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# User Manual

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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](#).

AC has two types of tutorials:

- [Text tutorials](#), which focus on individual aspects and features, and are the quickest way to get up and running.
- [Video tutorials](#), which focus on the main aspects using practical examples, and are best for getting a good overview of how AC works.

The video tutorials available are described below:



## 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.



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

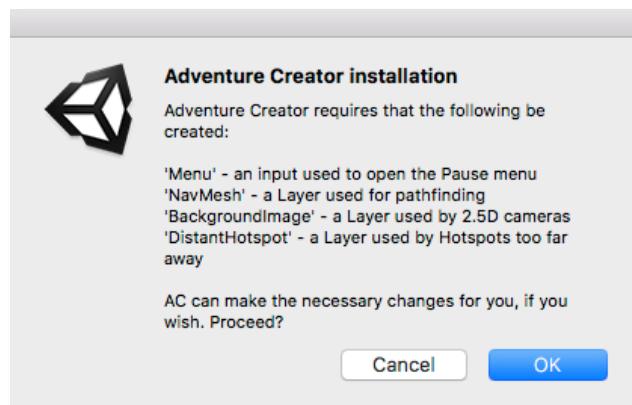
## 1.1. Installation

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

 **PROTIP:** Depending on your chosen play-style, more inputs may need defining. AC will

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. This will open when Unity is launched, but this behaviour can be disabled.



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](#).

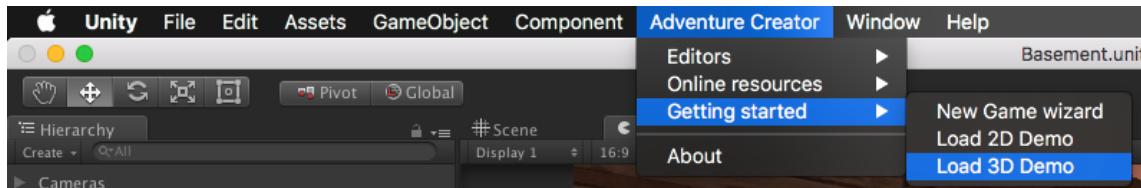


**PROTIP:** By default, AC will be imported into a directory inside the project's Assets folder named AdventureCreator. It can be moved elsewhere (e.g. to a Package), so long as its location is updated in the Adventure Creator section of Unity's Project settings.

## 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:

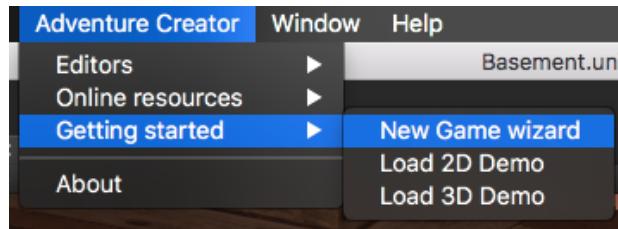


Each game made with AC requires its own set of Managers, which are explained in the [next section](#). While a demo scene is opened, its Managers are temporarily loaded into the AC Game Editor window. Closing the scene will cause your own Managers to be reappear.

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 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:



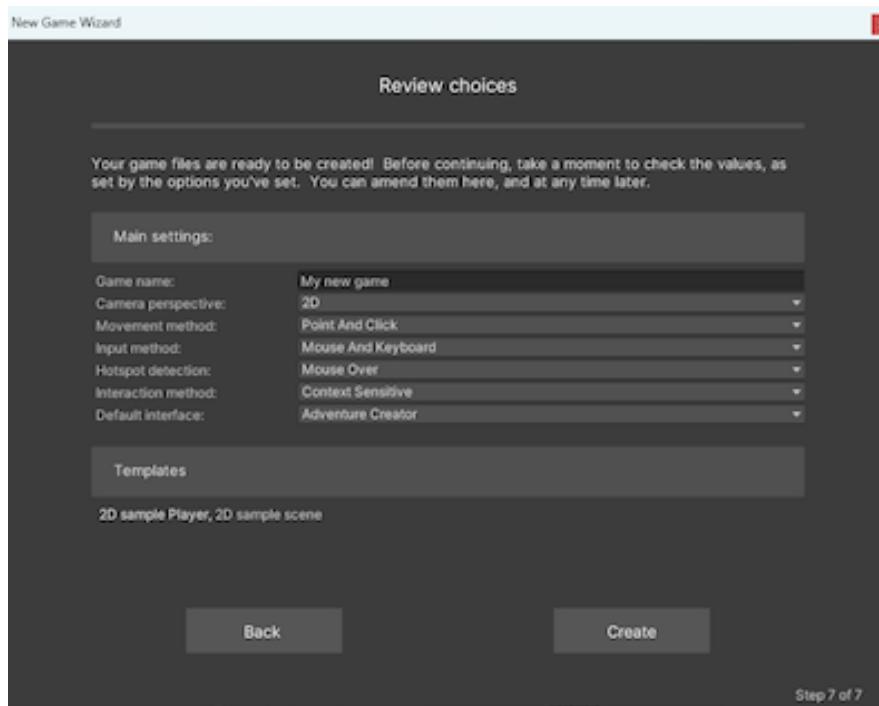
In the window that then appears, click **Begin** and then **New game** to get started. You will then be presented with a series of choices - such as camera perspective and movement style - that will be used to configure your starting assets.



