInstance.GetProperty (int propertyID)
```

Properties are stored in the `InvVar` class.

`InvInstances` are stored as Lists in `InvCollection` classes.

The player’s collection of items can be retrieved with:

```java
KickStarter.runtimeInventory.PlayerInventoryCollection;
```

Items in a collection can be modified and accessed with:

```java
invCollection.Add (InvInstance invInstance);
invCollection.Insert (InvInstance invInstance, int index);
invCollection.Delete (InvInstance invInstance);
invCollection.Delete (int itemID, int amount);
invCollection.DeleteAll ();
invCollection.DeleteAllInCategory (int categoryID);
```

The currently-selected item can be retrieved with:

```java
KickStarter.runtimeInventory.SelectedItem;
```

And de-selected with:

```java
KickStarter.runtimeInventory.SetNull ();
```
The unselected item underneath the cursor can be retrieved with:

```javascript
KickStarter.runtimeInventory.HoverItem;
```

Numerous functions related to currently-held Documents and active Objectives can be found within the `RuntimeDocuments` and `RuntimeObjectives` classes, which can be accessed with:

```javascript
KickStarter.runtimeDocuments
KickStarter.runtimeObjectives
```

The Inventory system involves the following **events**:

```javascript
OnInventoryAdd (InvItem invItem, int value);
OnInventoryAdd_Alt (InvCollection invCollection, InvInstance invInstance, int amount);
OnInventoryRemove (InvItem invItem, int value);
OnInventoryRemove_Alt (InvCollection invCollection, InvInstance invInstance, int amount);
OnInventorySelect (InvItem invItem);
OnInventorySelect_Alt (InvCollection invCollection, InvInstance invInstance);
OnInventoryDeselect (InvItem invItem);
OnInventoryDeselect_Alt (InvCollection invCollection, InvInstance invInstance);
OnInventoryInteract (InvItem invItem, int iconID);
OnInventoryInteract_Alt (InvInstance invInstance, int iconID);
OnInventoryCombine (InvItem invItem1, InvItem invItem2);
OnInventoryCombine_Alt (InvInstance invInstance1, InvInstance invInstance2);
OnInventoryHighlight (InvItem invItem, HighlightType highlightType);
OnInventoryHighlight_Alt (InvInstance invInstance, HighlightType highlightType);
OnContainerAdd (Container container, InvInstance invInstance);
OnContainerRemove (Container container, InvInstance invInstance);
OnContainerRemoveFail (Container container, ContainerItem containerItem);
OnCraftingSucceed (Recipe recipe);
OnOpenDocument (Document document);
OnCloseDocument (Document document);
OnObjectiveUpdate (Objective objective, ObjectiveState state);
OnObjectiveSelect (Objective objective, ObjectiveState state);
```
7. Variables
7.1. Variables overview

Variables are essential when implementing puzzle logic, as they allow you to keep track of various states and decisions in your game. For example, they can be used to record a choice made by the player, or how many times a particular interaction has been attempted.

Variables can be defined in three places:

**Global**
Meaning they are scene-independent and can be accessed anywhere at any time, including ActionList assets.

**Local**
Meaning they are saved as part of a scene and cannot be accessed outside of that scene.

**Component**
Meaning they are saved as part of a GameObject, and can be accessed anywhere – so long as that GameObject is active within a scene.

Global and Local variables are managed in the Variables Manager. You can switch between the two at the top:

![Variables Manager](image)

Component variables are managed after adding a Variables component to a GameObject – either via the Scene Manager's “Logic” panel, or via the Add component menu in a GameObject's Inspector.

**PROTIP:** Global, Local or Component? To avoid clutter, a variable should be placed according to where it need to be accessed. If it must be accessed across multiple scenes, it should be Global. If it is only accessed within a single scene, it's best off as Local. Component variables are best relied on when they are associated with the GameObject or Prefab they are attached to – for example, an "Is locked?" variable placed on a treasure chest.
It is possible to convert a variable's location between Global and Local by clicking the cog icon to the right of it. You should backup your project beforehand, however, as AC will then go through your project and amend any Actions and Manager fields that refer to it.

**NOTE:** When converting a variable from Global to Local, be mindful that ActionList assets cannot reference Local variables. If AC detects that an Action refers to this variable, it will not amend it – but instead display a warning message in the Console.

Each Variable has a number of fields:

<table>
<thead>
<tr>
<th>Local variable 'Opened door' properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Label:</strong></td>
</tr>
<tr>
<td><strong>Type:</strong></td>
</tr>
<tr>
<td><strong>Replacement token:</strong></td>
</tr>
<tr>
<td><strong>Initial value:</strong></td>
</tr>
</tbody>
</table>

**Label**
The variable's internal name, used by Actions to reference it.

**Type**
The variable type, which can be one of five values:

- **Boolean**
  A simple True/False flag

- **Integer**
  A whole number

- **String**
  A piece of text

- **Float**
  A number with a decimal point

- **Pop Up**
  One of a set of pre-defined labels. These labels can either be unique to the variable, or shared amongst several by creating a Preset.

- **Vector 3**
  A group of three numbers that can represent a position, scale, rotation or direction

**Game Object**
In the case of Global variables, this is a prefab. For Local and Component variables, this can either be a prefab or an object in the scene.
**Unity Object**
A Unity asset or prefab available in the Project window.

**Replacement token**
This is a unique piece of text that, when used as dialogue speech or places in a Label element, will be replaced at runtime by the variable's current value. This is useful when you want to display the variable's value on-screen. For more, see Text tokens.

**Initial value**
The variable's value when the game begins.

**Link to** (Global and Component only)
In the case of a Global variable, this allows you to synchronise its value to Options data, a Playmaker global variable, or a custom script. In the case of a Component variable, this also allows you to synchronise its value to a Playmaker local variable, or a custom script. For more, see Variable linking.

**Internal description**
An Editor-only description to aid designers on its use.

Once defined, Variables can be read and manipulated using the Variable Actions.

**PROTIP:** Placing forward-slashes in a variable's name will cause the slash to turn into a divider when listed in Actions. For example, the label "Options/IsFullScreen" will place it in an "Options" hierarchy. This makes it much easier when referencing them.

As variable values can be set by the user, they can also aid in testing. For example, a "Skip opening cutscene" boolean could be used in your OnStart cutscene to bypass an opening cinematic when set to True by the user.

**NOTE:** Using the Variables Manager to change a variable's value while the game is running will not affect the game's current instance of those variables. For debugging, the realtime values of Variables can be seen during gameplay by checking Show runtime values? at the top of the Manager. Checking this option also allows you to modify Variable values directly in the Editor at runtime.
7.2. Managing variables at runtime

Variables are primarily read and modified at runtime with the various Variable Actions. It is recommended that you do so inside the ActionList Editor so that the logic flow is more easily readable.

**PROTIP:** The Variable: Copy Action can be used to transfer a Variable’s value between a Local one and a Global one.

Variable values can also be used in dialogue speech – see Text tokens.

**PROTIP:** The cog icon to the right of an variable’s label in the Variables Manager can be used to find all references made to that variable in the project.

Variable values can also be both read and written to through scripting – see Variable scripting. They can also be automatically synced with other values or assets – see Variable linking.
7.3. Variable linking

Variables are normally independent, with their values stored in save game files and updated when a save file is loaded.

However, both Global and Component variables can be linked to other sources, so that their values becomes synchronised with another value. This allows for AC variables to integrate more easily with third-party assets and custom options data.

To do so, select the Variable you wish to link, and amend its Link to field:

It can be set to the following values:

**None**
The variable is not linked to anything and its value is independent with the rest of the project

**Playmaker Variable**
This variable is linked to a Playmaker variable, allowing Playmaker variable values to be saved.

**Options Data**
The variable’s value is stored in PlayerPrefs as “options data”, and is independent of save games. This setting is only valid for Global variables.

**Custom Script**
The variable is synchronised with a separate script or third-party asset by hooking into custom events.
7.3.1. Linking with Playmaker Variables

If you have the popular Playmaker asset, which is a separate Unity asset to Adventure Creator, you can synchronise AC’s variables with Playmaker’s.

Upon setting a variable’s Link to value to Playmaker Variable, you will be prompted to add the PlayMakerIsPresent scripting define symbol to your game’s Player Settings. You can find this field from Edit → Project Settings → Player.

You can then enter the name of the Playmaker Variable you wish to link to. AC Global variables can only link to Playmaker global variables, and AC Component variables can only link to Playmaker variables defined within a GameObject FSM. Bear in mind that the two variables must match type: if you are linking a Playmaker float, you must do so with an Adventure Creator float as well.

**NOTE:** An AC PopUp variable should be linked with a PM Integer variable.

You can also choose whether or not Playmaker determines the initial value of the AC variable. Generally, the link should be kept one-way - that is, one asset affects it, while the other reads it. When a Playmaker variable is changed, its value is “downloaded” to AC when it requested – i.e. when the Variable: Check Action is used to determine its value.

Using this method, you can save the value of Playmaker Variables automatically.

**NOTE:** By default, Playmaker takes control over the mouse cursor via the PlayMakerGUI object’s Control Mouse Cursor option. This can create a conflict with AC, since both assets are trying to control the cursor. To solve this, just uncheck this field.
### 7.3.2. Linking with custom scripts

By using custom events, AC global variables can be connected to other variables present in your own scripts or third-party assets.

Upon setting a variable's Link to value to Custom Script, events will be called whenever it is read or modified:

- **OnVariableUpload (GVar variable)**

  This event will be triggered after AC amends the variable's value. Therefore, a custom event can use this to update the custom script's variable accordingly.

- **OnVariableDownload (GVar variable)**

  This event will be triggered before AC reads the variable's value, when requested through e.g. the Variable: Check Action. Therefore, a custom event can use this to transfer the value of the custom script's variable to AC.

Reading and modifying a variable involves accessing the GVar class. The provided **Variable Linking Example** script demonstrates how an custom integer can be synchronised with an AC global variable. Its usage is described within the comments of the file.
7.4. Variable presets

Variable presets allow you to assign the values all Global or Local variables at once. This is particularly useful when testing, since you can use them to quickly assign your variables to states appropriate to specific points in your game.

Presets are listed and defined in the Preset configurations panel of the Variables Manager:

![Preset configurations panel]

You can assign each Variable's preset values within the its Properties panel:

![Global variable 'Player score' properties]

When the game is running, a preset can be assigned by selecting it in the Variables Manager and clicking Bulk-assign. Presets can also be assigned by using the Variable: Assign preset Action, which can be useful if you need to ensure all players have the exact same variable values at some point during gameplay.
7.5. Exporting variables

It is possible to export all of a game's variables as a CSV file, so that you and other team members can keep track of them outside of the Editor.

To export them, navigate to the type of Variables you want to export (e.g. Global), click on the cog icon to the right of the "Create new" button and choose **Export variables...**:

This will bring up the **Variable export wizard**, which you can use to specify what data is exported:

When you click **Export CSV** and choose a save location, AC will then go through all scenes added to your **Build settings** and extract any local variables you've defined. Therefore, you should save the current scene before attempting this process.

**PROTIP:** Forward slashes (/) in a Variable's **Label** can be used to organise them into categories. To aid with importing data into third-party script-writing software, these characters can optionally be replaced with a full-stop (.) instead.
7.6. Scene attributes

Scene attributes are a special set of variables that exist in all scenes, but can’t be written to. They allow you to set properties about a scene that can later be read using the Scene: Check attribute Action.

An ActionList asset that's called when a scene begins, for example, can be used to initialise a scene or run some common task depending on the attributes of that scene.

Scene attributes are created within the Scene Manager, under the Scene attributes header:

Attributes are created by clicking Manage attributes, and using the window that opens to define the attributes available to your game:

The values for each scene’s set of attributes can then be set back in the Scene Manager:
7.7. Variable scripting

Variables can be referenced both by name, or by ID number. This number is displayed to the left of it when listed in the Variables Manager, or the Variables component.

A Global Variable can be retrieved with:

```csharp
GVar myVar = GlobalVariables.GetVariable (int id);
GVar myVar = GlobalVariables.GetVariable (string name);
```

Similarly, a Local Variable can be retrieved with:

```csharp
GVar myVar = LocalVariables.GetVariable (int id);
GVar myVar = LocalVariables.GetVariable (string name);
```

To access Component Variables, a reference to the Variables class is needed:

```csharp
GVar myVar = myVariables.GetVariable (int variableID);
GVar myVar = myVariables.GetVariable (string variableName);
```

Each Variable is an instance of the `GVar` class. Its value can be read and set by script:

```csharp
myVar=IntegerValue = 2;
myVar[BooleanValue = true;
myVar[FloatValue = 3.5f;
myVar[TextValue = "Hello";
myVar[Vector3Value = new Vector3 (1f, 2f, 3f);
```

You can also get the Variable's display value in a string-format:

```csharp
myVar.GetValue ();
```

The variable system has the following events:

- `OnVariableChange (GVar variable)`
- `OnDownloadVariable (GVar variable, Variables variables)`
- `OnUploadVariable (GVar variable, Variables variables)`
8. Miscellaneous components
8.1. Highlight

The Highlight component is used to control visual effects for Hotspots. A Hotspot can be associated with a Highlight component via its **Object to highlight** field:

The Highlight component can be used to brighten a Hotspot's associated MeshRenderer when selected by the player, when the FlashHotspots input button is invoked, or by using the **Object: Highlight** Action. However, it can also be used to assist with custom visual effects.

**PROTIP:** This component is also necessary if you want Hotspots to have icons show when a Hotspot is selected, which can be enabled via the **Settings Manager’s Display Hotspot icons** field.

It has the following Inspector fields:

**Enable when associated Hotspot is selected?**
When checked, the Highlight effect will be enabled when its associated Hotspot is selected. This can be disabled in favour of manually invoking its **HighlightOn()** and **HighlightOff()** methods through script.

**Auto-brighten materials when enabled?**
When checked, the component will brighten any attached Renderer component when the effect is enabled. Note that this works by shifting the "_Color" property of the Renderer's materials – so it may not have any effect if certain shaders are used. In this case, or if a different effect is desired, either events (below) or the reading of the component's **GetHighlightIntensity()** method through script can be used to manually alter the Renderer.

**Also affect child Renderer components?**
When checked, then child Renderer components will be affected as well as any on the same GameObject.

**Intensity curve**
An animation curve that defines the intensity of the effect over time, where a y-axis value of 1 means “default brightness”. This does not affect the transition time of the effect – for that, use the field below.
Transition time (s)
A slider to control how long it takes for the highlight effect to become fully enabled.

Flash hold time (s)
A slider to control how long the highlight effect is enabled when the FlashHotspots input button is invoked.

Call custom events
When checked, event boxes will allow events to be called whenever the highlight effect is enabled or disabled. Note that these events will be called regardless of whether or not Auto-brighten materials when enabled? is checked, allowing for custom effects.
8.2. Shapeable

If a Skinned Mesh Renderer references a model that has blendshapes, their weights can be controlled independently at runtime.

However, it is often the case that some shapes won’t be used together – and as one is made active, the other must be made inactive. This is often the case when using blendshapes for expressions or mouth phonemes.

The Shapeable component allows you to group blendshapes together so that their weights can be controlled in bulk, by only allowing for one shape within a group to be the “active” at a time.

**PROTIP:** The 3D Demo game’s Brain NPC uses this technique to group his ExpressionHappy and ExpressionSad blendshapes together.

Attach the Shapeable component to a Skinned Mesh Renderer, and you will be able to define as many shape groups as you like. A group can contain any number of shape keys, which each correspond to a different blendshape:

Once configured, it can then be manipulated with the Object: Blend shape Action. This Action can be used to make one key in a group the “active” one – all others will be disabled. This can be performed over time, however, for smooth transitions.

This component is also when animating the mouths of 3D characters – see Lip syncing.
8.3. Moveable

In order to manipulate a GameObject's Transform component with the Object: Transform Action, the Moveable component must be attached. Simply attach it to the GameObject, and its Transform can be manipulated.

**NOTE:** In order to save a GameObject's Transform, attach the Remember Transform component – see Saving scene objects.
8.4. Parallax 2D

When running 2D scenes, the camera does not physically move. When the view pans across the scene, the perspective remains fixed – regardless of the camera’s Projection setting.

As this happens, all objects in the scene will move across the game window at the same rate, regardless of their distance from the camera.

To combat this, the Parallax 2D component is be used to achieve a depth affect by causing objects to move relative to the camera's panning. It can also be made to react to the mouse cursor’s position instead.

PROTIP: This technique is used in the 2D Demo scene to give a 3D effect. The component is attached to the ParkForeground1, ParkBackground and ParkCloud GameObjects.

Attach the Parallax 2D component to a background sprite, choose whether it Reacts to the Camera (recommended), the Cursor, or a specific Transform. Then assign a Depth value, and enable a scrolling direction:

The more positive the Depth, the further the sprite will appear to be relative to the "regular" graphics. The more negative, the closer it will appear to be. The value should stay within −1 to +1 in general.

For more advanced effects, it is also possible to limit the parallax movement to within pre-set boundaries in both the X and Y directions. Just check Constrain? within each directional box to set upper and lower bounds.

NOTE: Do not attach this to the parts of your scene that the player can navigate or interact with – it is not intended to work with gameplay elements, and should be used for background effects only.
8.5. Limit Visibility

Particularly in 2.5D scenes, you may wish for an object to be visible only when a particular camera is the active one. Attach the Limit Visibility to camera script, and you can limit its visibility to certain cameras – and optionally its children, too.

The effect can also be negated – so that it is not visible to certain cameras.

**PROTIP:** This component also works with Video Player components, and works by setting the Alpha value of the video to either 1 or 0, based on the active camera.
8.6. Align To Camera

The Align to Camera component is used to assist the placement of sprites when building 2.5D games.

When working in 2.5D, scene sprites are used for interactive graphics and to mask characters behind the background when moving behind certain areas – and should be facing the camera at all times. As 2.5D cameras are positioned in 3D space and rarely aligned down the Z-axis, the sprites too must be rotated to face them.

By attaching the Align to Camera component, you can have a sprite automatically face a given camera. Once aligned, its distance from this camera can be controlled with the Depth property.

Optionally, you can lock the sprite's perceived scale when the Depth is adjusted: this will cause the sprite to get larger as it moves further away, causing it to appear the same size when viewed through the camera.
8.7. Particle Switch

When you create a Unity Particle System, you may wish to turn it on at some point during gameplay, rather than play it continually. For example, a fireplace would only need to produce smoke when it's lit.

The Particle Switch component is used to turn the Particle System on and off easily with the Object: Send message Action. When attached to a Particle System, the Turn On and Turn Off messages will perform as expected, and the Interact message will cause it to emit all of its particles once.
8.8. Light Switch

When you create a Unity Light, you may wish to turn it on at some point during gameplay, rather than play it continually. For example, a lamp would only emit light if the player has plugged it into a wall socket.

The **Light Switch** component is used to turn the Light on and off easily with the **Object: Send message** Action. When attached to a Light, the **Turn On** and **Turn Off** messages will perform as expected.

**NOTE:** To save the on/off state of a Light, follow the steps outlined in the online **Saving custom scene data** tutorial.

**PROTIP:** The intensity of a Light can also be animated, and controlled with the **Object: Animate** Action.
8.9. Sprite Fader

In order to manipulate a Sprite's transparency with the Object: Fade sprite Action, the **Sprite Fader** component must be attached to it. This component can also optionally the transparency of its children in the Hierarchy.

**NOTE:** In order to save a Sprite's transparency, attach the **Remember Visibility** component – see [Saving scene objects](#).

**PROTIP:** Sprite transparency can also be animated, and controlled with the Object: **Animate** Action.
8.10. Tint maps

Tint maps are a way of faking lighting effects in 2D scenes. They work by altering the colour of sprites based on their position. This allows you to easily create dynamic lighting effects, such as having your Player get darker when they enter a shaded portion of the background.

When making a 2D game, tint maps can be found under the Camera section of the Scene Manager’s list of prefabs:

The active Tint map must be assigned as the Default Tint map, under the Scene settings panel.

When created, it will appear 10 units in the Z-axis, but its Z-position is not actually important, as it can be hidden when the game begins. What is important is its scale in the X and Y directions – after creating it, stretch it out so that it covers the same area as your background graphic.

You can then supply a "tint" texture to its Inspector. This texture will tint any sprites that "follow" it – but pure white will not have an effect. Such sprites will be tinted according to their position over the Tint map. A colour modifier can also be applied to the final effect, and this can be controlled through animation for dynamic lighting effects.

**NOTE:** The texture you supply must be readable by Unity. This is a simple but crucial step: within its properties Inspector, check Read/Write Enabled. If you are using older versions of Unity, you may also have to set its Texture Type to Advance.

To make a sprite follow a Tint map, simply add the Follow Tint Map component to it. This component will normally follow the scene's Default Tint map, but you can also supply a separate Tint map if you prefer.

You can also adjust the intensity of the tinting effect. These values can also be changed mid–game by using the Object: Change Tint map Action – allowing you to change the Tint effect dynamically, e.g. when the player turns on a light switch.

**PROTIP:** A tutorial on working with Tint maps can be found online.
8.11. ActionList Starter

This component allows you to run ActionLists when the scene starts through natural gameplay, or is opened as the result of loading a save game file.

Though the same can be achieved in the Scene Manager, which provides Cutscene on start and Cutscene on load fields, this method allows you to store such functionality in a prefab. This is useful if multiple instances of the same prefab, which each have their own “starting logic”, need to run their own ActionList when the scene begins.

If Player-switching is enabled, you can also use this to run an ActionList when the scene is loaded due to a change in Player character.

PROTIP: The linked ActionList can also be run by invoking this component’s RunActionList() method.

The linked ActionList can optionally be made to run instantly, as opposed to naturally over time. This is similar to Cutscene skipping, when all Actions are run at once over a single frame.

If the ActionList it runs makes use of parameters, then its parameter values can be set within this component’s Inspector. If the ActionList is an asset file that has Can run multiple instances? checked, then multiple instances of the ActionList can be run simultaneously – each with its own set of parameter values.
8.12. Set Interaction Parameters

The Set Interaction Parameters component allows you to set values for all parameters defined on a Hotspot's Interaction.

If an Interaction has a GameObject parameter defined, then the Hotspot component optionally allows you to set that parameter to itself when run. However, this component allows you to set the values for all parameters when the Interaction is triggered.
8.13. Set Inventory Interaction Parameters

The Set Inventory Interaction Parameters component allows you to set values for all parameters defined in an Inventory item's Interaction ActionList asset file.
8.14. Set Trigger Parameters

The Set Trigger Parameters component allows you to set values for all parameters defined in an Trigger's asset file, provided that the Trigger's Actions source field is set to Asset File.

**PROTIP:** If this is attached to a GameObject with multiple Triggers, then this will refer to the first one. However, all Triggers that share the same number of parameters will be affected as well.
8.15.  Auto Correct UI Dimensions

The Auto Correct UI Dimensions component is used to re-position and re-size a Unity UI-based Menu, if the "playable" area is not the same as game screen. This can be the case if an aspect ratio is enforced, or if running on a mobile device with notched features. Each of the default UI prefabs make use of this component to ensure they look correct with different playable areas.

To use it, attach it to the UI prefab's Rect transform boundary. This should be an immediate child of the Canvas, but which is a parent, and defines the boundary of, all other UI components – so that manipulating it affects the whole UI's display.

In it's Inspector, you then set the minimum and maximum anchor points as decimals relative to the screen. For example, the default values of (0.5, 0.5) for each will place the UI in the centre of the screen.
8.16. Link Variable To Animator

This component can synchronise a Component variable's value to that of an Animator parameter, provided that both share the same type and name. This is useful when you want an object’s appearance to reflect an associated variable – for example, an "Is Locked" bool used for a door. Rather than having to update both the variable and the Animator parameter, you can use this component to only update the variable.

To use it, have both a Variables component (with either a Bool, Int or Float variable defined), as well as an Animator component with a parameter of the same type and name defined. In the Variable Inspector, select the variable and set its Link to field to Custom Script. Then attach the Link Variable To Animator component, and fill in the fields in its Inspector.

This script relies on the technique covered in Linking with custom scripts chapter.
Chapter II: Advanced Features
9. Saving and loading
9.1. Saving and loading overview

AC provides a robust save system that can be used with minimal effort on the developer’s part. However, as it is not completely automatic, it is important to understand how it works before it can be used effectively.

Save game files can be read and written to in one of three ways:

**Menus**
The *SavesList* element displays all existing save files and, when clicked, can be made to either overwrite or restore them. The default interfaces provide both Save and Load Menus accessible from the Pause Menu.

**Actions**
The included *Save Actions* can be used to save and load files from *ActionLists*.

**Scripting**
The *SaveSystem class* includes numerous static functions that can be used to save and load files from code.

> **NOTE:** Loading can occur at any time after a scene has initialised, but saving is only possible under the following conditions:

1. No *Conversation* is currently active (unless regular gameplay is allowed, and its options are not overridden in the *Dialogue: Start conversation* Action).
2. No gameplay-blocking *ActionList* (both scene-based and asset-based) is running other than the one that contains the *Save: Save or load* Action (if being used to save).
3. The *Engine: Manage systems* Action is not currently locking the save system off.

The *Save: Check* Action can be used to determine if saving is currently possible.

When recording a save file, AC stores three types of data:

**Main data**
This includes the values of *Variables*, the *Inventory*, the current scene, the music, which Menus are open, and the Player’s position. Basically, anything that AC knows must always be saved – and as such, is automatic.

**Scene data**
This includes anything in a particular scene that has been flagged up for being saved. This is done simply by attaching appropriate components to it – see *Saving scene objects*.
Asset reference data
This includes any changes made to asset references by a scene object or the Player. For example, a character's walk sounds, or an object's material – see Saving asset references.

When a save file is recorded or read, it's location is shown in the Console window. A set of game-wide options regarding the recording of save-game files can be found in the Settings Manager:

Save file name
The name to assign save files when either recording to disk, or as PlayerPrefs keys.

Use '_Editor' prefix for Editor save files?
If checked, then saves recorded while testing in the Unity Editor will rely on a different set of files to those used in builds.

Enable save game profiles?
If checked, allows multiple profiles to be made use of, each with their own Options and save files. For more, see Save profiles.

Save screenshots
Allows screenshots to be recorded at the moment the game is saved.

NOTE: For screenshots to display, a SavesList element’s Display type field must be set to allow for them. An example package can be found online.

Save using separate thread?
If checked, the saving process will be handled by a separate CPU thread, which is useful when autosaving as it allows regular gameplay to continue alongside the process.

Save asset references with Addressables?
If checked, then assets referenced by save game files will be based on their Addressable name, as opposed to being in a Resources folder. For more, see Saving asset references.

Reference scenes by
Allows you to choose whether – inside save files – scenes are referred to by filename or build index number. If scenes are added to the game dynamically via Addressables or Asset Bundles, set this to Name – as such scenes do not have valid index values.
**Auto-add Save components to GameObjects**
Automatically searches the project and attempts to attach save components as appropriate. For more, see Saving scene objects.

**Manage save-game files**
Brings up the Save File Manager, in which you can view all stored save game files and Options data currently found on disk.

When reading a save file, AC reads this data and returns the player to the correct scene automatically. When switching scene through gameplay, scene data will also be loaded automatically.

⚠️ **NOTE:** In order for scene data to correctly save and load when switching scenes, you must use either the Scene: Switch Action or by calling the following method beforehand:

```
AC.Kick Starter.sceneChanger.PrepareSceneForExit();
```

Sometimes, however, more work is necessary to ready a scene after loading. For example, we may need to return a character to their "Idle" animation if they were in the middle of a complex tree of animations beforehand. For this, we can use the **On load Cutscene**, as defined in the Scene Manager's Scene cutscenes panel:

This Cutscene is run after a save file is opened and the game continues from this scene. Actions inside it will run only once all save data has been successfully loaded.

💡 **PROTIP:** It is possible to save custom global data by storing them in Global Variables. A tutorial for doing so can be found online.
9.1.1. Saving scene objects

A typical scene will feature GameObjects that require saving beyond the Player, who is saved automatically. This might be a sprite's visibility, a Conversation’s enabled options, or which camera is currently active.

In AC, this is done by adding components to these GameObjects that inform the save system about what kind of data needs saving.

These components can be added automatically to your scenes from the **Save game settings** section of the **Settings Manager**:

![Save game settings](image)

**NOTE:** You should back up your project before running this operation, but this will work for most games that don't rely on custom save data. However, you should still be aware of the procedure to prepare objects manually should your game have particular save requirements.

When a GameObject has such a component, a disk icon appears beside it in the Hierarchy window:

![Hierarchy window](image)

The most basic save component is **Constant ID**, which is used to generate a unique number for any GameObject it is attached to:

![Constant ID](image)

This number is used as an identifier, and is necessary whenever we want to save a reference to a particular object, rather than anything about it. The most common example for this is the scene's active camera: AC needs to know which camera is currently active, but doesn't need to know anything about the camera itself.
Constant IDs are also used by ActionList assets to reference scene objects.

The other save components are the Remember scripts, which each save a particular set of data about the GameObject they are attached to. For example, the Remember Transform script instructs the save system to record its position, rotation, and scale.

The following Remember scripts are available:

**Remember ActionList Parameters**
When attached to a scene-based ActionList, it will save its current parameter values. The parameter values of ActionList assets cannot be saved directly, but instances of them can be by setting a Cutscene’s Actions source field to Asset File, referencing the asset, unchecking Sync parameter values?, and checking Sync local parameter values?.

**Remember Animator**
When attached to an Animator, it will save its current-playing animation, parameter values and layer weights. If an animation is in mid-transition when saving occurs, only the “transition-to” animation will be saved.

The active Animator Controller can also be optionally saved (though changing the Controller at runtime requires a custom script). To restore a change in the Controller, it must be placed in a Resources subfolder and given a unique name (see Saving asset references).

It is also possible to set the Animator Controller’s default parameter values – which is useful if a Controller is shared by more than one Animator, since the default parameter values are set per-Animator.

**Remember Collider**
When attached to a Collider, it will save its enabled state. It also allows you to have the Collider disabled by default.

**Remember Container**
When attached to a Container, it will save the items stored within. This is included on the Container prefab by default.
Remember Conversation
When attached to a Conversation, it will save the state of each of its options. This is included on the Conversation prefab by default.

Remember Footstep Sounds
When attached to a Footstep Sounds component, it will save the sound clips it references. Such sounds can be changed with the Sound: Change footsteps Action. Note that the AudioClip assets involved must be stored properly – see Saving asset references.

Remember Hotspot
When attached to a Hotspot, it will save its enabled state, changes made to its name, and the enabled states of each of its Interactions. It also allows you to have the Hotspot disabled by default.

Remember Material
When attached to a Renderer, it will save the Materials that it uses. Note that the Material assets involved must be stored properly – see Saving asset references.

Remember Moveable
When attached to a Draggable or PickUp object, it will record its position and rotation. It also allows you to have the object disabled by default. To save a change in a Draggable object’s track, all associated tracks will need a Constant ID.

Remember Name
When attached to a GameObject, it will save its name.

Remember NavMesh2D
When attached to a Polygon Collider NavMesh, it will record any changes made to its hole structure using the Scene: Change setting Action.

Remember NPC
When attached to an NPC, it will save its name, various movement and graphical variables as well as the enabled state of any attached Hotspot component – which can be disabled by default. Note that in order to also save their position along a Path object, the Path must have a Constant ID. Changes in portrait graphic, and walk and run sounds (if set within the NPC component) can also be saved – but the Texture and AudioClip assets involved must be stored properly – see Saving asset references.

Remember Particle System
When attached to a Particle System, it will save its playback state.

Remember Shapable
When attached to a Shapeable, it will save the active blendshape and its weight.
Remember Sound
When attached to a Sound, it will save its playback state and optionally the change in audio clip. To do so, the AudioClip assets involved must be stored properly – see Saving asset references.

Remember Transform
When attached to a GameObject, its position, rotation and scale will be recorded. It can optionally save its parentage, but its direct parents must have a Constant ID.

It can also save the object's presence in the scene, as changed with the Object: Add or remove Action, provided that it is a prefab asset that is stored properly – see Saving asset references. If multiple instances of the object are spawned at runtime, assign its own Constant ID number as the Linked prefab ConstantID.

Remember Timeline
When attached to a Playable Director, the playback state of its linked Timeline will be recorded. In order to save track bindings, each track’s bound GameObject requires a Constant ID component. In order to save the Timeline asset, both the original and any new assets must be stored properly – see Saving asset references. If the Timeline was not playing when it was saved, the frame it was stopped at can optionally be evaluated – so that the effects of it are then felt.

Remember Track
When attached to a Drag track, saves the enabled state of its defined regions.

Remember Trigger
When attached to a Trigger, it will save its enabled state. It also allows you to have the Trigger disabled by default.

Remember Variables
When attached to a Variables component, the states of its defined Variables will be saved. This is attached by default to the Variables prefab type in the Scene Manager.

Remember Video Player
When attached to a Video Player, it will save its playback state. The Video Player is only available in Unity 5.6 or later. The loaded video clip asset can optionally be saved, but both the original and any new assets must be stored properly – see Saving asset references.

Remember Visibility
When attached to a Renderer (Sprite or Mesh), Sprite Fader or Follow Tint Map component, it will save its visibility – and optionally its children as well. It also allows you to have the Renderer invisible by default. It can also save the enabled state of a Canvas.
An object can have multiple save scripts, and Remember scripts also generate Constant IDs. If set automatically, all save components on a single GameObject will share the same ID number.

**PROTIP:** It is possible to save custom data about scene objects by writing your own Remember script. A tutorial for doing so can be found online.

**NOTE:** Save file sizes are proportional to the number of such components present in your game – so it’s generally best to only add them when necessary.

Scene data is stored and retrieved automatically – both when traversing them through natural gameplay, or when loading save files. Scene data is also limited to the scene that they are in – so if multiple scenes are open (through use of the Scene: Add or remove Action), then each one’s data is handled independently.

If Remember components are placed on scene-surviving objects (i.e. those that are flagged with *DontDestroyOnLoad*), then those too are saved. However, their data is only retrieved when loading a save file – not when changing scene through gameplay. In this way, “global” elements can be added to the game – for example, a Conversation flagged with *DontDestroyOnLoad* can be updated and accessed from any scene.
9.1.2. Saving asset references

Certain Actions can be used to change which assets are referenced by the scene. For example, the Object: Change material Action changes which Material asset a Renderer uses, the Sound: Change footsteps Action changes which AudioClip assets a character plays when walking, and the Object: Add or remove Action can spawn a Prefab at runtime.

Remember components are used to record such changes. However, in order to successfully restore these changes when loading a save–game file, these assets need to be identifiable.

There are two ways of doing this:

1. Resources folders

This is the default method, and is easiest to set up – though is the less performant of the two.

To make an asset identifiable, it must be stored in the following way:

- Given a filename unique to the project
- Placed in an Assets subfolder named Resources

**NOTE:** This must be done for both the original asset and the new one.

**PROTIP:** Searching Resources folder(s) for asset files can be an intensive process. If you have many such files, it is recommended to rely on SaveableData subfolders – see Performance and optimisation for more.

2. Addressable name

This method is a little more involved, but more performant than the use of Resources.

This method makes use of Unity's Addressables Asset System, which is an optional package that provides a way to reference assets by “address”. Refer to Unity's own documentation for more on this system.

To enable this method, go to the "Save game settings" panel in the Settings Manager, and check Save asset references with Addressables?. So that the necessary code can compile, you will then need to make sure that AddressableIsPresent is listed in your project's Scripting Define Symbols.
To make an asset identifiable, it must then be stored in the following way:

- Given a filename unique to the project
- Given an Addressable name that matches its filename
- Placed outside of any Assets subfolder names Resources

**NOTE:** This must be done for both the original asset and the new one.
9.1.3. Saving example: The 3D Demo

The 3D demo game, while simple, demonstrates a fully-functioning save and load system.

The first step to creating such a system is to be aware of the conditions under which saving is possible. While loading is possible at any time, a game can only be saved during normal gameplay (that is, not during cutscenes or conversations). For that reason, the player cannot save progress in the demo until the introduction cinematic has played, and we can use this knowledge to make assumptions about the state of the scene when the game loads.

We know that during normal gameplay, the NPC Brain will be sat in the chair, and the canvas will be tipped over. Therefore, the Scene Manager’s On load Cutscene sets the correct Idle state for Brain. This is necessary because Brain uses the Legacy animation engine, which cannot be saved with the Remember Animator component.

The rest of the save system is set up by careful placement of ConstantID and Remember scripts:

- **ConstantID** placed on the NavCam1 and NavCam2 GameCameras ensures the reference to the active camera is stored. Only these cameras require this script, since the game can only be saved during normal gameplay.
- **RememberNPC** placed on Brain ensures his transformation is stored
- **RememberAnimator** placed on the Barrel, Canvas and Chair SetGeometry objects, as well as the Player prefab, Tin Pot (since these objects use Animators for their animation playback).
- **RememberConversation** placed on the Conversation BrainConv ensures the enabled state of each option is stored
- **RememberHotspot** placed on the Sword Hotspot saves its enabled state, as it is turned off as the player picks it up.
- **RememberTransform** placed on the Sword mesh (inside the _SetGeometry folder) ensures its transformation is stored. Since it’s parentage changes when the Player holds it in the Sword: Take Interaction, its original parent Transform, _SetGeometry, also has a ConstantID.

Additionally, the demo game makes use of a Local Variable called Played intro, which is read by the On start Cutscene to either play the opening cutscene or skip it. This is purely a debug Variable – as is useful when testing the scene during development.
9.2. Autosaving

Autosaving is a way of saving the player's progress for them automatically.

Save slot "0" is reserved for Autosaves, and appear in Save and Load menus with the label "Autosave". Only one Autosave file can exist per profile – subsequent Autosaves will overwrite the previous.

Autosaving can be achieved by three ways:

1) **The Save: Save or load Action**
   This Action allows you to save or load the game without the use of Menus.

2) **Completing Cutscenes**
   At the top of a Cutscene's inspector, tick the **Autosave after running?** box to save the game automatically once the Cutscene has run. Be aware that this will only occur if the Cutscene does not "branch off" onto another Cutscene object: gameplay must be set to resume once the Cutscene has finished.

3) **Custom scripting**
The following code will save and load the Autosave file respectively:

   ```csharp
   AC.SaveSystem.SaveAutoSave ();
   AC.SaveSystem.LoadAutoSave ();
   ```

**NOTE:** As with regular saving, Autosaving is only possible under the following conditions:

1. No **Conversation** is currently active.
2. No gameplay-blocking **ActionList** (both scene-based and asset-based) is running other than the one that contains the **Save: Save or load** Action (if being used to save).
3. The **Engine: Manage systems** Action is not currently locking the save system off.
9.3. Options data

Options data is independent from save data, allowing option values to “survive” the loading of a save file. They are stored in Unity’s PlayerPrefs, under a key that is based on your game’s name. If you make use of Profiles, then each profile has its own set of Options data.

Options data is loaded when the game begins, and saved whenever a change is made to any of them.

All Adventure Creator games have five options by default:

- Whether or not subtitles are on
- The game’s active language
- The volume levels of music, speech, and sound effects

At runtime, these can be changed by the player in the default Options Menu. Their default values are set in the “Default Options” section of the Settings Manager:

![Default Options Menu]

It is possible to create custom options in your game by way of Variables. The Link to property of a Global Variable, as listed in the Variables Manager, can be set to Options Data:

![Global variable 'Use full-screen' properties]

When this is done, the Variable's value will be stored with the other Options data, and not in save game files. This is useful for creating your own options, such as graphics settings. Just as with regular Variables, you can use the Variable: Set Action, or Cycle, Toggle and Slider elements to affect its value.

💡 PROTIP: A tutorial on creating custom options can be found online.
9.4. Loading screens

If your game features complex scenes, or it is played on older hardware, it may take a few seconds to transition between scenes. In this case, you may wish to create a loading screen, that appears during this pause to alert the player that the game is loading.

You can do this by creating a dedicated "loading" scene, which is displayed during transitions. This does not need to be an Adventure Creator scene (i.e. one with a GameEngine prefab) - it can merely be a camera with a sprite texture in front of it.

Create a scene you wish to act at the loading screen, and add it to your game's list of Scenes in build from the Build Settings. Then, check the Use loading screen? box in the Settings Manager, and supply the scene's build index number or name:

![Scene loading settings]

You can also opt to make use of asynchronous loading. This feature allows you to load scenes in the background, allowing animation to continue for a short time while the next scene loads. By checking Load scenes asynchronously?, you can then provide a delay time before and after the load process - which is useful if you want some nice loading effects.

**PROTIP:** When using asynchronous loading, you can use the Scene: Switch Action to preload scenes in advance so that they can be switched to more quickly when needed.

A tutorial on creating a Loading menu, complete with progress bar, can be found online.

With asynchronous loading, it is also possible to delay the switching to a newly-loaded scene until a script function is called. This is useful if, for example, you want to prompt the user to "press a key to continue". To do this, check Scene loading requires manual activation?. Once a scene has loaded, it will then wait until a script calls the following:

```csharp
AC.KickStarter.sceneChanger.ActivateLoadedScene ();
```

A "Complete Loading Example" script that demonstrates this can be found on the AC wiki.
9.5. Importing saves from other games

If you are making an episodic game that spans multiple projects, you can have the player import save game files from one to another so that their progress is transferred. This works by transferring the Global Variable values, and ignoring all other data.

**NOTE:** This feature has three requirements:

- The other project's Company name (as set in the Player Settings window) must be identical to the current project.
- The two projects must share exactly the same Global Variables – it is recommended to copy the VariablesManager asset and use it in both projects.
- Due to Unity's security measures, this feature only works on standalone platforms (PC, Mac and Linux).

This is done by adding a SavesList menu element that is set to import files instead of load them. When importing, only the file's Global Variables (and thus the player's choices) into the current game.

When a SavesList's List type field is set to Import, you must supply an Import product name (as set in the other project's Player Settings window), and Import save filename (as set in the other project's Settings Manager):

![SavesList properties](image)

**PROTIP:** It is possible to limit the available files to those in which a particular boolean Variable has been set to true. This is useful if you only want players to be able to import a save if they have reached the end of the previous game.
9.6. Save profiles

Profiles allow you to separate save game files and options settings by the player who created them. This is useful because it means that one player cannot accidentally overwrite another player's save files, and also allows options such as the language to be unique to the person playing.

PROTIP: All profiles found on the system can be viewed in the Save-game Manager.

Profiles can be enabled under Save game settings in the Settings Manager:

You can now use the ProfilesList element to list all profiles created by your game's players – and when one is clicked, it will be selected. To display the current profile non-interactively, a Label can be created with a Label type of Active Save Profile.

Profiles are not created in the same way as save games – they are instead created exclusively through the Save: Manage profiles Action, which can create, delete, load and rename profiles.

When a new profile is created or renamed, its name can be set by the value of a String Global Variable. You can have the player enter a name of their choice by using an Input menu element, and using the Variable: Set Action to store the Input box's contents in the String Global Variable. When a profile is deleted, any associated save game files will also be deleted, so you may want to have a confirmation box appear before performing this.

To provide the ability to rename or delete profiles in the form of Button Menu Elements beside your list of profiles, it is recommended to make use of ActionList parameters to condense the number of ActionLists you need to make. If a Button Menu Element is set to run an ActionList that has an Integer parameter, then the parameter can be set within the Button’s properties. If you set this parameter to match the slot index number of the profile list beside it (indices start from zero), you can use just one Save: Manage profiles Action to handle the deletion of any profile.

PROTIP: A tutorial that uses this technique to create custom save game labels can be found online.

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A basic Profiles menu is included in default interface. To make use of it, select the default Pause menu, and un-hide the ProfilesButton from its list of elements.
9.7. Custom save labels

Custom save labels, and more refined saving interfaces, can be created by using the Save: Save or load Action together with a SavesList element.

By default, the SavesList element works by instantly saving and loading upon the player clicking a slot. When saving, a label is automatically generated based on the Time display field in the Settings Manager.

This default functionality can be overridden by unchecking a SavesList's Save when click on? field in it's properties:

Doing to will disable the automatic saving or loading and will instead allow you to run an ActionList asset when a slot is clicked. If this ActionList has an Integer parameter, that parameter's value can be set to the slot index that was clicked, and you can use this to set the save label dynamically.

The basic workflow is:

- The player clicks on a save slot to save into
- The slot index is passed to an ActionList as an Integer parameter
- This parameter is stored in a Global Variable
- A new Menu appears that allows the player to enter in their own label
- Actions then save the slot with a custom label

**PROTIP:** A tutorial that covers these steps in detail is available online. The principles can also be used to name Save profiles.
9.8. Custom save data

It is possible to write scripts that extend the save system by saving both custom scene and global data.

Saving scene data is possible by writing custom Remember scripts. Create a new C# subclass of Remember, overriding the SaveData and LoadData functions.

PROTIP: A tutorial on writing custom Remember scripts can be found online.

To save global data, use the OnBeforeSaving and OnAfterLoading custom events to synchronise data with Global Variables, which are recorded automatically in save files. If a script that uses these events is attached to the PersistentEngine prefab, it will persist throughout the game.

PROTIP: A tutorial on saving custom global data can be found online.
9.9. Custom save formats and handling

AC makes changes to the way that saved data is both serialized and stored based on the project's platform. For example, desktop games rely on binary serialization, while iPhone games use XML. Most platforms store save data in the persistentDataPath, while the WebPlayer platform stores it in PlayerPrefs.

It is possible, however, to override the default behaviour. This makes it possible, for example, to allow saving on platforms that AC does not officially support, such as the Playstation Vita.

To override the default file format, you use the following:

```csharp
SaveSystem.FileFormatHandler = new MyClassName();
```

Where MyClassName is a C# class that implements the iFileFormatHandler interface. The following classes are already provided:

- **FileFormatHandler_Binary**
  Saves data in binary

- **FileFormatHandler_Xml**
  Saves data in XML

- **FileFormatHandler_Json**
  Saves data in Json (only available for Unity 5.3 and newer)

You can save in custom formats by writing a new implementation of the iFileFormatHandler interface and assigning it as above. The included format classes can be used as examples.

**NOTE:** In order to have the override take effect before any data is loaded, assign it in an Awake function on a component attached to the PersistentEngine prefab. This can be found in /Assets/AdventureCreator/Resources.

Options data, by default, will share the same file format as save game data. You can override this with the following:

```csharp
SaveSystem.OptionsFileFormatHandler = new MyClassName();
```
Overriding the location of save files is done in a similar way:

```
SaveSystem.SaveFileHandler = new MyClassName ();
```

Where MyClassName is a C# class that implements the `ISaveFileHandler` interface. The following classes are already provided:

```
SaveFileHandler_SystemFile
Saves data to the `persistentDataPath` folder

SaveFileHandler_PlayerPrefs
Saves data to Unity's `PlayerPrefs`
```

You can save data to custom locations by writing a new implementation of the `ISaveFileHandler` interface and assigning it as above. The included format classes can be used as examples.

Options data, by default, is always stored in Unity's `PlayerPrefs` – but this, too can be overridden:

```
Options.OptionsFileHandler = new MyClassName ();
```

Where MyClassName is a C# class that implements the `IOptionsFileHandler` interface. The following classes are already provided:

```
OptionsFileHandler_PlayerPrefs
Saves options data to Unity's `PlayerPrefs`. This is the default.

OptionsFileHandler_SystemFile
Saves options data to the `persistentDataPath` folder – one file per profile.
```

You can save options data to custom locations by writing a new implementation of the `IOptionsFileHandler` interface and assigning it as above.
9.10. Save-game file management

Each save-game file is associated with the currently-active Save profile. It is possible to view and manage all profiles, and their associated save files, that are currently stored on the system. This information is accessed from within the Settings Manager, by clicking Save-game file management in the "Manage save-game files" section:

This brings up the Save-game Manager, which has the following sections:

File and format handlers
This displays the active save and option file and format handlers, which determine the location and format of save files. Each supported platform has its own default handlers, but these can be altered through script – see Custom save formats and handling.

Profiles
If Save profiles are enabled, this displays all found profiles. Selecting one will display its properties, and associated save-game files, beneath.

Profile properties
This displays the selected profile's name and Options data (including linked Variables). It can be deleted, or – if Save profiles are enabled – made active.

Save game files
This displays all save-game files associated with the selected profile. Selecting one will display its properties and data beneath. New saves and can be made at runtime – provided that saving is currently possible.

Save game properties
This displays information bout the selected save-game file – including name, file location, and timestamp. It can be deleted, and – at runtime, overwritten or loaded.

Save game data
This displays all data associated with the save-game file – including the state of variables, each Player, and each scene's Remember scripts. This is mainly intended to aid debugging.
9.11. Save scripting

The scripting guide has entries for the `SaveSystem` and `Options` classes online.

To save, load or delete the game with a specific ID, use:

```csharp
SaveSystem.SaveGame (int saveID);
SaveSystem.LoadGame (int saveID);
SaveSystem.DeleteGame (int saveID);
```

Saves displayed in `SavesList elements` must have an ID value of zero or greater. However, saves with negatives IDs can be saved and loaded using the above functions, without having them appear in menus.

**NOTE:** As saving–handling is a background process, the "OnFinish" events below must be used to handle what happens afterwards.

**PROTIP:** Be careful when saving manually – gameplay–blocking cutscenes will not be saved, so it is always best to save only when in normal gameplay.

To save and load the `Autosave` file, use:

```csharp
SaveSystem.SaveAutoSave ();
SaveSystem.LoadAutoSave ();
```

To manage `Save profiles`, use:

```csharp
Options.SwitchProfileID (int profileID)
KickStarter.options.CreateProfile (string profileName);
KickStarter.options.RenameProfileID (string newProfileName, int profileID);
```

To set the current profile's `Options data`, use:

```csharp
Options.SetLanguage (int index);
Options.SetSubtitles (bool value);
Options.SetSFXVolume (float volume);
Options.SetMusicVolume (float volume);
Options.SetSpeechVolume (float volume);
```

To read the current profile's `Options data`, use:

```csharp
Options.GetLanguageName ();
Options.GetLanguage ();
Options.AreSubtitlesOn ();
```
Options.GetSFXVolume();
Options.GetMusicVolume();
Options.GetSpeechVolume();

To read the value of an **Options-linked variable** associated with an inactive Profile, use:

```csharp
GVar variable = Options.GetProfileVariable (int profileID, int variableID);
```
You can also modify another profile's `OptionsData` class with:

```csharp
Options.LoadPrefsFromID (int profileID);
Options.SavePrefsToID (int profileID, OptionsData optionsData);
```

A save file's `Global Variables` data can be read with:

```csharp
SaveFile saveFile = Kickstarter.saveSystem.GetSaveFile (fileID);
List<GVar> vars = SaveSystem.ExtractSaveFileVariables (saveFile);
```

The saving of individual `Remember` components can be disabled with:

```csharp
GetComponent <Remember>().SavePrevented = true;
```

To restart the game and clear all temporary data (such as collected inventory items):