**PROTIP:** The choices made in the wizard are mainly there to help you get started: your Managers can be edited further as needed afterwards.

Based on your choices, the wizard may then present you with a series of optional [Templates](#) to install as well.

On the last page, you will be given a chance to review these details before creation:

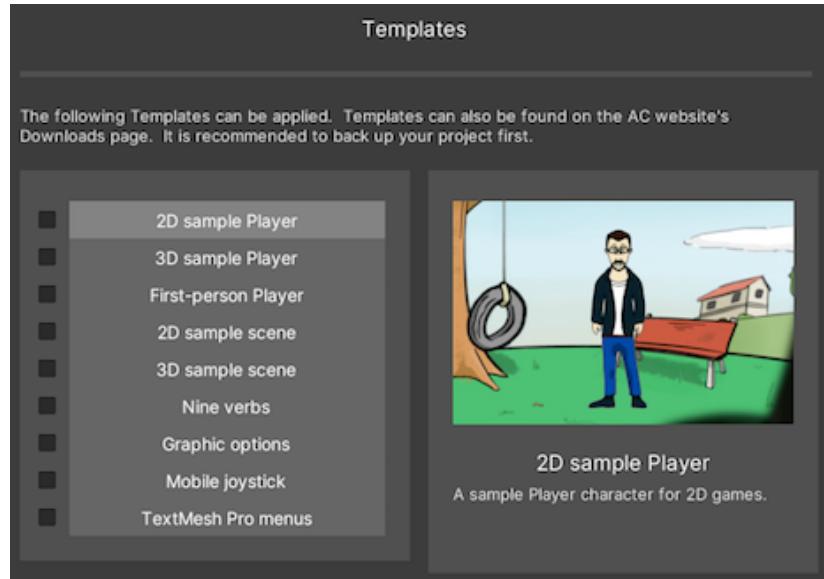


Click **Create**, and your game's files will be created in a new subfolder in your Project window. If you opted to also install a sample scene, that will be opened as well.

To begin creating your game, open a new scene and use the [Scene Manager](#) to initialise it.

### 1.3.1. Templates

To help get you up and running more quickly, AC includes a number of Templates that can extend your game with additional features or behaviour. These can be accessed from the [New Game Wizard](#), and are filtered based on your earlier choices:



**PROTIP:** After creating your Managers, you can return to the New Game Wizard and choose **Modify existing** to access all Templates without filtering.

The following Templates are available:

#### 2D sample Player

A sample Player character for 2D games. This uses the [Sprites Unity](#) animation engine, and are equipped with a Hotspot Detector for optional [Player-vicinity detection](#). When installed, they will be assigned as the default Player in your [Settings Manager](#).

#### 3D sample Player

A sample Player character for 3D games. This uses the Mecanim animation engine, and are equipped with a Hotspot Detector for optional [Player-vicinity detection](#). When installed, they will be assigned as the default Player in your [Settings Manager](#).

#### First-person Player

A sample Player character for [First-person](#) games. This uses a custom animation set for camera motion, and also includes a crouching ability that can be invoked with the Crouch input button. When installed, they will be assigned as the default Player in your [Settings Manager](#).