```csharp
KickStarter.RestartGame (bool rebuildMenus, int newSceneIndex);
```

Saving, loading, and options involve the following `events`:

- `OnBeforeSaving (int saveID);`
- `OnFinishSaving (SaveFile saveFile);`
- `OnFailSaving (int saveID);`
- `OnBeforeLoading (SaveFile saveFile);`
- `OnFinishLoading ();`
- `OnFailLoading (int saveID);`
- `OnBeforeImporting ();`
- `OnFinishImporting ();`
- `OnFailImporting ();`
- `OnSwitchProfile (int profileID);`
- `OnRestartGame ();`
- `OnChangeLanguage (int language);`
- `OnChangeVolume (SoundType soundType, float volume);`
- `OnChangeSubtitles (bool showSubtitles);`
10. Speech and text
10.1. Gathering game text

AC is able to gather up all text in your game and store them in the Speech Manager. This is necessary if you want to:

- Manage translations
- Play speech audio in time with a character’s dialogue line
- Export script sheets for voice actors to use

This is by clicking **Gather text** in the **Game text** panel of the Speech Manager:

![Gather text in Speech Manager](image)

**PROTIP:** By default, all display text is translated – including subtitles, Hotspot names, and Menu labels. The **Translatable text types** field, however, lets you choose exactly what gets included in this process.

When clicked, you will be prompted to back up your game as AC will then go through all of your scenes and modify them by assigning unique ID numbers to any text it finds.

**NOTE:** Only scenes added to Unity’s **Build Settings** will be searched by this process.

This text is then listed at the bottom of the Speech Manager, which can be filtered down by various options:

![Filtered text](image)
Clicking on a text entry will reveal more information about it:

![Image of text entry information]

Each line of text is assigned a unique ID number. ID numbers will not be overwritten – if you re-gather text after making changes, existing IDs will be retained.

**NOTE:** By default: once an ID number is assigned, it is never used by anything else – even if the text that it is assigned to is later removed from the game. This behaviour can be amended via the ID number recycling field.

**NOTE:** The record of game text is not "live", so if you make a change to e.g. a speech line, it will not be reflected in the Game text panel until you re-gather it.
10.2. Speech audio

Once your game's text has been gathered, it can be used to playback speech audio when characters speak.

For a speech audio file to play, it must be linked to its associated Dialogue: Play speech Action or Speech Timeline track. This can be done in one of three ways:

1) Automatically, based on naming convention in a Resources folder
2) Automatically, based on naming convention in an Asset Bundle
3) Manually, by assigning an AudioClip file in the Speech Manager

Which method is used is based on the Speech Manager's References speech files setting:

![Speech audio settings](image)

**PROTIP:** If using Translations, you can have different audio for each language by checking Speech audio can be translated?. By default, the game's current language will be used for both speech audio and display text, but these can be separated by checking the Speech audio and display text can be different languages? field that appears beneath.

**By Naming Convention**

In this mode, speech AudioClip assets must be placed in a Resources/Speech folder, and given a specific name. This filename is – by default – based on the character’s name, the line’s ID number, and is displayed in a line's entry in the Game text panel along with the folder it should be in:
The **Set custom** button can be used to assign a custom filename, and this can also be set by importing a CSV file via the **Import text**.. button.

The **Place audio files in speaker subfolders**? setting allows you to divide AudioClip assets into further folders based on character name. The name of the “Speech” subfolder can also be changed if desired, and the full filepath can be overridden completely via the SpeechManager script’s **GetAutoAssetPathAndNameOverride** delegate override function.

NOTE: If speech audio has **Translations**, each translation has the same filename but is placed in a different sub-folder as shown.

**By Asset Bundle**

This mode is similar to **By Naming Convention** in that files are loaded in automatically based on their expected name. However, rather than placing them in a Resources subfolder, they are instead placed in an **Asset Bundle**.

Each language relies on its own Asset Bundle, and these are defined in the **Languages** panel:

NOTE: The supplied AssetBundle must be in a subfolder named **StreamingAssets** within your Assets folder.

AssetBundle(s) will need rebuilding if you want to add more speech lines or audio. Therefore, it is recommended to perform this step towards the end of your game’s development, as relying on **By Naming Convention** (i.e. in Resources folders) is more convenient for testing.

**PROTIP:** A tutorial on using AssetBundles for voice files can be found online.

NOTE: AssetBundles are loaded in asynchronously – meaning the game will begin while they’re still being prepared. As this operation can take a few seconds, you can hook into the **OnLoadSpeechAssetBundle** custom event so that you can determine when these assets are ready.
By Direct Reference

In this mode, speech AudioClip assets must be manually assigned to each speech line's entry in the Game text panel:

![Image of a Game text panel showing details for a speech line.]

**NOTE:** If a speech line has no associated character, it is considered a narration. A Sound prefab to use for narration audio can be assigned in the GameEngine object's Dialog component, but if none is assigned then one will be automatically generated.

AC also supports “audio ducking”: when speech audio plays, all other audio can be made to quieten slightly so that the speech can be more easily heard. The amount by which SFX and Music volumes are reduced are set in the Speech audio panel:

![Image of a Speech audio panel showing settings for SFX and Music reduction.]

To animate characters' mouths when speaking in time with their audio, see Lip syncing.

**PROTIP:** If your game makes use of multiple Players, then each Player can be assigned their own audio and lipsync files for shared speech lines – i.e. ones where the Dialogue: Play speech Action has Player line? checked. To allow this, check 'Player' lines have separate audio for each player?. Note that this feature is only available if both Auto-name speech audio files? and Use Player prefab name in filenames? are also enabled.
By Addressable

This mode is similar to **By Naming Convention** in that files are loaded in automatically based on their expected name. However, rather than placing them in a Resources subfolder, they are instead referenced by their Addressable name. The Addressable system is available as a separate package using Unity’s Package Manager.

Once set to this mode, and the Addressable package is installed, you must then define `AddressableIsPresent` as a Scripting Define Symbol in Unity’s Player Settings. This is so that AC is aware that it’s safe to refer to this system in its code.

This filename is – by default – based on the character's name, the line's ID number, and is displayed in a line's entry in the **Game text** panel:

![Game text panel](image)

The **Set custom** button can be used to assign a custom filename, and this can also be set by importing a CSV file via the **Import text** button.

**NOTE:** Due to the way the Addressable system is designed, an error will be thrown if a speech is played without its associated files listed as an Addressable.
10.3. Displaying subtitles

Speech lines are defined and played via either the Dialogue: Play speech Action, or the Speech Timeline track.

For speech text to show, a menu equipped to display it must be defined in your Menu Manager. This involves creating a menu with an Appear type set to When Speech Plays, and creating within it a Label element with a Label type of Dialogue Speech.

NOTE: If a speech line has associated audio, then the Show subtitles? option must also be enabled (see Options data), or the menu must have Ignore 'Subtitles' option? checked.

Such a menu is included as part of the default interface – see The default Subtitles menu. All menus can be restyled, but this menu type features a number of unique properties that control how and when it is displayed:

For speakers of type
This allows you to define exactly characters the menu will show (or not show) for.

For speech of type
This allows you to limit the menu's display to blocking or background speech only. The Dialogue: Play speech Action triggers "background speech" if the ActionList that contains it has its When running field set to Run In Background.

Duplicate for each line?
This will cause a new instance of the menu to be created for each line that it displays for, as opposed to re-purposing the same one each time. This is useful if two characters speak simultaneously, since this allows both character's speech text to show together.

Limit by speaker proximity
This causes the menu to only show if the speaking character is within a set distance to either the Player or the camera. This is useful if you don’t want subtitles to show if the speaking character is too far away. Note that this option is only available if Duplicate for each line? is also checked.
10.4. Script sheets

Once your game's text has been gathered, speech lines can be exported as an HTML script sheet to hand out to voice actors.

In the Speech Manager's Game text panel, click Create script sheet... to bring up the Script sheet export window:

All speech lines listed in the Speech Manager can be exported as an HTML file. This will display each line's text, character, audio filename(s) and description. If the game features translations, a language can be selected.

Optionally, you can limit lines by character name, language, or by speech tag. Speech tags are labels that you can assign ActionLists that contain Dialogue: Play speech Actions, and are useful if your voice actors to only record lines for a specific cutscene or sequence. They can be created by clicking Edit speech tags under the Speech Manager's Subtitles panel:

Once tags are enabled and defined, any ActionList that contains a Dialogue: Play speech Action can be assigned to one within its list of properties:
Further options allow you to remove Text tokens, and include descriptions. Descriptions can be written either directly in the Speech Manager, or imported using the Import text wizard – see Translations.

You can also opt to only output lines that already have an associated audio file. This is useful when conducting multiple recording sessions, as you can set script sheets to only show those lines that have yet to be recorded.

**NOTE:** You will need to re-gather your game’s text for the changes to be reflected in the Speech Manager.
10.5. Translations

Once your game’s text has been gathered, it can be used to handle translations.

PROTIP: The 3D Demo game includes an example French translation.

The Speech Manager’s *Gather text* button collects all display text, specifically:

- Speech lines
- Hotspots and Dialogue Option labels
- NPC names (if set to something other than their GameObject’s name)
- Menu text
- Journal entries
- Inventory Item names
- Pop-up and String Variables
- Cursor names and prefixes
- Custom translatables

A game’s translations can be managed from the *Languages* panel:

Arabic or Hebrew can make use of the *Reads right-to-left?* option. If checked, then Hotspot and inventory labels (e.g. “Use sword on barrel”) will be reversed (e.g. “barrel on sword Use”) as will Input menu elements. Speech scrolling, enabled in the *Subtitles* panel, will also be reversed.

When a new language is created, each entry in the *Game text* panel will be updated with an associated field:
Each entry’s translation can be modified directly in the Editor, but it is recommended to export them so that they can be edited using a spreadsheet. To do so, click the cog icon beside a language's name and choose **Export**:

This will open up the **Text export wizard**, which you can use to select which text is exported and in what order:

Text is then exported as a CSV file, which can be opened with a spreadsheet application such as Excel or OpenOffice, ready for translating.

**NOTE:** Prior to Unity 2019.2, the CSV uses the pipe character (|) to separate fields. OpenOffice is the recommended tool to use with minimum fuss, and should be the first thing to try if files imported in other spreadsheets appear wrong.

In Unity 2019.2 or later, CSV files adopt the standard format – with commas (,) separating fields, and fields containing commas or quotations being wrapped by quotation marks. You can switch back to the “legacy” format from the Project Settings.
Once changes have been made, you can import the CSV file back into the Speech Manager by choosing Import from the same location. After selecting the CSV file, you will then be presented with the **Text import wizard**, in which you can choose which columns get imported as what translation. The game’s original text can also be updated this way.

The file’s line ordering does not matter. The importer will identify text by the ID number in the first column – not by the row in which they appear.

**PROTIP:** It is also possible to rely only on translations, and ignore any text entered in Actions and Editors, by checking **Don’t use at runtime?** in the Speech Manager’s "Original language" panel.

Translations can also be modified at runtime – see **Speech scripting**.
10.5.1. Custom translatables

The **Speech Manager** can gather up all text used within Managers, Actions, and logic objects so that it can be translated. However, it can also gather up custom text that it finds, by placing it in scripts that implement the ITranslatable interface.

The ITranslatable interface has functions to retrieve and assign a unique ID number for each piece of translatable text, as well as functions to determine if such text is appropriate for translation. When gathering text, the Speech Manager will automatically detect the presence of any MonoBehaviour script, or custom Action, that implements ITranslatable. This includes prefabs referenced by the **Object: Add or remove Action**.

For a description of the ITranslatable interface, see the **Scripting guide**.

---

**PROTIP:** A sample script that demonstrates translatable text can be found in the form of the **Custom Translatable Example** component.

---

Once an implementation has been written, and translatable text has been gathered, it can be displayed along with the rest of your game's text in the Speech Manager. This then means it can be exported for external translation, or have translations written directly within the manager.

Once translations have been provided, you can retrieve the translatable text in the game's current language with:

```csharp
AC.KickStarter.runtimeLanguages.GetTranslatableText (ITranslatable translatable)
```
10.5.2. Localization integration

Unity’s Localization package allows for translations through the use of database tables that can be updated externally with e.g. Google Sheets. Text gathered through the Speech Manager (see Gathering game text) can optionally be synchronised with Localization table entries.

To make use of this feature, the number and order of languages defined in AC’s Speech Manager (including the original) must match that of the Locales defined in your Localization settings. For example, if your AC game’s default language is in English, and has French and German translations, then your Localization settings must have English, French and German locales defined – in that order.

To enable the integration, first add the text LocalizationIsPresent as a Scripting Define Symbol in Unity’s Project settings.

Once added, a new option named Auto-sync Locale with Language? will appear in the Speech Manager. This allows AC to synchronise the active Localization Locale with AC’s active language.

For any line of text you wish to link to Localization, select it at the bottom of the Speech Manager and check Rely on Localization?. This then enables a Localized string field, that can be used to create or connect an entry in your Localization tables. The text in this table will be used, including when using the game’s original language.

Additional assets associated with the line, such as speech audio or lipsync data, are still linked to the AC line as normal.
10.6. Text tokens

Tokens are snippets of text that, when inserted into game text (normally a character's line of dialogue), are replaced or have a dynamic effect. The following tokens are recognised:

[var:ID]
Replaces the token with the value of a Global Variable, where “ID” is the ID number of the referenced Variable. The replacement token of any Variable is listed in its properties in the Variables Manager. This token also works in Label elements, Journal elements, and Conversation options.

NOTE: A tutorial on using this token in Menus can be found online.

[localvar:ID]
Replaces the token with the value of a Local Variable, where “ID” is the ID number of the referenced Variable. The replacement token of any Variable is listed in its properties in the Variables Manager. This token also works in Label elements, Journal elements, and Conversation options.

[compvar:CID:VID]
Replaces the token with the value of a Component Variable, where “CID” is the Constant ID number associated with the Variables component, and “VID” is the ID number of the referenced Variable. The replacement token of any Variable is listed in its properties in the Variables Inspector, provided that a Remember or Constant ID component is attached. This token also works in Label elements, Journal elements, and Conversation options.

[continue]
If the dialogue this is placed in is not running in the background, then from this point onward it will be. This is useful if you want to cut the camera on a particular word, mid-sentence.

[hold]
Like [continue] above, the ActionList will continue when this token is displayed on screen. However, the speech itself will remain on the screen indefinitely, until the Dialogue: Stop speech Action is used to end it. This is useful if you want a character's last-spoken line to remain on the screen when the player is presented with a Conversation option.

[expression:Name]
Changes the speaking character's expression to the one named “Name”. See Facial expressions.
[wait]
Removes the token, and only displays the speech text up to the point at which it was placed. The character will not continue speaking until the player clicks/taps. Note that Subtitles can be skipped? must be enabled in the Speech Manager.

[wait:X]
Removes the token, and only displays the speech text up to the point at which it was placed. The character will wait X seconds before continuing to speak. The value of X can be either an integer or a decimal.

[param:X]
Replaces the token with the value of an ActionList parameter. For this to work, a parameter with an ID of X must be present in the ActionList from which this Dialogue: Play speech Action is called. This token also works with Action comments.

 PROTIP: The [param:X] token is processed before all others, so that you can use it in place of other token values, for example [var:[param:X]] will use a parameter value in place of the variable token's ID number.

[paramlabel:X]
Similar to the [param:X] token above, only it displays a label if the parameter is a GameObject, Inventory Item, Global Variable or Local Variable. For example, if set to a Global Variable, the token will display the variable’s label as opposed to value. If the GameObject has a Hotspot component, then the Hotspot’s label will be displayed. Similarly if there is a Player or NPC component. If no such component is found, the GameObject’s name will be shown. All other parameter types will show the same value as the [param:X] token.

[paramval:X]
Similar to the [param:X] token above, only – if the parameter is linked to a Variable, then it instead displays that Variable’s value, as opposed to that Variable’s ID number. All other parameter types will show the same value as the [param:X] token.

[speaker]
Replaces the token with the display name of the character associated with the line of dialogue.

[line:ID]
Replaces the token with text gathered in the Speech Manager, set to the game's current language. This is useful if you want, for example, to display a Conversation’s dialogue option label as the speech text that the player says when chosen.

[token:ID]
Replaces the token with a string assigned by calling the SetCustomToken function inside the RuntimeVariables script, where “ID” is the ID number of the custom token. A tutorial
on using this token can be found online. This token also works in Label elements, Journal elements, and Conversation options.
10.6.1. Speech event tokens

Speech event tokens are a special kind of token that can be used in speech lines. Rather than being used to place text dynamically, they are instead used to trigger custom events.

This allows you to run additional code directly from your speech text. For example, the token [anim:wave] could be used to make a character wave, or [look:John] could tell the speaking character to look at an NPC named John.

Speech event tokens take the form:

[key:value]

Where both key and value are both strings. In order for a key to be recognised, it must first be added to the Dialog script’s internal array of accepted keys. This is done by writing to:

KickStarter.dialog.SpeechEventTokenKeys

For example, to allow the keys "anim" and" look" to be recognised, we can write the following code:


When tokens of the form [anim:X] and [look:Y] are placed in speech text, they will then trigger the OnSpeechToken custom event – allowing you to run whatever code is necessary. The following code will define the above token keys, and run an event when read:

private void OnEnable ()
{
    EventManager.OnSpeechToken += OnSpeechToken;
}

private void OnDisable ()
{
    EventManager.OnSpeechToken -= OnSpeechToken;
}

private void OnSpeechToken (AC.Char speakingCharacter, int lineID, string tokenKey, string tokenValue)
{
    Debug.Log (speakingCharacter + " said token [" + tokenKey + ":" + tokenValue + "]");
}
A speech token will be automatically removed when the text is displayed on-screen. However, with the `OnRequestSpeechTokenReplacement` event, it is also possible to use events to dynamically replace the token with something else. This is useful for inserting procedural text, for example. The following code will replace the token `[random:animal]` with the name a random animal every time it is used in speech text:

```csharp
private void OnEnable ()
{
    Kickstarter.dialog.SpeechEventTokenKeys = new string[1]
    { "random" };
    EventManager.OnRequestSpeechTokenReplacement +=
    OnRequestSpeechTokenReplacement;
}

private void OnDisable ()
{
    EventManager.OnRequestSpeechTokenReplacement -=
    OnRequestSpeechTokenReplacement;
}

private string OnRequestSpeechTokenReplacement (Speech speech, string tokenKey, string tokenValue)
{
    if (tokenKey == "random" && tokenValue == "animal")
    {
        int i = Random.Range (0, animals.Length);
        return animals[i];
    }
    return string.Empty;
}
```
10.6.2. Text event tokens

Text event tokens are similar to Speech event tokens in that they rely on custom events to replace text dynamically at runtime. Text tokens are used more widely than speech tokens, and are typically valid in any text field found in Actions.

Text event tokens take the form:

[key:value]

Where both key and value are both strings. In order for a key to be recognised, it must first be added to the RuntimeVariables script's internal array of accepted keys. This is done by writing to:

```
KickStarter.runtimeVariables.TextEventTokenKeys
```

For example, to allow the keys "anim" and "look" to be recognised, we can write the following code:

```
KickStarter.runtimeVariables.TextEventTokenKeys = new string[2]
{ "anim", "look" };
```

When tokens of the form [anim:X] and [look:Y] are placed in text, they will then trigger the `OnRequestTextTokenReplacement` custom event – allowing you to replace the entire token dynamically through script. The following code will replace the token [favourite:colour] with a random colour every time it is used in speech text:

```
private void Start ()
{
    KickStarter.runtimeVariables.TextEventTokenKeys = new string[1]
    { "favourite" };
}

private void OnEnable ()
{
    EventManager.OnRequestTextTokenReplacement +=
    OnRequestTextTokenReplacement;
}

private void OnDisable ()
{
    EventManager.OnRequestTextTokenReplacement -=
    OnRequestTextTokenReplacement;
}

private string OnRequestTextTokenReplacement (string tokenKey, string tokenValue)
{
    if (tokenKey == "favourite" && tokenValue == "colour")
    {
    ```
int i = Random.Range (0, colours.Length);
return colours[i];
}
return string.Empty;
10.7. Lip syncing

Animating characters convincingly makes a big difference to a game's quality, and there are a number of methods available. The Mecanim and Legacy animation engines, for example, allow you define a facial animation clip within each Dialogue: Play speech Action.

However, it's often unfeasible to keyframe an animation for every line of dialogue – so AC provides several ways to animate lips automatically. This is known as lip syncing.

Lip syncing involves two processes:

1) Extracting a list of phonemes (lip shapes) from a speech line
2) Using those phonemes to construct an animation
Extracting phonemes

The method by which phonemes are extracted is determined by the **Lip syncing** option in the Speech Manager:

![Lip syncing option](image)

It can take the following values:

**From Speech Text**
Phonemes are generated automatically based on the speech text. This option is best used when there is no accompanying audio: it won't always be a totally accurate approximation, but it will give the character's animation some noticeable variety.

**Read Pamela File**
Phonemes are generated by a Pamela file. **Pamela** is a free Windows application that can generate phonemes, and can be used to fine-tune an animation.

**Read Sapi File**
Phonemes are generated by a SAPI file. **SAPI** is another free Windows application, and can be used to generate bulk files automatically.

PROTIP: The **Physics demo** makes use of this option.

**Read Papagayo File**
Phonemes are generated by a Papagayo file. **Papagayo** is a free, cross-platform lip-sync tool that's easy to use.

**Face FX**
See **FaceFX integration**.

**Salsa 2D**
This option will make use of the 2D lip-syncing features of **SALSA With RandomEyes**, which is a separate Unity asset.

While the **Salsa 3D** script component can be used on 3D characters independently of Adventure Creator, **Salsa 2D** cannot – because 2D characters can face multiple directions, and therefore need different sets of “talking” frames. To get around this problem, simply choose this option, and add the Salsa 2D to your character's base object (which should also have an AudioSource), and ignore its sprite fields. AC will instead make use of the sprite animations you provided in the NPC / Player components, and use Salsa 2D to perform the lip-syncing processing.
You will also need to add **SalsaIsPresent** as a scripting define symbol – see Supported third-party assets.

**Rogo Lip Sync**
This option will make use of **Rogo Digital's Lip Sync**, which is a separate Unity asset.

LipSyncData files are generated as normal, and must then be named/placed according to the description below. The lip-sync animation will then be played automatically provided the speech line has an ID, and the speaking character has a LipSync script component attached to the root GameObject.

You will also need to add **RogoLipSyncIsPresent** as a scripting define symbol – see Supported third-party assets.

Pamela, SAPI, Rogo Digital LipSync, and Papagayo files are detected by Adventure Creator in the same way that **Speech audio** files are.

If they are connected to speech automatically, they must be placed in a **Resources/Lipsync** folder, and be of the same filename as they’re relevant audio file, only with a `.txt` extension (or `.asset` for Rogo Digital LipSync). For example, if an audio file is “Resources/Speech/Player2.mp3”, its accompanying phoneme file would be “Resources/Lipsync/Player2.txt”.

Lip sync files can also work with **Translations**.
Constructing animations

Generated phonemes must be mapped to animation frames in order to be played back at runtime. We can do this from the Phonemes Editor, which is available in the Lip syncing panel of the Speech Manager:

![Phonemes Editor](image)

Here, you can define how many animation frames you want, and which phonemes make use of them. Multiple phonemes can be mapped to the same frame by separating them with a slash “/”. The Revert to defaults button will map appropriate phonemes to your chosen Lip-sync method, but it will likely require further tweaking.

Once mapped, you can now use them to animate your characters. The Perform lipsync on setting chooses how: Portrait will animate a Character’s portrait graphic (assuming it's an animated texture), Portrait And Game Object will also animate the Character’s GameObject, and Game Object Texture will animate a texture on a Character's Skinned Mesh Renderer.

The method by which Portrait And Game Object affects the character’s GameObject is based on their chosen animation engine:

- With **Sprites Unity**, each lip-sync frame will correspond to a frame in the character's talking animation. This animation is assumed to be of the same number of frames as have been declared in the Phonemes Editor.

- With **Sprites Unity Complex**, the current lip-sync frame can be output to the Animator controller by declaring a Phoneme integer parameter in the character's Inspector.