## **2D sample scene**

A small sample 2D scene, that demonstrates [Cutscenes](#), [Polygon Collider pathfinding](#), [Sorting Maps](#), [2D GameCameras](#), [Hotspots](#), [Triggers](#), [Conversations](#) and [Variables](#). These features are commented on in the Console as you play - keep the window open to learn more about them. When installed, this scene will be opened automatically.

## **3D sample scene**

A small sample 3D scene, that demonstrates [Cutscenes](#), [Unity Navigation pathfinding](#), [GameCameras](#), [Hotspots](#), [Triggers](#), [Conversations](#) and [Variables](#). These features are commented on in the Console as you play - keep the window open to learn more about them. When installed, this scene will be opened automatically.

## **Nine Verbs interface**

Replaces part of the default menus to provide a classic 'Nine verbs' interface, in the style of LucasArts adventure games in the 90s. Because of the extra space needed at the bottom of the screen, you may wish to lower your GameCamera's vertical offset to better see the Player.

## **Graphic options**

Provides a 'Graphic options' menu, that can be used to configure the game's resolution, quality preset and more. Optionally, it can also provide a button to access this inside your existing [Options](#) menu.

## **Input System integration**

Provides an integration for Unity's [Input System](#) package. Upon installation, a custom Event System will be assigned at the top of the [Menu Manager](#), which references a Controls input actions asset where inputs can be defined. An Inputs menu will also be added, which can be used to remap inputs by the user at runtime.

## **Title screen**

Provides a 'Title screen' scene and menu, which includes "New game" and "Continue" options for the player to begin the game from, as well as access to the default Load and Options menus. To change which scene is opened when running a new game, edit the generated [Title\\_NewGame\\_OnClick ActionList asset](#).

## **Mobile joystick**

Provides an on-screen joystick that can be used to control the Player and camera on mobile devices. Its appearance can be tweaked, and additional buttons added, by editing the [JoystickUI](#) prefab it generates.

## **TextMesh Pro menus**

Converts all Unity UI-based Menus currently in the [Menu Manager](#) to use [TextMesh Pro](#) instead. This involves replacing [Text](#) components with their [TextMesh Pro - Text \(UI\)](#) counterpart. TextMesh Pro will need to already be imported into the project via Unity's [Package Manager](#).

### **Animated cursor**

Renders the cursor using [Unity UI](#), allowing for playback of some simple animations when hovering over Hotspots, or selecting Inventory items.

### **Cutscene borders**

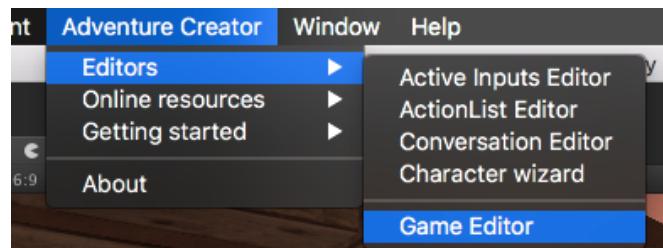
Renders black borders at the top and bottom of the screen during cutscenes. To prevent them from showing automatically, use the [Menu: Change state Action](#) to lock the **CutsceneBorders** menu.

## 1.4. The Game Editor window

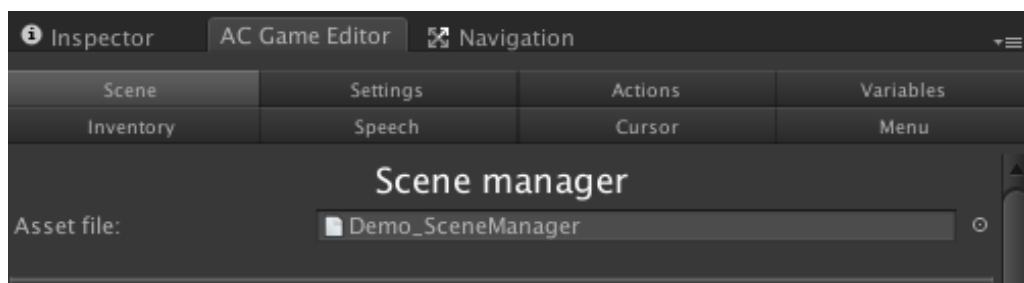
All games made with AC have eight “Managers” - asset files that each control a different aspect of the project. For example, the Inventory Manager holds all inventory items the player can pick up:

- 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:

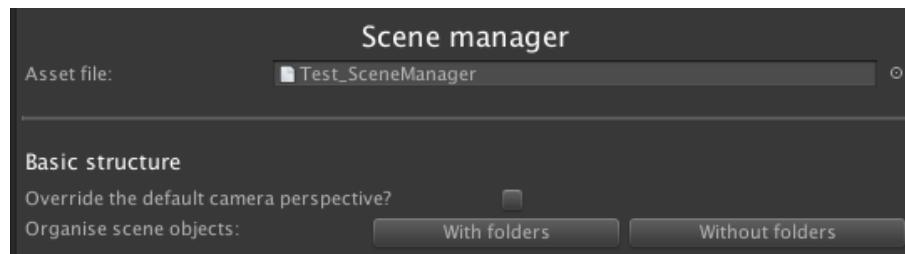


If you keep this window open when loading either of the demo games, you’ll see that each demo has its own set of Managers. You can create your own using the [New Game Wizard](#).

### 1.4.1. The Scene Manager

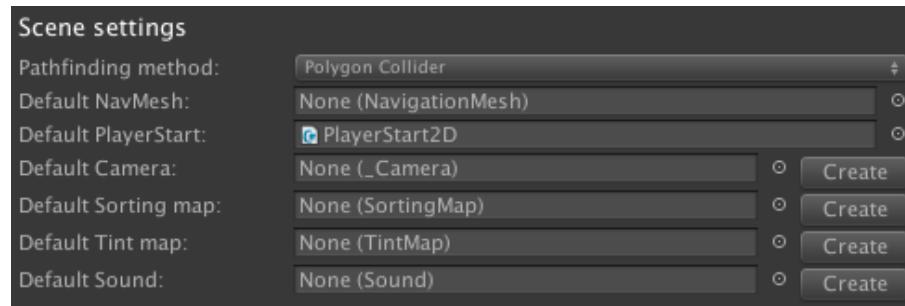
The Scene Manager exposes settings unique to the open scene, and allows for the handling and creation of AC objects in your Hierarchy. It is this Manager that is used to convert a “regular” Unity scene into an “AC” one.

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:

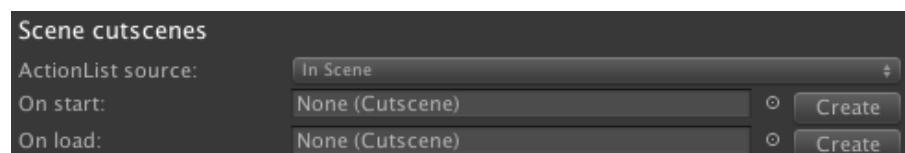


Once either is chosen, a GameEngine will be added and the rest of the Scene Manager will be revealed in the form of five sub-sections:

#### 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

These are where the scene’s three “automatic” **cutscenes** are defined. **On start** will run whenever the scene begins through natural gameplay, while **On load** will run whenever the scene is switched to after loading a save game or [player-switching](#). 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. Click an object type to create a new instance of it. Hovering over an object type will bring up a description, and right-clicking will display a list of existing instances of that type 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 depend on what [Camera perspective](#) your game uses. The following is a brief run-down of what each prefab type is for:

## Camera



### Standard

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



### Array

A camera that interpolates between multiple sub-cameras based on the target's position.



### Third-person

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



### Stationary

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.



### Standard (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.



### Drag

A camera that can be dragged around using the mouse.



### 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 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.



### Random Marker

A Marker that describes a volume - using either a Box or Sphere Collider - of which a point will be chosen at random when referenced by the Character: Move to point Action.



### Random Marker 2D

A Marker that describes an area - using either a Box 2D or Polygon Collider - of which a point will be chosen at random when referenced by the Character: Move to point Action.



### 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 2D

A polygon that defines the area that characters can use when pathfinding in 2D scenes.

## 1.4.2. 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 to 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.

### 1.4.3. 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](#).

## 1.4.4. 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.

## 1.4.5. 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 categories, which are a way of grouping Inventory items, Documents, or Objectives 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](#).

## 1.4.6. 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 matched 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](#).

## 1.4.7. 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 subsections:

### **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.

## 1.4.8. 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 sub-sections:

### 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.

## 1.5. 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.

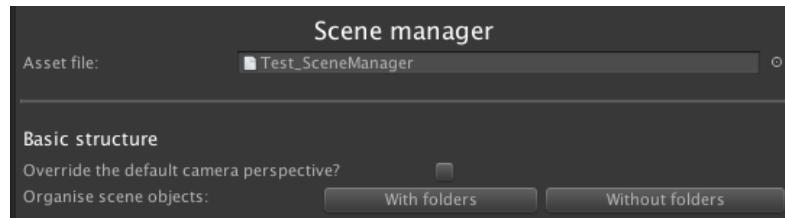
Creating a scene for a 3D game typically consists of five steps:

- [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.

### 1.5.1. Adding a PlayerStart

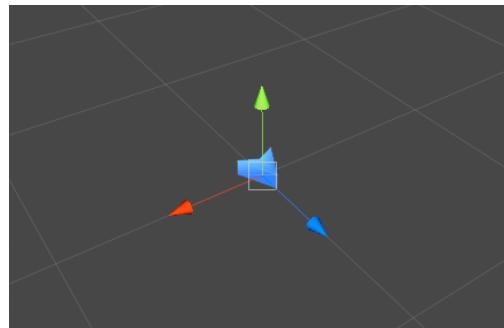
With a new scene, the top of the Scene Manager will have two **Organise scene objects** buttons: **With folders** and **Without folders**:



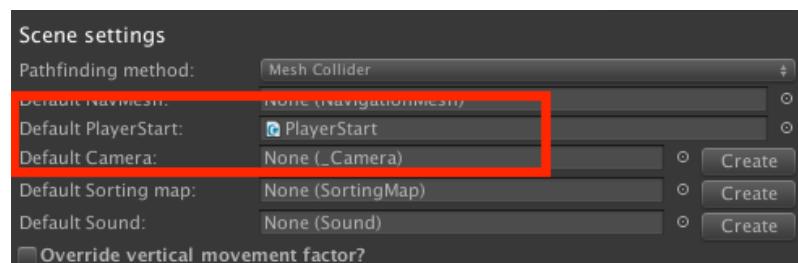
Both of these buttons will set up your scene to be useable by Adventure Creator – the only difference is whether or not “helper” folders (empty GameObjects) will also be created to help keep things organised. As you use the Scene Manager to create Hotspots, Conversations and other prefabs, it will place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

## 1.5.2. 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.



**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.

### 1.5.3. 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.

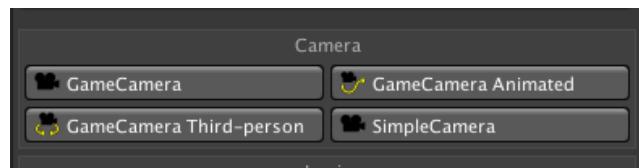


**PROTIP:** The 3D Demo game has wall colliders even though it uses point-and-click movement. This is so that you can experiment with different movement types in the scene to see which one suits your own game.

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**.

## 1.5.4. 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:



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.

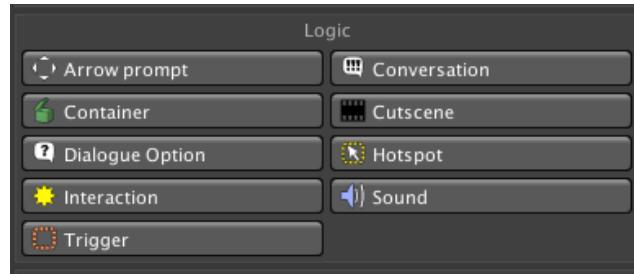
### 1.5.5. Adding interactivity

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.

## 1.6. Preparing a 2D scene

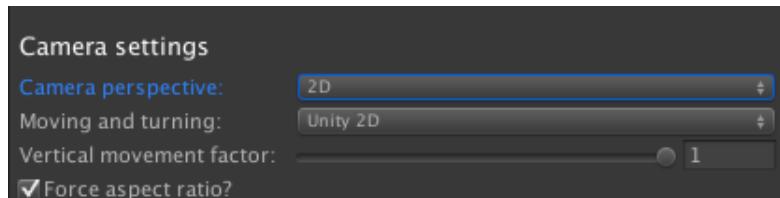
After creating your Managers with the [New Game Wizard](#), you are ready to begin creating your scenes. The [Game Editor](#) window is best docked in a tall vertical pane when working.