- With **Legacy** and **Mecanim**, lip-syncing works by manipulating blend shapes. Each lip-sync frame will be mapped to a particular blend shape, as declared by the Shapeable script. All blend shapes used to animate the mouth must be placed in the same group (see the Shapeable component), and the group to affect is then declared in the character's inspector.
To use **Game Object Texture** mode, a **Lip Sync Texture** component must be attached to the Character's root GameObject. Once attached, it will provide texture replacement fields that correspond to each phoneme frame.

**PROTIP:** The **Lip Sync Texture** component works by updating a Material's texture according to the current phoneme. This is normally done in an Update call, but this can optionally be done in LateUpdate instead. This may be necessary if conflicts arise due to controlling the same texture via an Animator.

**NOTE:** A series of lip sync tutorials can be found [online](#).
10.8. FaceFX integration

FaceFX is a popular application used to create facial animation from speech audio, and can be used to animate AC’s characters.

To begin using FaceFX’s XML files, you must first download and import the official FaceFX Unity plugin.

Next, go to the Speech Manager and set Lip syncing to Face FX. You will be prompted to add FaceFXIsPresent as a Scripting Define Symbol. You can find this field from Edit → Project Settings → Player.

FaceFX scripts attached to characters will then be automatically detected when they speak. These scripts must be, or must derive from, FaceFXControllerScript_Base, but can be attached either to the character’s root or a child. If both a script and speech AudioClip is detected, AC will attempt to play an XML file of the same name as the clip, but with “Default_” inserted before it.

For example, if the audio file is named “Player2”, then the assumed XML name is “Default_Player2”.
10.9. Facial expressions

If a character uses Mecanim or Sprites Unity Complex for their animation, or makes use of Portrait graphics, then their expression can be changed mid-speech by using the [expression:Name] token within their speech text.

The "Name" part of this token refers to the label given to an expression defined in the Player or NPC Inspector, underneath Dialogue settings, once Use expressions? is checked:

Here, multiple expressions can be created and managed – each with their own portrait graphic and ID number.

**PROTIP:** The text token [expression:None] will clear the active expression.

The ID number is fixed, and displayed just above the expression's "Name" field. If your character uses Mecanim animation, then your chosen Expression ID integer parameter (as set under the Mecanim parameters panel) will be set to this value when the expression is triggered.

Another option is to use blendshapes. If your character uses Mecanim or Legacy animation, an additional Map to Shapeable? option will appear. Checking this will allow you to link the expressions to a Shapeable group, provided one is attached to the character’s Skinned Mesh Renderer. Note that the expression names listed in the character Inspector must match the key labels defined in the linked Shapeable groupe.

**PROTIP:** A tutorial on working with character expressions can be found online.
10.10. External dialogue tools

There are a number of external tools for writing dialogue, including Chat Mapper and articy:draft, which you may prefer to work with over AC’s built-in tools – particularly when working in team projects.

Dialogue System, which is a Unity asset dedicated to this aspect of game development, is able to link such tools with Adventure Creator. It can import both Chat Mapper and articy:draft projects, and has a number of Actions and features when working with Adventure Creator.

Further integration can be added through custom events. The AC wiki includes a sample script that demonstrates how an articy:draft FlowPlayer can be used to trigger speech and Conversations in AC.
10.11. Speech scripting

Characters can be made to speak through custom scripts with either:

```csharp
KickStarter.dialog.StartDialog (AC.Char speakingCharacter, string speechText);
KickStarter.dialog.StartDialog (AC.Char speakingCharacter, int lineID);
```

Where `lineID` refers to a speech line gathered in the Speech Manager.

These functions return a `Speech` class instance, which can be used to end the speech prematurely:

```csharp
KickStarter.dialog.KillDialog (mySpeech);
```

Or even modify the speech text at runtime:

```csharp
mySpeech.ReplaceDisplayText ("My new speech text");
```

A log of all speech spoken since the last file load can be retrieved with:

```csharp
KickStarter.runtimeVariables.GetSpeechLog ();
```

This returns an array of the `SpeechLog` class.

Translations can be modified or created at runtime by using:

```csharp
KickStarter.runtimeLanguages.ImportRuntimeTranslation (TextAsset textAsset, string languageName, int newTextColumn);
KickStarter.runtimeLanguages.UpdateRuntimeTranslation (int lineID, int languageIndex, string translationText);
```

Where `textAsset` is a CSV file of the form used by the Speech Manager to amend translations, `languageName` is the name of the language to modify, and `newTextColumn` is the index number of the column that contains the new translation text.

**PROTIP:** The above function can be used to support new languages for a game after its release. However, you must still cater for this within your game’s initial build: whether it by using Unity AssetBundles, or by reading a file online, your game must still be able to “look out” for future languages even if they do not exist at the time of release.

If your game relies on AssetBundles for its voice files, you can manually enforce the loaded AssetBundle for both audio and lipsyncing:

```csharp
KickStarter.runtimeLanguages.CurrentAudioAssetBundle = value;
KickStarter.runtimeLanguages.CurrentLipsyncAssetBundle = value;
```
The speech system has the following **events**:

```csharp
OnStartSpeech (AC.Char speaker, string speechText, int lineID);
OnStartSpeech_Alt (Speech speech);
OnStopSpeech (AC.Char speaker);
OnStopSpeech_Alt (Speech speech);
OnStopSpeech (Speech speech, bool justCompletingScroll);

OnStartSpeechScroll (AC.Char speaker, string speechText, int lineID);
OnStartSpeechScroll_Alt (Speech speech);

OnEndSpeechScroll (AC.Char speaker, string speechText, int lineID);
OnEndSpeechScroll_Alt (Speech speech);

OnCompleteSpeechScroll (AC.Char speaker, string speechText, int lineID);
OnCompleteSpeechScroll_Alt (Speech speech);

OnSpeechToken (AC.Char speaker, int lineID, string tokenKey, string tokenValue);
OnSpeechToken_Alt (Speech speech, string tokenKey, string tokenValue);

string OnRequestSpeechTokenReplacement (Speech speech, string tokenKey, string tokenValue);

string OnRequestTextTokenReplacement (string tokenKey, string tokenValue);

OnLoadSpeechAssetBundle (int language);
```
11. Menus
11.1. Menus overview

An AC game's entire interface – save for the cursor – is built using menus.

A menu is a collection of Menu elements that make it interactive. An inventory menu, for example, could feature an InventoryBox grid to show the player’s items, and two Buttons to scroll through them.

When using the New Game Wizard, you can opt to begin with a Default set of menus that form a fully-functioning UI for an adventure game. These can then be modified to suit, which is easier than starting from scratch. This UI is also used by the 3D Demo game.

Menus are listed in the Menu Manager:

Selecting a menu allows you to view its properties, as well as a list of its elements:
Selecting an element allows you to view properties of its own.

Menus can be drawn by one of two modes:

**Adventure Creator**
Which uses OnGUI calls to render a menu without need for any other assets.

**Unity UI**
Which links the menu to a Unity UI Canvas prefab to give the user full stylistic control.

Which render method a menu uses is set from its **Source** field:

![Menu Manager](image)

**PROTIP:** AC or Unity UI? Since AC-based menus are easier to set up quickly, but Unity UI offers more style options, it is recommended to first prototype your UI using AC menus, and then switch to Unity UI once happy with the functionality.

**NOTE:** Draw ordering between menus can only be set for those that use the same drawing mode. AC menus are drawn in order of their listing in the Menu Manager, while Unity UI menus rely on the **Sort Order** values in their Canvas components.

AC menus will always appear above Unity UI ones.

The next most important property of a menu is its **Appear type**:

![Appear type properties](image)

This property determines the rule for when it is shown. It can take the following values:

**Manual**
The menu is never shown or hidden automatically – only by using the **Menu: Change state** Action.

**Mouse Over**
The menu is shown when the cursor hovers over its boundary.
During Conversation
The menu is shown when a Conversation is active.

During Cutscene
The menu is shown whenever gameplay is blocked due to an ActionList. This can be used to add black borders on the screen during a cutscene, or add a Skip cinematic button. The Clickable in cutscenes? option must be set for a Menu to be interactive at this time.

On Container
The menu is shown when a Container has been opened using the Container: Open Action.

On Input Key
The menu is shown when a particular input button has been pressed by the player. If pressed while open, the menu will close. The supplied Toggle key input's name must match that of an axis in Unity’s Input Manager.

On Interaction
The menu is shown when the player must choose a Hotspot's interactions from a menu – see Choose Hotspot Then Interaction mode. The Settings Manager’s Close interactions with field determines how the menu is closed again.

On Hotspot
The menu is shown when a Hotspot is selected before an interaction is run.

When Speech Plays
The menu is shown when a character is speaking and subtitles are enabled – see Options data. Further settings with this mode allow the menu to be duplicated for each line, and for it to be limited to only show for lines that meet certain criteria: for example, those spoken by a specific character, or those played in the background. It can also account for proximity, so that it only shows when the speaking character is close enough.

During Gameplay
The menu is shown during normal gameplay.

While Inventory Selected
The menu is shown while an Inventory item is selected, ready to be used on another item or Hotspot.

Except When Paused
The menu is shown during normal gameplay and cutscenes, but hidden whenever the game is paused.
During Gameplay And Conversations
The menu is shown during normal gameplay, and when a Conversation is active.

PROTIP: When a menu is locked, it won't be shown even if the current conditions match its Appear type. A menu's locked state can be controlled with the Menu: Change state Action.

Other properties common to all menus include:

**Name**
The internal name of the menu, used to reference it in Menu Actions and scripts.

**Start game locked off?**
If checked, the menu will be locked by default and must be unlocked using the Menu: Change state Action before it will be displayed.

**Ignore cursor clicks?**
If checked, then it will not react to the cursor, and any interactive elements or objects behind it will register. This should be used for Hotspot menus, and Interaction menus that rely on Choose Hotspot Then Interaction mode's Cycling Cursor And Clicking Hotspot option.

**ActionList when turn on/off**
ActionList assets that can be run whenever the menu is shown or hidden. These can be used to initialise the menu correctly or disable certain systems using the Engine: Manage systems Action. Such ActionLists should generally have their When running field set to Run In Background so that they do not interfere with gameplay.

PROTIP: The Default Pause menu makes use of this to deselect the active Inventory item when it turns on.

**Enabled on start?** (Manual only)
If checked, then the menu will be shown by default.

**Pause game when enabled?**
If checked, then the menu will pause the game when it is shown. This option is only available for certain Appear types.

**Clickable in cutscenes?**
If checked, then the menu will be interactive while gameplay-blocking cutscenes are running. This option is only available for certain Appear types.
Hide in save screenshots?
If checked, then the menu will be momentarily hidden from view while taking a save-game screenshot. For this option to be visible, \textit{Save screenshots} must be enabled in the \textit{Settings Manager}.

Further options are available depending on the \textit{Source} field.
11.1.1. Adventure Creator menus

Adventure Creator menus are simple to set up as they can be made completely within the Menu Manager – without the for any other assets or scene objects.

They can be previewed while editing by checking Preview in Game window? at the top of the Menu Manager:

![Menu Manager settings](image)

**PROTIP:** Elements can be quickly selected for editing by clicking on them in the Game window.

To draw a menu using AC, set the Source property is set to Adventure Creator – this is the default setting:

![Menu properties](image)

**PROTIP:** Both demo games rely on AC menus for their interfaces.

This menu type is styled by tweaking its properties:

**Position**
How the menu's position is chosen. It has the following options:

- **Centred**
  Places the menu in the centre of the screen.

- **Aligned**
  Aligns the menu to a corner of edge of the screen.

- **Manual**
  Allows you to position the menu exactly.
Follow Cursor
Moves the menu with the cursor, offset by some determine amount.

Appear At Cursor Then Freeze
Positions itself over the cursor when turned on, and then made stationary.

On Hotspot
Positions itself over the selected Hotspot, offset by some determine amount.

Above Speaking Character
Positions itself over the currently-speaking character. If the Appear type is When Speech Plays and One menu per speech? is checked, the Menu can optionally remain stationary once it appears regardless of the character’s motion.

Above Player
Positions itself above the Player.

PROTIP: When a Menu is set to appear above a character, AC will attempt to determine where that character’s head is. However, you can specify exactly where to place the Menu by defining a Speech menu placement child for that character.

Size
How the menu’s size is chosen. It can be set manually, or automatically based on the Elements it contains.

Resize every frame?
If checked, then the menu’s size will be updated every frame. As this is an expensive operation, it should be left unchecked for menus that are not expected to change size.

Background texture
A texture that can be drawn across the menu. Its Elements will be drawn above it.

Element spacing
The spacing amount between Elements that have a Position type of Aligned.

Element orientation
The orientation of Elements that have a Position type of Aligned.

Transition type
The effect by which the menu turns on and off. Available options are the ability to zoom, pan, and fade.
Transition time (s)
The duration of the transition effect when turning on and off, if it has one.

Transition animation
How the transition effect changes over time, when turning on and off. An animation curve can optionally be supplied.

Update when fading out?
If checked, then changes to the menu and Elements within will be seen even when transitioning out.

PROTIP: When two AC menus overlap, their drawing order is based on their order in the Menu Manager: the bottom-most menu in the list will be drawn above all others.

Similar styling properties are also available for each Elements an Adventure Creator menu contains.
11.1.2. Unity UI menus

Unity UI menus allow you to make use of Unity’s UI system and styling options while letting AC handle clicks and visibility.

The link works by assigning a UI canvas to the menu, and a UI component to each of the menu's Elements. AC will then override click functionality, labels, etc with the properties in the Menu Manager.

**PROTIP:** Each of the menus in The default Interface can be switched to Unity Ui Prefab, as can those in the 3D Demo game.

To have an AC menu connect to Unity UI, change its Source field to either Unity Ui Prefab or Unity Ui In Scene:

![Menu 12: 'Pause' properties](image)

**Unity Ui Prefab**

Links the menu to a Unity UI canvas prefab, which is instantiated by AC automatically when the game begins.

**Unity Ui In Scene**

Links the menu to a Unity UI canvas in the scene, if one exists.

**PROTIP:** Prefab or in-scene? If your Canvas' Render mode is World Space, you will need to use Unity Ui In Scene. Otherwise, it is more convenient to use Unity Ui Prefab. Note that in order to control an "In Scene" menu, the Canvas must be manually placed in each scene.

The steps to connect a menu to a UI canvas are as follows:

1) Create the menu in the Menu Manager along with any Elements it needs.
2) Set the menu's Source field to either Unity Ui Prefab or Unity Ui In Scene
3) Separately create your Unity UI canvas
4) Assign the UI canvas into the menu's Linked Canvas field. This should either be a prefab or a scene object, depending on the Source type.

**NOTE:** All UI canvases linked to the Menu Manager should be independent of one another in the Hierarchy. AC turns off such menus by disabling them – so having one Canvas the child of another can cause it to be inadvertently turned off.
5) Assign the UI's "bounding box" into the menu's **RectTransform boundary** field. This can be an invisible RectTransform object if need be. This is so that AC can reposition it (if necessary) and determine it the cursor is over it.

**NOTE:** Do not assign the Canvas itself as the RectTransform boundary. A child RectTransform must instead be assigned.

6) Place the UI canvas in the scene (if a prefab) and assign each UI component (Text, Button, etc) into its associated menu Element's **Linked UI** field. Elements with multiple slots (such as InventoryBoxes) will need one object per slot. The canvas must be in the scene because Unity does not allow for expanded hierarchies in the Project window.

7) Update the prefab (if appropriate) by clicking **Apply** at the top of its Inspector. This is because linking UI components to Elements generates **Constant ID** components.

8) Remove the UI canvas from the scene (if a prefab).

**PROTIP:** A tutorial on linking the default Inventory menu to Unity UI can be found online.

Unity UI-linked menus have the following properties:

**Position type**
How the menu's position is chosen, provided a **RectTransform boundary** has been assigned. It has the following options:

**Above Player**
Positions itself above the **Player**.

**Above Speaking Character**
Positions itself over the currently-speaking character.

**PROTIP:** When a Menu is set to appear above a character, AC will attempt to determine where that character's head is. However, you can specify exactly where to place the Menu by defining a **Speech menu placement child** for that character.

**Appear At Cursor Then Freeze**
Positions itself over the cursor when turned on, and then made stationary.

**Follow Cursor**
Moves the menu with the cursor, offset by some determine amount.
Manual
Does not move by AC, and can only be moved with custom scripting.

On Hotspot
Positions itself over the selected Hotspot, offset by some determine amount.

Always fit within screen?
If True, then the menu will be kept within the screen's border, if Aspect ratio is set in the Settings Manager's Camera settings panel.

Transition type
The effect by which the menu turns on and off. The available options are:

Canvas Group Fade
The menu will fade by affecting the Alpha value of the Canvas Group component that must be attached to the UI's root GameObject.

Custom Animation
The menu will play animations from the UI's root Animator component. Four states must be present on the Animator: On, Off, OnInstant and OffInstant – though they can be empty if not necessary. Note that to ensure it works correctly when pausing is involved, set the Animator’s Update Mode to Unscaled Time.

None
The menu will be turned on and off instantly.

Update when fading out?
If checked, then changes to the menu and Elements within will be seen even when transitioning out.

Linked Canvas
The UI canvas that is linked to the menu. This should either be a prefab, or a scene-based GameObject, depending on the chosen Source.

RectTransform boundary
A RectTransform child of the UI canvas that marks the menu's boundary. This is necessary for AC to know where the menu lies, and how to re-position it if necessary.

Auto-select first visible Element?
If checked, then the first visible element listed in the Menu Manager will be automatically highlighted when the menu is turned on. This is useful if the menu is keyboard-controlled, but which elements will be active is unknown.

First selected Element
The name of the element to automatically highlight when the menu is turned on. This is useful if the menu is keyboard-controlled, as an element must be selected before it can be controlled with a keyboard or gamepad.

NOTE: When using Keyboard or controller input, options appear at the top of the Menu Manager regarding when menus can be controlled without using a cursor.

For gamepad/keyboard control during gameplay, you must enable it using the Engine: Manage systems Action to enable it BEFORE the Menu is turned on, or in the menu’s ActionList when turn on asset.

Also be aware that the game must be in normal gameplay at the time that the menu is turned on: if an ActionList is used to turn it on, set its When running field to Run In Background.

Because Unity UI canvases requires an Event System to work, AC will automatically generate one if a scene has none. You can have it spawn your own one, however, by making it a prefab and assigning it at the top of the Menu Manager.