**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 uses 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](#)).

### 1.6.1. 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**:

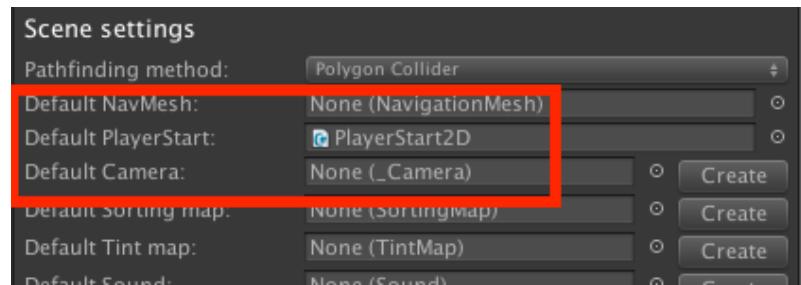


Both of these buttons will set up your scene to be useable by Adventure Creator – the only difference is whether or not “helper” folders (empty GameObjects) will also be created to help keep things organised. As you use the Scene Manager to create Hotspots, Conversations and other AC prefabs, it will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



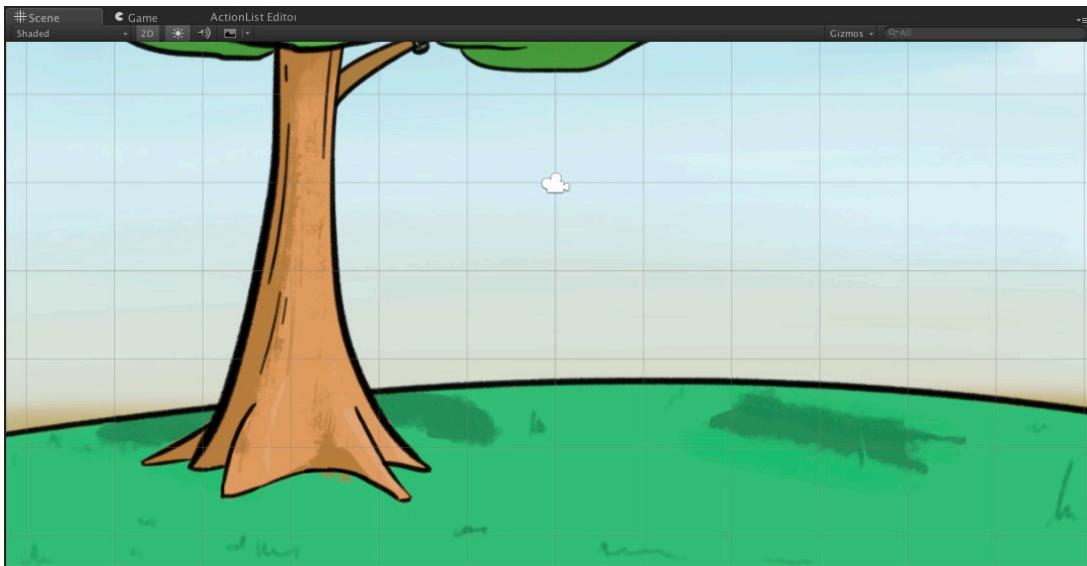
This is a **PlayerStart**, which is used to give the player a starting position and rotation when the scene begins. You can see that the Scene Manager has automatically assigned this as the **Default PlayerStart** within its **Scene Settings** panel:



**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.

## 1.6.2. 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.

### 1.6.3. Adding a 2D NavMesh

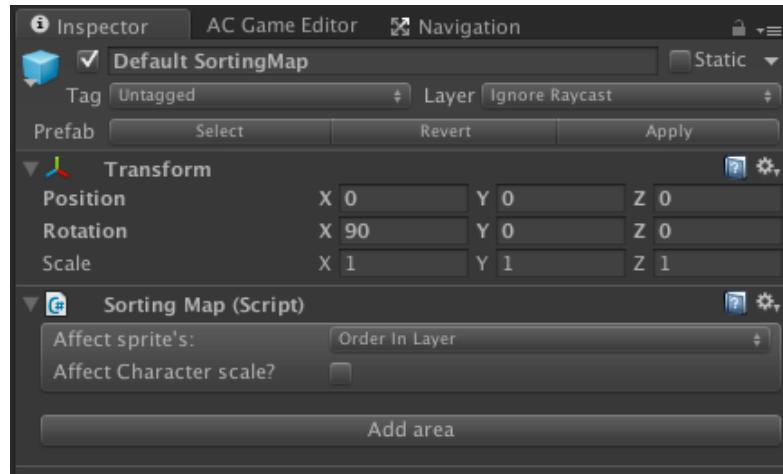
Now we will want a 2D Navigation Mesh, or **NavMesh 2D**, which marks the area in a scene over which our characters can move around through pathfinding. In 2D scenes, we can make use of Unity's Polygon Collider 2D to "draw" this NavMesh in our scene - see [Polygon Collider pathfinding](#) for more.



Once you've made a 2D NavMesh, be sure to set it as the **Default NavMesh** in the **Scene settings**.

#### 1.6.4. Adding a Sorting Map

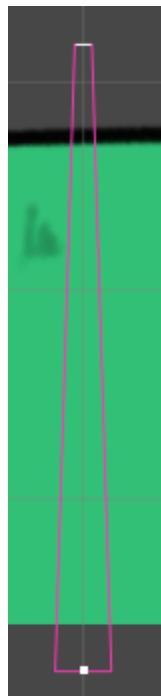
Because Unity 2D games are built on a 2D plane, characters will all have the same distance from the camera as they move around. To get around this, we use a Sorting Map. A Sorting Map can scale characters and optionally affect their sprite orders as they move around, faking a depth effect. We can auto-create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



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



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:



**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 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

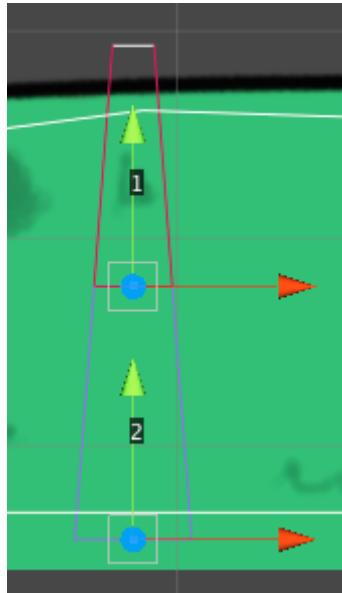


underneath when “behind”.

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.



**PROTIP:** A Sorting Map does not necessarily need to affect sprite sorting. If **Affect Character sorting?** is unchecked, then sorting will be based on the **Transparency Sort Axis** defined in the Graphics section of Unity's Project Settings.

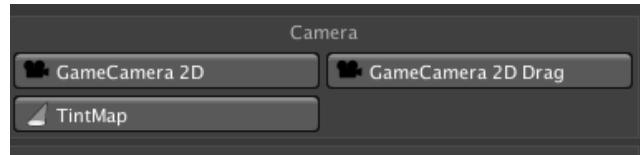
Since 2D games involve faking perspective, you may wish for your characters to move vertically more slowly than horizontally. You can adjust the **Vertical movement factor** slider to do just this, either globally in the [Settings Manager](#), or per-scene in the [Scene Manager](#).



**NOTE:** If two or more **Follow Sorting Map** components occupy the same Sorting Map region, their relative positions along the Y-axis will be 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.

## 1.6.5. 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.

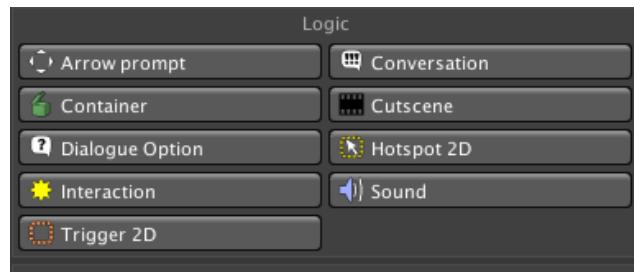
## 1.6.6. Adding interactivity

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](#).