PROTIP: By default, Menus will rely on Unity UI Text components for text display. However, you can alternatively opt to rely on on Text Mesh Pro – see Supported third-party assets.
11.2. Menu elements

A menu's elements are what make it interactive. When a menu is selected in the Menu Manager, its elements are listed beneath:

New elements can be created by choosing a type and clicking **Add new**. The following types are available:

**Label**
A simple text box.

**Button**
A button that can be clicked.

**DialogList**
Displays the options of the active Conversation.

**Interaction**
Displays Icons defined in the Cursor Manager.

**InventoryBox**
Displays Inventory items carried by the player.

**Crafting**
Provides a grid for placing down crafting ingredients – see Recipes.

**SavesList**
Displays save files to load or overwrite – see Saving and loading.

**ProfilesList**
Displays user profiles to switch to – see Save profiles.

**Journal**
A multi-page document.
**Input**  
A text box that the user can edit.

**Toggle**  
A button that toggles between On and Off states.

**Cycle**  
A button that cycles through an array of labels when clicked.

**Slider**  
A slider that represents a numerical value.

**Timer**  
A timer that represents a timed numerical value.

**Drag**  
An area that can be mouse-dragged within a boundary.

**Graphic**  
A static or animated image.

Each element type has its own unique properties, but the following are available for all types:

**Element name**  
The internal name of the element, used to reference it in Menu Actions and scripts.

**Is visible?**  
If checked, the element will be shown by default. Elements can be shown and hidden at runtime by using the Menu: Change state Action.

**Hover / click sound**  
AudioClips that play when the element is hovered over by the cursor, or clicked. To play, a Default Sound must be defined in the Scene Manager’s Scene Settings.

Element-specific properties are listed in the next section.
Label elements

Labels are used to display text non-interactively. They are primarily used for headings, subtitles, and interaction display. They have the following properties:

Label type
What type of text is shown. The available options are:

Normal
Shows the contents of the Label text box. Can make use of variable tokens – see Text tokens.

Hotspot
Shows the name of the currently-selected Hotpot or Inventory item, together with the active Interaction if enabled in the Cursor Manager.

Dialogue Line
Shows the speech text being currently spoken by a character. If Text Mesh Pro is being used (see Supported third-party assets), and subtitle scrolling is enabled, an additional option to make use of TMPro’s Typewriter effect will be made available.

Dialogue Speaker
Shows the name of the currently-speaking character.

Global Variable
Shows the value of a Global Variable. This is deprecated by the Normal type's ability to use tokens.

Active Save Profile
Shows the name of the active Save profile.

Inventory Property
Shows the value of a Inventory property.

Document Title
Shows the title of the active Document.

Selected Objective
Shows text related to the currently-selected Objective – it’s Title, Description, State Description, State Label, or State Type.

Label text
If the Label type is Normal, the actual contents of the label.
Additional properties for styling will be shown if used in an Adventure Creator menu.

**PROTIP:** When using Unity UI, they can be linked to UI Text components.
Button elements

Buttons are the most common form of UI interactivity.

They are used primarily for accessing other menus and running ActionLists. They have the following properties:

**Click type**
What happens when it is clicked. The available options are:

- **Turn Off Menu**
  Turns off its parent menu.

- **Crossfade**
  Simultaneously turns off its parent menu and turns on another.

- **Offset Element Slot**
  Shifts the slots of an element that relies on multiple slots – InventoryBox, DialogList, SavesList, ProfilesList – by some amount. This can be used to create, for example, scrolling inventories.

- **Run Action List**
 Runs an ActionList asset. It the asset has an Integer parameter, then its value can optionally be set here.

- **Custom Script**
  Does nothing by itself, but the OnMenuElementClick custom event can be used to run code when clicked.

- **Offset Journal**
  Shifts the pages of a Journal element.

- **Simulate Input**
  Simulates the invoking on an input listed in Unity's Input Manager. This can be used to create, for example, an on-screen joystick or a "Skip cutscene" button – see Input descriptions.

- **Button text**
The display text. If it features textures, can be left blank.

- **Hotspot label override**
If text is entered, then the Hotspot menu will display this text when the mouse hovers over it.
**Alternative input button**
When given the name of an input defined in the Input Manager, pressing that input will be the equivalent of clicking the element.

**Change when cursor over?**
If checked, the cursor can have its icon changed when over it to one defined in the Cursor Manager.

Additional properties for styling will be shown if used in an Adventure Creator menu.

**PROTIP:** When using Unity UI, they can be linked to UI Button components.
DialogList elements

DialogLists display a Conversation's options. When clicked, the associated option will be triggered. They have the following properties:

Map to
How to map a Conversation's dialogue options to the element. List allows all options to be displayed, as a list, in the one element. Fixed Slot Index will show only one option – determined by the index of available options, so that the “nth” option always appears in the same place. Fixed Option ID will only show one option – determined by that option's ID number, so that it always shows the same option.

Maximum number of slots
The maximum number of slots, if Fixed option number? is unchecked. If there are more options than slots, they can be shifted using a Button with a Click type of Offset Element Slot.

Display type
Whether options are represented by text, icons, or both.

Mark options already used?
If checked, then options already triggered once can be tinted differently.

Prefix with index numbers?
If checked, then option labels will begin with their order in the list.

Change when cursor over?
If checked, the cursor can have its icon changed when over it to one defined in the Cursor Manager.

Additional properties for styling will be shown if used in an Adventure Creator menu.

PROTIP: When using Unity UI, they can be linked to UI Button components.
Interaction elements

Interaction elements display Interaction icons defined in the Cursor Manager.

They are used by Choose Hotspot Then Interaction and Choose Interaction Then Hotspot modes to select an interaction. They have the following properties:

**For fixed icon?**
If checked, then this element will be used to represent a single icon – so that clicking it will always result in the same interaction type. If unchecked, then this element will represent multiple icons using as many slots as you define. If there are more icons than can be shown, the element can be scrolled through using a Button element with a Button type set to Offset Element Slot.

**Display type**
Whether icons are represented by text, image, or both. Note that For fixed icon? is checked, Unity UI–based Interaction elements do not rely on the icons set within the Cursor Manager. Instead, the graphics are assigned manually within the UI Image component.

**Cursor**
The Interaction icon, defined in the Cursor Manager, it is mapped to. Only available when For fixed icon? is checked.

**Override icon texture?**
If checked, an alternative graphic can be used in place of the icon's default. Only available when For fixed icon? is checked.

**Alternative input button**
When given the name of an input defined in the Input Manager, pressing that input will be the equivalent of clicking the element. Only available when For fixed icon? is checked.

Additional properties for styling will be shown if used in an Adventure Creator menu.

PROTIP: When using Unity UI, they can be linked to UI Button components. Icon graphics can work with both Image and Raw Image components on the Button.
InventoryBox elements

InventoryBoxes are used to list Inventory items.

They are mainly used to show the player’s current inventory, but can also be used to show items in a Container, or those available to the selected Hotspot. They have the following properties:

**Inventory box type**
What items are shown, and how they behave. The available options are:

- **Default**
  Shows the player's full inventory, and items react to clicks as normal.

- **Hotspot Based**
  Shows the items associated with a given Hotspot. This is only used when building Interaction Menus for Choose Hotspot Then Interaction mode, and Include Inventory items in Interaction Menus? is enabled in the Settings Manager.

- **Custom Script**
  Shows the player's full inventory. Does nothing by itself, but the OnMenuElementClick custom event can be used to run code when clicked.

- **Display Selected**
  Shows the currently-selected item for visual purposes only.

- **Display Last Selected**
  Shows the previously-selected item, allowing it to be re-selected by the player.

- **Container**
  Shows the active Container's items. Clicking them places them in the player's inventory.

**PROTIP:** The element can be connected to a specific Container by writing to its OverrideContainer variable through script:

```
(AC.PlayerMenus.GetElementWithName ("MyMenu", "MyInventoryBox") as AC.MenuInventoryBox).OverrideContainer
```

Note that the Menu’s Appear type should not be set to On Container, as this will interfere with the active Container.

**Objectives**
Shows a list of Objectives.
Display type
Whether items are represented by text, icons, or both.

Maximum number of slots
The maximum number of slots, if Fixed option number? is unchecked. If there are more items than slots, they can be shifted using a Button with a Click type of Offset Element Slot.

Prevent interactions?
Prevents the running of Inventory interactions, and display of Interaction menus – so that interactivity is limited to the selection and re-arrangement of items only. This is useful when working with Container or Crafting menus.

Prevent selection?
Prevents the selection of Inventory items. Used in conjunction with the OnMenuElementClick event, this is useful when creating custom inventory behaviour.

Additional properties for styling will be shown if used in an Adventure Creator menu.

PROTIP: When using Unity UI, they can be linked to UI Button components. Item graphics can work with both Image and Raw Image components on the Button.
Crafting elements

Crafting elements allow for items to be crafted from others – see Recipes. They have the following properties:

Crafting element type
What kind of items are shown, and how they behave. The available options are:

- **Ingredients**
  Shows the items used as ingredients in the current recipe. The player can move items to and from their own inventory – see InventoryBox elements.

- **Output**
  Shows the item that results from a successful recipe.

Result is automatic?
For Output types only. If checked, then resulting Recipe items will appear automatically when the correct ingredients have been placed. Otherwise, the Inventory: Crafting Action must run to create the recipe.

Display type
Whether items are represented by text, icons, or both.

Number of slots
How many items can be shown at once, if the Crafting element type is Ingredients. If there are more items than slots, they can be shifted using a Button with a Click type of Offset Element Slot.

Additional properties for styling will be shown if used in an Adventure Creator menu.

PROTIP: When using Unity UI, they can be linked to UI Button components.
SavesList elements

SavesLists display save game files.

They are used for saving and loading the game – see Saving and loading. They have the following properties:

**List type**
What kind of save files are listed, and how they react when clicked. The available options are:

- **Save**
  Shows the game's save files, which can be overwritten when clicked.

- **Load**
  Shows the game's save files, which can be loaded when clicked.

- **Import**
  Shows another game's save files, which can be imported – see Importing saves from other games.

**Display type**
Whether save files are represented by text, screenshot, or both. Save screenshots can be enabled in the Settings Manager.

**Fixed Save ID only?**
If checked, then only one save file will be shown. This is useful if you want to arrange your files non-linearly.

**Maximum number of slots?**
The maximum number of slots, if Fixed Save ID? is unchecked. If there are more saves than slots, they can be shifted using a Button with a Click type of Offset Element Slot.

**Allow empty slots?**
If checked, then save slots will be visible even when empty. For example, if slots 1 and 3 are filled, an empty slot 2 will be available.

**Show 'New save' option?**
If the List type is Save, checking this provides an option to create a new save. Otherwise, new saves can be made with the Save: Save or load Action.

**Save/load when click on?**
If checked, then saving and loading will be handled automatically.
**ActionList after saving/loading**
The ActionList asset that can be run after a successful save or load, if Save/load when click on? is checked. This can be used to update the UI as required.

**ActionList when click**
The ActionList asset that can be run when clicked, if Save/load when click on? is unchecked. This can be used in conjunction with the Save: Save or load Action to create more dynamic save menus – see Custom save labels. If the asset has an Integer parameter, it can optionally be set to the save that was clicked on.

Additional properties for styling will be shown if used in an Adventure Creator menu.

PROTIP: When using Unity UI, they can be linked to UI Button components.
ProfilesList elements

Profiles display a list of Save profiles.

They can be used to select a profile for switching, deleting, or renaming. They have the following properties:

**Fixed Profile ID only?**
If checked, then only one profile will be shown. This is useful if you want to arrange your files non-linearly.

**Include active?**
If unchecked, the active profile will not be displayed. The name of the active profile can also be displayed in Label elements.

**Maximum number of slots?**
The maximum number of slots, if Fixed Profile ID? is unchecked. If there are more profiles than slots, they can be shifted using a Button with a Click type of Offset Element Slot.

**Switch profile when click on?**
If checked, then clicking a profile will result in it being made active.

**ActionList when click**
The ActionList asset that can be run after a switch, if Switch profile when click on? is checked. This can be used to update the UI as required.

**ActionList after selecting**
The ActionList asset that can be run when clicked, if Switch profile when click on? is unchecked. This can be used in conjunction with the Save: Manage profiles Action to rename and delete profiles. If the asset has an Integer parameter, it can optionally be set to the profile that was clicked on.

Additional properties for styling will be shown if used in an Adventure Creator menu.

💡 **PROTIP:** When using Unity UI, they can be linked to UI Button components.
Journal elements

Journals display text from a number of pages. Such text can either be tied to the element, or managed separately in Documents.

The open page can be changed by using a Button element with a Click type set to Offset Journal, or with the Menu: Set journal page Action. Pages can be added or removed with the Menu: change state Action.

PROTIP: A tutorial on using Journals to create a diary system can be found online.

Journal elements have the following properties:

**Journal type**
Where pages are sourced from. The available options are:

- **New Journal**
  It is a new journal and has its own pages.

- **Display Existing Journal**
  It shares pages with another Journal element on the same Menu. Since a Journal element can only display one page at a time, this allows you to show two side-by-side by having a second one share pages from the first.

- **Display Active Document**
  It shows the page text of the currently–active Document, which is defined separately in the Inventory Manager and opened using the Document: Open Action.

**Page text**
When Journal type is New Journal, this is where pages are created.

**Page offset #**
When Journal type is Display Existing Journal, this allows you to offset the open page compared with the journal it shares with.

Additional properties for styling will be shown if used in an Adventure Creator menu.

PROTIP: When using Unity UI, they can be linked to UI Text components.

NOTE: In order for any in-game changes made to a journal to be recorded in save game files, all pages must be listed in the Speech Manager – see Gathering game text.
Input elements

Input elements provide a text box that the player can write into.

They can be used for things like password puzzles and name-entry. Their values can be converted to Global string Variables by using the Variable: Set Action.

When using Adventure Creator menus, they have the following properties:

**Default text**
The box’s text when the menu is turned on.

**Input type**
What type of input is allowed. It has the following options:

- **Alpha Numeric**
  Only letters and numbers can be entered.

- **Numeric Only**
  Only numbers can be entered.

- **Allow Special Characters**
  Any character type can be entered.

**Character limit**
The maximum number of characters that can be entered.

**'Enter' key's linked Button**
When given the name of a Button element in the same menu, pressed Enter/Return inside the Input will have the same effect as clicking the Button.

**PROTIP:** When using Unity UI, they can be linked to UI InputField components.
Toggle elements

Toggles are a special type of button that can be toggled between On and Off states. They can be used to toggle subtitles, or a Global boolean Variables. They have the following properties:

**Label text**
The label that is shown at all times.

**Append state to label?**
If checked, the state of the Toggle will be added to the label, e.g. "Subtitles: On".

**Toggle type**
What the toggle state is linked to. The available options are:

- **Custom Script**
  Toggles between on and off and nothing else. The OnMenuElementClick custom event can be used to run code when clicked.

- **Subtitles**
  Toggles the visibility of subtitles – see Options data.

- **Variable**
  Represents the state of a Global boolean Variables.

- **Global boolean var**
  If the Toggle type is Variable, the ID of the Global boolean Variables to link to.

- **ActionList on click**
  If the Toggle type is either Custom Script or Variable, the ActionList asset to run when it is clicked. This asset’s When running field should be set to Run In Background to avoid interference.

- **Alternative input button**
  When given the name of an input defined in the Input Manager, pressing that input will be the equivalent of clicking the element.

- **Change when cursor over?**
  If checked, the cursor can have its icon changed when over it to one defined in the Cursor Manager.

Additional properties for styling will be shown if used in an Adventure Creator menu.
PROTIP: When using Unity UI, they can be linked to UI Toggle components.
Cycle elements

Cycles are a special type of button that cycle their label through a set of texts when clicked. They can be used to change the language, or a Global Variable. They have the following properties:

**Cycle type**
What texts are cycled through when clicked, and what this affects. The available options are:

- **Language**
  Cycles through the game's available languages – see Translations. The game's active language is linked to the element. If voice audio and display text languages are separated, you can choose which language type this affects.

- **Custom Script**
  Cycles through user-defined texts and nothing else. The OnMenuElementClick custom event can be used to run code when clicked.

- **Variable**
  Links the current label's index to a Global Integer or Popup Variable. If linked to a a Popup, then labels will match those defined by the variable.

**Choices**
If the Cycle type is either Custom Script or Variable, the available texts that can be cycled through are defined here.

**Global Variable ID**
If the Cycle type is Variable, the ID of the Global Integer Variable to link to.

**ActionList on click**
If the Cycle type is either Custom Script or Variable, the ActionList asset to run when it is clicked. This asset's When running field should be set to Run In Background to avoid interference.

**Alternative input button**
When given the name of an input defined in the Input Manager, pressing that input will be the equivalent of clicking the element.

**Change when cursor over?**
If checked, the cursor can have its icon changed when over it to one defined in the Cursor Manager.

Additional properties for styling will be shown if used in an Adventure Creator menu.
PROTIP: When using Unity UI, they can be linked to both UI Button and Dropdown components.
Slider elements

Sliders are bars whose length represents a value. They can be used to change volumes, or a Global float variable. They have the following properties:

**Slider affects**
What information the slider is linked to, and what it affects. The available options are:

- **Custom Script**
Changes its own value and nothing else. The OnMenuElementClick custom event can be used to run code when clicked.

- **Float Variable**
Links to the value of a Global float variable.

- **Music**
Links to the current music volume – see Options data.

- **SFX**
Links to the current SFX volume – see Options data.

- **Speech**
Links to the current speech volume – see Options data.

**Global Float var**
If the Slider affects is Float Variable, the Global float variable to link to.

**Min/max value**
If the Slider affects is Custom Script or Float Variable, the minimum and maximum values it can take.

**ActionList on click**
If the Slider effects is Custom Script or Float Variable, the ActionList asset to run when its value is changed. This asset's When running field should be set to Run In Background to avoid interference.

**User can change value**
If checked, the user can control the slider by interacting with it. Otherwise, it is read-only – this is useful if you want to represent player stats like health as a metered bar.

**Change when cursor over?**
If checked, the cursor can have its icon changed when over it to one defined in the Cursor Manager.
Additional properties for styling will be shown if used in an Adventure Creator menu.

**PROTIP:** When using Unity UI, they can be linked to UI Slider components.
Timer elements

Timers are a special type of slider that automatically animates their value when linked to gameplay.

They can be used to represent the time left in a Conversation, Quick-time event, or in a scene load. They have the following properties:

**Timer type**
What kind of value the timer represents. The available options are:

- **Conversation**
  Shows the time left of a timed Conversation. The Conversation must have **Is timed?** checked in its own Inspector.

- **Loading Progress**
  Shows the time left of a current scene–load. **Load scenes asynchronously?** must be checked in the Settings Manager – see Loading screens.

- **Quick Time Event Progress**
  Shows the progress the player has made in the current Quick-time event.

- **Quick Time Event Remaining**
  Shows how much time remains in the current Quick-time event.

- **Invert value?**
  If checked, the appeared value will be the inversion of the true value – that is, it will go upward when the time goes down.

- **Value smoothing**
  If non-zero, enables smoothing. Higher values will result in more smoothing, so the timer will react more slowly to value changes.

Additional properties for styling will be shown if used in an Adventure Creator menu.

**PROTIP:** When using Unity UI, they can be linked to UI Slider components.
Drag elements

Drag elements allow for drag effects in a menu.

They can be used to drag entire menu or a single element within a pre-defined boundary. This also works on elements that are larger than the menu they're contained in, making it useful for displaying documents that are larger than the screen. They have the following properties:

Label
The label to display.

Drag type
What effect dragging has. The available options are:

Entire Menu
The parent menu can be dragged.

Single Element
A single element can be dragged.

Element name
If the Drag type is Single Element, the name of the element to drag.

Drag boundary
The boundary limits in which dragging can occur.

Change when cursor over?
If checked, the cursor can have its icon changed when over it to one defined in the Cursor Manager.

PROTIP: This Element type is not necessary in Unity UI menus, as it can be recreated using ScrollBar and ScrollRect components. A tutorial on using this for Adventure Creator menus can be found online.
Graphic elements

Graphic elements allow for textures to be drawn.

They can be used to either display a texture, or a character's portrait graphic. They have the following properties:

**Graphic type**
What kind of graphic to draw. The available options are:

**Dialogue Portrait**
Shows the currently-speaking character's portrait graphic, as defined in the Player or NPC Inspector.

**Normal**
Shows a specific texture.

**Document Texture**
Shows the associated texture of the currently-active Document.

**Objective Texture**
Shows the associated texture of the currently-selected Objective.

**Texture**
The texture to draw. This can optionally be animated if it consists of an animation sequence.

Additional properties for styling will be shown if used in an Adventure Creator menu.

PROTIP: When using Unity UI, they can be linked to both UI Image and Raw Image components.
11.3. The default interface

The default interface is created when using the New Game Wizard to create your Managers. While you can choose to use Unity UI or Adventure Creator as the basis, you can switch back and forth between these drawing modes via each menu's Source field at any time.

The default set of menus are designed to provide you with the key menus needed to create an adventure game, and is accessible directly via the Default_MenuManager Menu Manager asset file. They include:

- Pause
- Options
- Save
- Load
- Profiles
- Inventory
- InGame
- Conversation
- Interaction
- Subtitles
- Container
- Crafting
- Document
- Objectives
- Hotspot
The default Pause menu

The Pause menu pauses the game and allows access to the Options, Save and Load menus:

It is turned on when the player presses an input key named "Menu" (which is the Escape key by default), or clicks on the InGame menu.

If Save profiles are enabled, you can allow access to the Profiles menu by un–hiding the ProfilesButton element.

The Save button is automatically hidden

**NOTE:** The Save button is automatically hidden when the menu is opened while in a gameplay–blocking cutscene, since saving is prevented at this time. If you open this menu with the Menu: Change state Action, be sure to set the ActionList's **When running** field to **Run In Background** so that gameplay is not interrupted.
The default Options menu

The Options menu allows the changing of language, audio levels and subtitles:

These components are all linked to Options data. It is accessed via the OptionsButton element in the Pause menu.
The default Save menu

The Save menu allows the saving of save-game files:

It is accessed via the SaveButton element in the Pause menu.

PROTIP: A tutorial on extending this menu to accept custom save labels can be found online.
The default Load menu

The Load menu allows the loading of save-game files:

It is accessed via the LoadButton element in the Pause menu.
The default Profiles menu

The Profiles menu displays all *Save profiles* present:

![Profiles menu](image)

Here you can switch between profiles, create new ones, and delete the active. It is accessed via the *ProfilesButton* element in the *Pause* menu, though this element is hidden by default.
The default Inventory menu

The Inventory menu displays all Inventory items currently held by the player:

It is accessed by hovering the mouse over the top of the screen during normal gameplay. If the player is carrying more items than can fit in the InventoryBox, the ShiftLeft and ShiftRight Buttons allow you to scroll through them.
The default InGame menu

The InGame menu shows a single button to open the Pause menu:

![Menu]

This allows the Pause menu to be opened without the need for invoking the "Menu" input axis, and is useful when playing on mobile devices. It is visible in the lower-left corner of the screen during gameplay.

**PROTIP:** See this menu flashing at runtime? As this menu's **Appear type** is set to **During Gameplay**, it will be turned off anytime gameplay is blocked – even if only for a split-second. To prevent a momentary **ActionList** from interrupting gameplay, set its **When running** field to **Run In Background**.
The default Conversation menu

The Conversation menu shows the active Conversation's dialogue options:

![Conversation menu with dialogue options]

It also includes a Timer that shows how the duration left if the Conversation is timed. It is only visible when a Conversation is active.

**PROTIP:** When rendered Unity UI, the available options can be scrolled through using the mouse-wheel. This is made possible by the Mousewheel Scroll UI component attached to its Canvas root. This component can be attached elsewhere to support scrolling through other element types.
The default Interaction menu

The Interaction menu shows the available interactions when in Choose Hotspot Then Interaction mode:

![Interaction Menu]

This is a special-case menu in that it is used only when using this particular interface type. If Include Inventory items in Interaction menus? is checked in the Settings Manager, then it will also include Inventory items that can be used on the clicked Hotspot/item.

The Unity UI counterpart of this menu embeds the icon graphics directly within its Image components – they are not pulled from the Cursor Manager icon graphics.

**PROTIP:** When creating new Interaction icons in the Cursor Manager, this menu must be updated with new Interaction elements in order for them to show. Normally, icons that are not appropriate for the active Hotspot will not be shown – but this can be changed by unchecking Auto-hide Interaction icons based on Hotspot? in the Settings Manager.
The default Subtitles menu

Shows the most recently-said line of dialogue, as well as who is speaking:

It will appear whenever dialogue is spoken, provided that subtitles are enabled – see Options data.
The default Container menu

Shows the Inventory items in the currently-opened Container:

Items can be transferred between the Container and the player's own inventory. The menu opens automatically when using the Container: Open Action.
The default Crafting menu

Allows for recipes to be crafted – see Crafting:

Items can be placed into the crafting grid on the left, and combined to create a new item on the right. This menu can only be turned on using the Menu: Change state Action.
The default Document menu

Allows for the viewing of the active Document.

If the Document consists of multiple pages, the active page can be changed via the arrow buttons at the bottom. This Menu can only be opened via the Document: Open Action.
The default Objectives menu

Displays a list of all active, completed and failed Objectives.

Clicking an Objective from the list reveals more details about it. To turn on this Menu, use the Menu: Change state Action.
The default Hotspot menu

Displays the name of the active Hotspot or Inventory item:

The text also includes the current Interaction name if set within the Cursor Manager. It is only visible during normal gameplay.

Some menu element types also have a Hotspot label override property that can be used to set the Hotspot text. This can also be set dynamically by hooking into the OnRequestMenuElementHotspotLabel custom event.

**PROTIP:** This menu is at the bottom of the menu stack because it depends on the ones above it for its display. When hovering over the Inventory menu, for example, the label will show the names of Inventory items. As menus are updated in the order in which they are listed, those that depend on others must be placed further down.
Navigating menus directly

Menus can be navigated with the mouse (by hovering over each element with the pointer), or directly (by using a keyboard or controller to move between elements in turn). Options are available at the top of the Menu Manager to allow for direct-navigation:

These options can be used to directly-navigate menus when the game is paused, or when a Conversation is active. To allow for this behaviour during gameplay, the Engine: Manage systems Action must be used to allow it. Note that enabling this will not automatically disable player movement, which can be done using the Player: Constrain Action.

Menus can then be navigated with the Horizontal and Vertical input axes. For Adventure Creator menus, elements can then be selected with the InteractionA input button. For Unity UI menus, they can be selected with the Submit input button.

**NOTE:** When a gameplay Menu is set to be directly-controlled, it is important that the game is not in a cutscene when it is turned on. If the Menu is turned on using the Menu: Change state Action, ensure that its ActionList’s When running field is set to Run In Background, so that it does not interrupt gameplay at this moment.

Unity UI menus can only be directly-controlled if an element is designated to become selected when the menu is turned on. This can be done either with the Menu: Select element Action, or at the bottom of the menu’s properties:

**NOTE:** The order of Menus as they appear in the Menu Manager determines their selection priority. If two or more Menus are enabled at the same time, then the one furthest down the list will be made direct-controllable.

The selected element can be manually-set using the Menu: Select element Action.
11.5. Menu scripting

The scripting guide has entries for the `Menu` and `MenuElement` classes online.

To retrieve a List of all Menus at runtime, use:

```csharp
PlayerMenus.GetMenus ();
```

To get a specific Menu or MenuElement by name, use:

```csharp
PlayerMenus.GetMenuWithName (string menuName);
PlayerMenus.GetElementWithName (string menuName, string menuElementName);
```

A Menu can be turned on and off through script with:

```csharp
myMenu.TurnOn ();
myMenu.TurnOff ();
```

Note that if it’s **Appear type** condition will still control the Menu’s visibility. If it is set to e.g. **During Gameplay**, it can be prevented from showing by locking it:

```csharp
myMenu.isLocked = true;
```

To reposition a Menu with an **Appear type** of **Manual**, use:

```csharp
myMenu.SetCentre (Vector2 newPosition);
```

All element types are subclasses of the `MenuElement` class. To get the true class instance from a `MenuElement` variable, simply cast it:

```csharp
MenuButton myButton = PlayerMenus.GetElementWithName ("MyMenuName", "MyButtonName") as MenuButton;
```

MenuElements can also be used to retrieve information about Unity UI linked to them, for example:

```csharp
MenuInventoryBox myInventoryBox = PlayerMenus.GetElementWithName ("MyMenuName", "MyInventoryBoxName") as MenuInventoryBox;
UnityEngine.UI.Button uiButton = myInventoryBox.GetUIButtonWithItem (inventoryItemID);
```

To simulate the clicking of a MenuElement, use:

```csharp
PlayerMenus.SimulateClick (string menuName, string menuElementName, int slot);
```
If you have modified a Menu's appearance, you may need to recalculate it in order to update its display. To do this call:

```
KickStarter.playerMenus.RecalculateAll ();
```

You can also rebuild the runtime interface by referencing another Menu Manager:

```
KickStarter.playerMenus.RebuildMenus (MenuManager menuManager);
```

Additional instances of Menus can also be created by creating a new instance and copying its data:

```
Menu myMenu = ScriptableObject.CreateInstance <Menu>();
myMenu.CreateDuplicate (menuToCopy);
```

It can then be registered with the PlayerMenus component to have it’s display and interaction handling updated automatically:

```
KickStarter.playerMenus.RegisterCustomMenu (myMenu);
```

And unregistered with:

```
KickStarter.playerMenus.UnregisterCustomMenu (myMenu);
```

If a Menu drawn using Unity UI, then AC will generate an EventSystem to control it (unless one is manually assigned in the Menu Manager). This EventSystem can be read with:

```
KickStarter.playerMenus.EventSystem;
```

Menus have the following custom events:

```
OnGenerateMenus ();
OnMenuTurnOn (Menu menu, bool isInstant);
OnMenuTurnOff (Menu menu, bool isInstant);
OnMouseOverMenu (Menu menu, MenuElement menuElement, int slot)
OnMenuElementClick (Menu menu, MenuElement menuElement, int slot, int buttonPressed);
OnMenuElementShow (MenuElement menuElement);
OnMenuElementHide (MenuElement menuElement);
OnMenuElementShift (MenuElement menuElement, AC_ShiftInventory shiftType);
string OnRequestMenuElementHotspotLabel (Menu menu, MenuElement, int slot, int language);
```
12. Working with Timeline
12.1. Timeline integration overview

Adventure Creator has a number of ways in which it integrates with Unity’s Timeline feature:

- The **Engine: Control Timeline** Action, which can be used to control the playback of Directors.

- The **Remember Timeline** Action, which stores the current playback state of a Timeline in save game files.

- The following custom tracks:
  - **Main Camera**, which allows for the editing of MainCamera shots on a Timeline
  - **Camera Fade**, which allows for camera fading in and out
  - **Speech**, which allows for the triggering of speech on a Timeline
  - **Character Animation 2D**, which animates 2D characters based on their motion
  - **Head Turn**, which controls a 3D character’s head direction

**PROTIP:** From Unity 2018.3 and onward, the **3D Demo** relies on Timeline for its opening and closing cutscenes.

**NOTE:** If Timeline is removed using Unity’s Package Manager, then **ACIgnoreTimeline** must be defined as a **Scripting Define Symbol** in order for AC to compile.
12.2. Timeline playback

The **Engine: Control Timeline** Action can be used to play, pause, resume and stop Playable Director components:

If you wish for your Timeline to be dynamic, or if the objects it animates are spawned in at runtime (like the Player), you can re-bind GameObjects to the various tracks. Checking **Remap bindings?** will bring up a selector field for each of the tracks found, allowing you to re-assign fields as necessary. These fields support ActionList parameters.

**NOTE:** Particularly if you are using a custom motion controller to move your character, you may find that it is necessary to disable certain components, or alter their state, while they are affected by a Timeline. This can be done by hooking into custom events.
12.3. AC Timeline tracks

AC provides the following custom tracks:

- **Main Camera**, which allows for the editing of MainCamera shots on a Timeline
- **Camera Fade**, which allows for camera fading in and out
- **Speech**, which allows for the triggering of speech on a Timeline
- **Character Animation 2D**, which animates 2D characters based on their motion
- **Head Turn**, which controls a 3D character’s head direction
- **Shapeable**, which controls a Shapeable component
12.3.1. Main Camera tracks

The Main Camera track allows you to edit the MainCamera's position when a Timeline is running. It is available under AC --> Main Camera Track when creating a new track:

The MainCamera works by snapping itself to the various camera types you define in your scene – usually with the Camera: Switch Action. With this track, you can override this default behaviour and have it snap to cameras in the Timeline. Both snap-cutting and transitioning are supported.

When a clip is created in the track, you can assign which camera the MainCamera attaches itself to via the Game Camera field in its Inspector:

Alternatively, you can create a clip already mapped to a camera by right-clicking in the track and choosing Add From Camera from the context menu.

The clip's Inspector also allows you to set an optional Shake intensity, which will shake the MainCamera during that clip. This effect will only run at runtime – not in Edit mode.

When the Timeline ends, or when there is no shot at the current point in time, the MainCamera will revert back to its usual behaviour – unless Sets camera after running? is checked in one of the track Inspectors.

**NOTE:** Only one track of this type should exist in a given Timeline, and only one track of this type should run at any one time.

**PROTIP:** Set in the track's Inspector, this track type can optionally call the OnSwitchCamera custom event.
12.3.2. Camera Fade tracks

The Main Camera track allows you to fade the camera in and out when a Timeline is running. It is available under AC -> Camera Fade Track when creating a new track in the Timeline window:

Each clip on this track requires an Overlay texture – this should be a pure black texture for a black fade. The texture is assigned in the clip’s Inspector:

This texture will be overlaid on top of the game view when the clip is active. To create the fade in effect, set the clip’s Ease In Duration value:

Similarly, to fade out, set the clip’s Ease Out Duration value.
12.3.3. Speech tracks

The Speech track allows you to trigger character (and narrator) dialogue when a Timeline is running. It is available under AC -> **Speech Track** when creating a new track in the Timeline window:

All clips within a single track will be spoken by the same character. The character that speaks its lines is set within the track's Inspector:

Unless the speaking character is the default Player, you must assign them as a prefab into the **Speaker prefab** field. This allows the Timeline to be run from any scene without having to rebind it – since the speaking character will rely on the prefab's Constant ID value to identify them in the current scene. For more on Constant IDs, see **Saving scene objects**.

When a clip is created in the track, you can enter in the speech line's text in its Inspector:

This text will be included for translation when gathering game text, so long as it is referenced by a Playable Director or **Engine: Control Timeline Action**. **Speech audio** will also play automatically.
The Speech track has two playback modes, set in the track's Inspector:

**Natural**
In this mode, speech lines will last for as long as they would if played via the Dialogue: Play speech Action. Clip length will have no bearing on playback – only the clip start point will. Subtitle scrolling and display options in the Speech Manager will affect its duration.

**Clip Duration**
In this mode, speech lines will last for the duration of their associated clip. This gives you precise control over when a line is displayed in relation to other elements in the Timeline.

**NOTE:** Only one track per character should be defined in any given Timeline.

Speech tracks can be previewed in the Game window when the game is not running. To do this, you must first make sure that a Menu that can display subtitles exists in your Menu Manager. The default Subtitles Menu is one such Menu.

Next, enter the name of this Menu into the Speech Manager's Subtitle preview menu field:

![Speech Manager Subtitle preview menu](image)

This menu will then be used to preview speech tracks while in Edit mode.

**NOTE:** Speech skipping is prevented when played from a Timeline.

**PROTIP:** Only Adventure Creator menus can preview speech tracks. If the supplied preview menu uses Unity UI, it will temporarily switch Source to Adventure Creator.
12.3.4. Character Animation 2D tracks

When controlling 3D characters in Timeline, Unity's Root Motion feature allows their positions to be updated automatically based on their animation. For example, when playing a walking animation, they'll automatically move forward.

Since Root Motion is not available for 2D, however, this is not an option for sprite-based characters. As an alternative, the Character Animation 2D track offers the opposite approach: when characters move, their animations will update to match their changing position.

It is available under AC -> Character Animation 2D Track when creating a new track in the Timeline window:

Assign the character by binding them to the track:

**NOTE:** For this to be able to control a character, they must have Turn root object in 3D? unchecked in their Inspector. Also note that if the character is moved using an Animation track, the character’s root object must be moved – not the sprite child.

While a clip from this track is active, it will cause the character's walk or run animation to play as they move around the scene. By default, they will turn to face the direction of the motion, but this can be overridden by the Face fixed direction? option. This option can also be used to turn stationary characters.

**NOTE:** This track type does not support previewing.
12.3.5. Head Turn tracks

This track type allows you to assign a Transform that a 3D character faces turns their head towards. The character must be animated with Mecanim and support IK head-turning. A offset vector, in the Transform’s co-ordinate space, can optionally be applied as well.

To support IK head-turning, the character needs to have Use IK for head-turning? checked in their Inspector, and have IK Pass enabled in their Animator’s base layer.

This track is assigned per-character, and each clip requires a Transform to be assigned. When the clip is played, the character’s head will turn to that Transform with an influence equal to that clip’s weight.

⚠️ NOTE: This track type does not support previewing.
12.3.6. Shapeable tracks

This track type allows you to control the value of a Blendshape in a Skinned Mesh Renderer, by setting the active key of a Shapeable component.

Shapeable components allow the grouping of a model’s Blendshapes, so that changing the value of a particular shape will inversely affect others in the same group. This is particularly useful when using Blendshapes to animate a character’s expressions, since other expression shapes can be disabled automatically when one is animated.

This track type is bound to a Shapeable component. In each track’s Inspector, you can define the Group and Key you wish to affect, as well as its intensity. Multiple tracks can be blended together, provided they affect the same Shape Group.

⚠️ NOTE: This track type does not support previewing.
12.4. Timeline scripting

Timeline features the following custom events:

- `OnCharacterEnterTimeline (Char character, PlayableDirector director, int trackIndex);`
- `OnCharacterExitTimeline (Char character, PlayableDirector director, int trackIndex);`
Chapter III: Extending functionality
13. Integrating new code
13.1. Supported third-party assets

Adventure Creator can be integrated with a number of other Unity assets out-of-the-box. To allow AC to “talk to” these assets, it is necessary to add a particular Scripting Define Symbol to your Player settings – this is just a piece of text that tells AC that it can safely run certain lines of code without causing errors.

To add a Scripting Define Symbol, choose Edit → Project settings → Player from the top toolbar, and add the symbol in the text box underneath Scripting Define Symbols. Multiple symbols can be placed in this box – just separate them with a semicolon (;).

Below is a list of third-party Unity assets that can be integrated with Adventure Creator, together with their respective symbols. For unofficial integrations between AC and other assets, see the Integrations section of the AC wiki.

**2D Toolkit**

**Description**
2D Toolkit is an alternative sprite animation system to Unity's built-in 2D system, and can be used to animate Characters. For more, see Character animation (Sprites 2D Toolkit).

**Web address**
www.unikronsoftware.com/2dtoolkit

**Scripting define symbol**
tk2DIsPresent

**Cinema Director**

**Description**
Cinema Director is a timeline-based cutscene tool that can be used to make complex cinematics. The ThirdParty: Cinema Director Action can be used to trigger Cinema Director cutscenes within ActionLists.

**Web address**
https://assetstore.unity.com/packages/tools/visual-scripting/cinema-director-timeline-cutscene-editor-19779

**Scripting define symbol**
CinemaDirectorIsPresent
FaceFX

**Description**
Face FX is an industry standard application that produces automatic facial animation based on audio. For more, see [FaceFX integration](unitydemos.facefx.com.s3.amazonaws.com/FaceFXBonesMorph.unitypackage).

**Web address**
unitydemos.facefx.com.s3.amazonaws.com/FaceFXBonesMorph.unitypackage

**Scripting define symbol**
FaceFXIsPresent

Playmaker

**Description**
Playmaker is a popular visual scripting system for Unity. Adventure Creator can call Playmaker Events with the ThirdParty: PlayMaker Action. Global Variables can also be linked to Playmaker's Variables – see [Linking with Playmaker Variables](www.hutonggames.com).

**Web address**
www.hutonggames.com

**Scripting define symbol**
PlayMakerIsPresent

Rogo Digital LipSync

**Description**
Rogo Digital LipSync is a 3D lip-syncing Unity asset. AC can play lipsync animations generated by this asset when characters speak – see [Lip syncing](https://lipsync.rogodigital.com/).

**Web address**
https://lipsync.rogodigital.com/

**Scripting define symbol**
RogoLipSyncIsPresent
SALSA With RandomEyes

Description
SALSA With RandomEyes is a 2D and 3D lip-syncing Unity asset. While 3D characters made in Adventure Creator can make use of Salsa’s 3D component without conflict, 2D characters require special set up – see Lip syncing.

Web address
crazyminnowstudio.com/projects/salsa-with-randomeyes-lipsync/

Scripting define symbol
SalsalsPresent

Text Mesh Pro

Description
Text Mesh Pro is a free asset, included with Unity 2018.1 and later, which allows for crisp text rendering. Menus drawn with Unity UI can be made to rely on the TextMeshProUGUI component as an alternative to the standard Text component – see Unity UI menus.

Web address
https://docs.unity3d.com/Manual/com.unity.textmeshpro.html

Scripting define symbol
TextMeshProIsPresent

NOTE: Incorporating the above scripting define symbol will reset all references to regular Text components – and all UI canvases, including those used by the default interface, will not work correctly until they have been replaced with TextMeshProUGUI components. Therefore, it is recommended to first back up your project beforehand.

Ultimate FPS v1

Description
Ultimate FPS is a popular first-person control system for Unity – see Ultimate FPS integration. Note that this applies to the legacy UFPS asset – for UCC, see the wiki.

Web address
www.visionpunk.com

Scripting define symbol
UltimateFPSIsPresent

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13.2. Custom scripting

PROTIP: A community-led scripting resource for AC can be found at the AC wiki.

Custom scripting in AC games can either involve calling non-AC scripts from within AC, or by calling AC functions and variables from non-AC scripts.

To call non-AC scripts from within AC, you can use the Object: Send message and Object: Call event Actions. Both of these Actions can be used to invoke functions in scene scripts. Note that function parameters cannot be set when using the Object: Call event Action – this is a limitation of Unity's Editor tools.

You can also write your own Actions that plug into the ActionList system – see Custom Actions.

Custom code can also be called when AC performs common tasks – see Custom events.

All of AC's scripts use the AC namespace. To reference them, you will need to include this in your script. This can be done by beginning your script with:

```csharp
using AC;
```

A reference for AC's entire API is available in the online Scripting Guide. This guide gives descriptions for all classes, and public functions and variables.

PROTIP: The reference page for each component can be easily accessed by clicking the “Help” icon in the upper-right corner of its Inspector.

GameEngine and PersistentEngine components can be accessed via static variables in KickStarter. For example:

```csharp
KickStarter.playerInput
KickStarter.stateHandler
```

Similar variables also exist for the MainCamera and Player objects:

```csharp
KickStarter.mainCamera
KickStarter.player
```

And also for Managers:

```csharp
KickStarter.settingsManager
KickStarter.variablesManager
```

PROTIP: An API reference to any Manager field can be shown by right-clicking the field's label.
To determine if the game is in regular gameplay, cutscene, or paused, read:

```csharp
KickStarter.stateHandler.IsInGameplay ();
KickStarter.stateHandler.IsInCutscene ();
KickStarter.stateHandler.IsPaused ();
```

NOTE: To force the game into Cutscene or Pause mode, Interaction scripting.

AC’s startup processes include the following events:

```csharp
OnInitialiseScene ();
OnAddSubScene (SubScene subScene);
OnManuallyTurnOnAC ();
OnManuallyTurnOffAC ();
```

When a log is made to the Console, it can be read or modified with the event:

```csharp
object OnDebugLog (object message, DebugLogType debugLogType, Object context, bool isDisplayed);
```

System-specific coding help is given at the end of each section:

- Character scripting
- Camera scripting
- Interaction scripting
- Inventory scripting
- Variable scripting
- Save scripting
- Speech scripting
- Menu scripting

NOTE: As Managers are asset files, changes to them through code will survive game restarts. Therefore, separate code that runs when the game begins to set any such fields to their default values.

NOTE: To force the game into Cutscene or Pause mode, Interaction scripting.
13.3. Custom events

AC calls a number of events at specific times at runtime – for example whenever a character speaks, or the mouse hovers over a Menu element.

These events can be listened to by custom scripts, to aid in the integration of third-party assets or added-on features. When doing so, AC's functionality is not changed: these listeners simply run more code on top.

For example, the following events are called whenever the "game state" (i.e. normal mode, cutscene mode, etc) is changed:

```csharp
OnExitGameState (GameState oldGameState);
OnEnterGameState (GameState newGameState);
```

Events are defined in the EventManager script. A custom function can listen in by referencing it:

```csharp
void OnStart ()
{
    EventManager.OnEnterGameState += My_OnEnterGameState;
}
```

The custom listening function must match the event's parameters. For example, `OnEnterGameState` requires a `GameState` variable:

```csharp
void My_OnEnterGameState (GameState newGameState)
{
    Debug.Log ("The new gamestate is " + newGamestate);
}
```

A list of relevant events is provided at the end of each section:

- Character scripting
- Camera scripting
- Interaction scripting
- Inventory scripting
- Variable scripting
- Save scripting
- Speech scripting
- Menu scripting
- Timeline scripting

All events, together with descriptions, can also be found in the Scripting guide.

PROTIP: A tutorial on working with custom events can be found online, and another example can be found in Camera effects.
13.4. Integrating other gameplay

While Adventure Creator is intended primarily for traditional adventure games, other gameplay mechanics (such as combat, driving, etc) can be added on through careful integration of other assets or custom scripts. However, as each such game is unique, the procedure to do so is also unique – so it is important to understand how AC is designed before doing so.

First, it is strongly recommended to have a solid understanding of how AC works when used by itself. The multi-hour tutorial videos can provide this, and watching all of them will give you a good all-round knowledge of AC’s workflow regardless of the perspective or gameplay your game will ultimately have.

AC will only operate in any Unity scene that contains an instance of its GameEngine prefab – which keeps track of settings about the scene. This is generated automatically when you use the Scene Manager.

When the first such scene is run, the GameEngine will spawn an instance of AC’s PersistentEngine prefab – which keeps track of your player’s progress and any game-wide settings. If you then switch to a “non-AC” scene (i.e. one without a GameEngine) the PersistentEngine will go to sleep, and will only reawaken when you enter an AC scene again.

Therefore, if you want to keep your adventure game elements and non-adventure (e.g. combat) elements in separate scenes, then it is generally quite simple to make a game that shares the two.

It is also possible to send AC to sleep at any point – even in an AC scene – by calling the Kickstarter script’s static TurnOffAC function:

```csharp
AC.Kickstarter.TurnOffAC();
```

This will cause all of AC's Update, LateUpdate, OnGUI and FixedUpdate calls to cease until the script's TurnOnAC function is called:

```csharp
AC.Kickstarter.TurnOnAC();
```

This approach would be suitable if you wanted to disable AC entirely midway through a scene, and re-enable it later on.

If, however, you want a more closely-merged integration – for example, replace AC gameplay with combat but retain AC’s Menu system – you can use the Engine: Manage systems Action to selectively disable any of AC's systems. To prevent movement and interactions, for example, you would use this Action to disable the Movement and Interaction systems, and re-enable them at a later time.
Disabling individual systems will prevent them from being updated – so if a character is in the middle of walking, for example, then will only stop if you command them to with the **Character: Move along path** Action. The same goes for ActionList, which can be halted at anytime using the **ActionList: Kill** Action.

**PROTIP:** AC's scene-loading and data-restoration operations are called from Start functions. If you have custom code that depends on this in a Start function as well, you'll need to give its script's **Script Execution Order** a negative value to ensure that it runs first. Alternatively, you can hook into the **OnInitialiseScene** custom event.
14. Further considerations
14.1. Game debugging

Adventure Creator has a few features that aid in debugging:

A status box that displays the current Player, camera, running ActionLists and game state can be made to appear in the Game window. This can be enabled via the Show ‘AC Status’ box field under Debug settings in the Settings Manager.

Actions can be marked as breakpoints, causing the Unity Editor to pause just before they are run – allowing the user to check the state of a scene at that point in time. Actions can be toggled as breakpoints via their context menu to the top–right of their node – see The ActionList Editor.

Actions can also be commented from within the ActionList Editor window, by clicking the cog in their top–right corner. These comments can be printed in the Unity Console by Print Action comments in Console?, also in the Settings Manager.

When dealing with general gameplay and player issues, a good first step is to temporarily rely on assets from one the two provided demo games (depending on your game's chosen perspective). For example, the following sequence of tests can help determine the source of an issue with a player character:

- Try dropping the demo game's player prefab into your scene file and run it. If they run correctly, then the issue is likely with your character, and you can compare this prefab with your own to find the key difference.

- If not, try loading the demo game, drop your own player prefab into the demo scene, and run it. If it then runs correctly (missing cutscene animations notwithstanding), then the issue is likely with your scene.

- If not, Manager asset files can be swapped with demo counterparts in the Game Editor window. These can be changed individually (the main being the Settings Manager) or all at once. This may help to identify an issue with one of your Managers.

**NOTE:** Always be sure to re-assign your game's own Managers after testing. They can be re-assigned in bulk by double-clicking the ManagerPackage asset file that the New Game Wizard creates in your game's subfolder.

When dealing with issues with save–game files, it's possible to read all data associated with a given file – see Save–game file management.
14.2. Performance and optimisation

AC is designed with performance in mind. Depending on your game type, however, there are some tricks you can employ to further boost performance:

Stream music and ambience tracks
Music and ambience tracks are loaded when an AC game begins, so the amount of such data present will have a big impact on initial loading time. For all such such tracks, it is therefore recommended to check Load In Background and enable Streaming in their AudioClip Inspectors.

Speech audio AssetBundles
If your game relies on speech audio, it is recommended to rely on AssetBundles to store audio and lipsync files. For more, see Speech audio in AssetBundles.

Scene asset bundles
If you make use of Unity's Asset Bundles feature, AC can open scenes that have been loaded from an Asset Bundle rather than added to Unity's Build Settings. Provided that you have a means to load your Asset Bundles before AC requires them, this feature allows you to pack chunks of your game into bundles, so that they do not contribute to the game's initial loading times. To allow for this, set the Settings Manager's Reference scenes by field to Name, and then refer to your scenes in Actions and PlayerStarts by scene filename, rather than build index number.

Scene addressables
As an alternative to placing scenes in Asset Bundles (above), scenes can also be opened directly if they are marked as Addressable. This, too, allows scenes to be omitted from Unity's Build Settings. To allow for this, set the Settings Manager's Reference scenes by field to Name, check Load scenes asynchronously?, and then check Load scenes from Addressables?. Unity's Addressables package will need to be installed via Unity's Package Manager, and "AddressableIsPresent" will need to be entered as a Scripting Define Symbol in Unity's Player settings. Once done, you can then refer to a scene by its Addressable name in Actions and PlayerStarts.

Use SimpleCamera types
When creating cameras in 3D games, the SimpleCamera offers the best performance. Use this type whenever a camera does not need to move.

Auto-create the PersistentEngine
The PersistentEngine is a scene–independent object that is required for an AC game to run. By default, this is generated by spawning an instance of the PersistentEngine prefab – which is located in Adventure Creator's Resources directory. If you have no need to attach your own scripts to this prefab, you can have AC instead generate this
object from scratch, removing the need to search Resources upon startup. To do this, uncheck **Spawn PersistentEngine prefab from Resources?** in the Settings Manager.

**Cache Camera.main**
Unity's Camera.main property is called often with AC, but is an expensive operation if a scene has many cameras. If **Cache ‘Camera.main’?** is checked in the Settings Manager, this property will be cached. However, this cache may need updating if the main camera is not AC's, and/or it is changed at runtime. This can be done by setting the value of:

`AC.Kickstarter.CameraMain`

**Define all Input axes**
The Settings Manager will list your game's available Input Axes based on the settings chosen. By default, AC will perform try/catch statements to avoid errors if these inputs are not define. If the **Assume inputs are defined?** option beneath this list is checked, these statements will be ignored. The Inputs will be need to be present in Unity's Input Manager, but performance to the game will be increased.

**Use Addressables for asset references**
When loading save game files, AC will – by default – search your game's Resources folder for asset files that may be referenced by your save data. However, it is more performant to rely on Unity’s Addressables system instead – see Saving asset references.

**Use Addressables for menus**
Unity UI prefab Menus can also be loaded in via Unity's Addressable system. Checking **Use Addressables for UI prefab references?** at the top of the Menu Manager will replace all Linked Canvas prefab fields with Canvas asset key fields, where the name of the prefab’s Addressable key should be entered. Unity's Addressables package will need to be installed via Unity's Package Manager, and "AddressableIsPresent" will need to be entered as a Scripting Define Symbol in Unity's Player settings.

**Use Resources subfolders**
If you are not using Addressables for asset references (see above), then assets must be instead placed in Resources folders. Normally, this is performed by searching for all such assets with a **Resources.LoadAll()** function call. This is an intensive operation, and can be an issue particularly on mobiles, if you have many such assets in a Resources folder.

To get around this, you can place such assets in specially–named subfolders within your Resources folder. If such subfolders are found, then AC will only search them – which can lower the memory usage considerably if you have many files to search. This can be done by placing your Resources assets in the following folders:

- SaveableData/Textures – for Texture2D assets
- SaveableData/Audio – for AudioClip assets (this excludes speech audio)
- SaveableData/Animations – for AnimationClip assets
- SaveableData/Animators – for AnimatorController assets
- SaveableData/Materials – for Material assets
- SaveableData/ActionLists – for ActionList assets
- SaveableData/Prefabs – for GameObject prefabs (asset with a Transform component)
- SaveableData/VideoClips – for Video Clip assets (Unity 5.6 and later)
- SaveableData/Timelines – for Timeline assets (Unity 2017.1 and later)

For full optimisation, you should create subfolders with these names even if you have no relevant assets to place in them, and place a “dummy” asset inside of each – for example, a single AudioClip inside “SaveableData/Audio”. Note that once these subfolders exist, however, all such assets must be placed in them correctly for AC to be able to find them.

**Disable OnGUI**

Menus that have their Source property set to Adventure Creator are drawn with Unity's OnGUI calls. If your game relies on Unity UI-sourced Menus, or no Menus at all, then removing the OnGUI call can give a performance boost – particularly on mobile. The OnGUI call can be removed by entering `ACIgnoreOnGUI` as a Scripting Define Symbol.

Be aware, however, that OnGUI is also used by AC for drawing camera effects and Software cursors – though the latter can be corrected by changing your *Cursor rendering* to **Hardware** in the **Cursor Manager**. If the OnGUI code required only some of the time, it can be run manually by calling the StateHandler script's `OnGUI()` function:

```csharp
AC.Kick Starter.stateHandler._OnGUI ();
```

**Disable Character evasion**

If your game is in 2D, then the Navigation Mesh Inspector, which is used by 2D NavMeshes, has a number of options that can aid performance. Setting **Character evasion** to **None** will reduce the number of pathfinding calls, and the **Accuracy** slider can be reduced. As the latter will affect the accuracy of pathfinding, it is best to experiment while the game is running to find the optimum value.

**Disable Console logs**

AC will output log messages to the Console when necessary – this may be frequent if there is something wrong with your game. Such messages can impact performance. While you should always check the Console for AC’s messages, these logs can be disabled completely by switching **Show logs in Console**? to **Never** in the Settings Manager.

**Use Timeline for cutscene animation**

Rely on Unity's own **Timeline** feature to handle character animation during cutscenes when possible, particularly if your characters rely on the *Sprites Unity* animation engine. Animator controllers that hold many animations can increase load times, so removing “one off” animations that play at controlled moments and playing them via Timeline
assets can boost performance. Timeline tracks can be played via the Engine: Control Timeline Action.

Remove the border camera
If Aspect ratio is enabled in the Settings Manager, then a second “Border camera” will be used to render letterboxing/pillarboxing bars. This can lower framerates – particularly when using HDRP – but is there to safeguard against glitch artefacts. This may not always be necessary, however, and can be disabled by unchecking Render border camera? further down.

Use an Assembly Definition file
To speed up script compilation times when updating non–AC scripts, create an Assembly Definition file in AC's Scripts folder. Adventure Creator's scripts use the "AC" namespace, and requires Unity's Timeline listed as an "Assembly Definition Reference". A separate Editor .asmdef file is not required.
14.3. Version control and collaboration

When collaborating, rely on ActionList assets over scene-based ActionLists (such as Cutscenes) whenever possible. Hotspots, Conversations and other components that reference Actions each have an Actions source field. Setting this to Asset File allows you to make use of an ActionList asset instead of a scene-based Action.