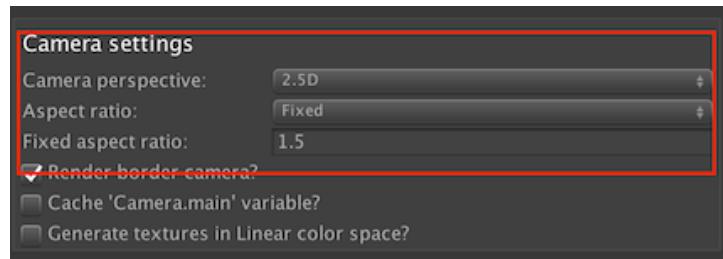


**PROTIP:** The 2D Demo’s player prefab, Brain2D, is designed to work with a variety of play styles and is useful when testing a scene if you don’t yet have a Player of your own. Just drop him into the scene and run it - he’ll override whatever prefab you have assigned in your Settings Manager.

## 1.7. 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](#).

### 1.7.1. Adding a PlayerStart

With a new scene, the top of the Scene Manager will have two **Organise scene objects** buttons:

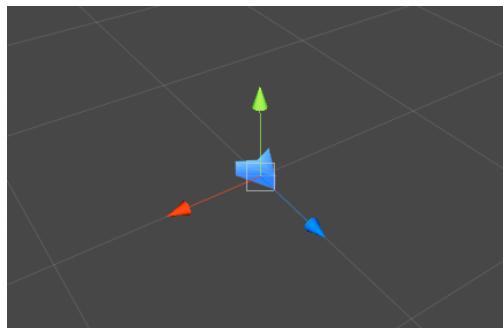
**With folders** and **Without folders**:



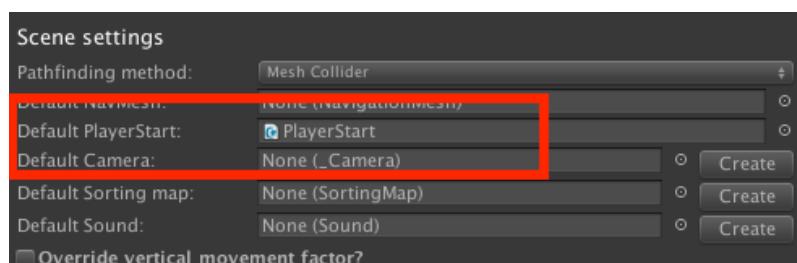
Both of these buttons will set up your scene to be useable by Adventure Creator – the only difference is whether or not “helper” folders (empty GameObjects) will also be created to help keep things organised. As you use the Scene Manager to create Hotspots, Conversations and other prefabs, it will place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



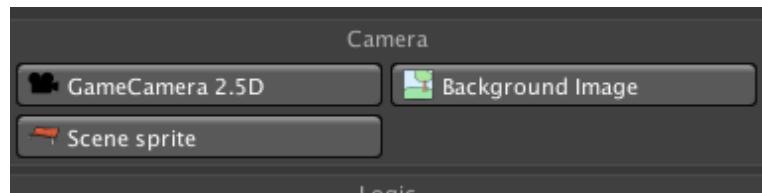
**PROTIP:** A scene can have multiple PlayerStarts, with each one setting the Player’s starting position when entering from another scene. The difference with the Default PlayerStart is that this will be used if the game begins from this scene, or if no more suitable PlayerStart is found.

## 1.7.2. Adding backgrounds and cameras

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

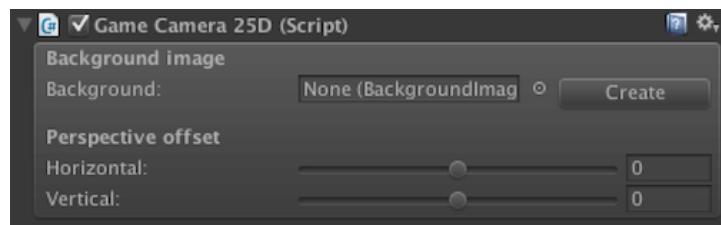
AC makes the development of 2.5D scenes easier by having the background graphics drawn only at runtime, so that you don't have to spend time placing graphics in the scene and getting them to line up properly.

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:** Working with Unity's URP? A script to overlay the scene and background together can be found on the AC wiki [here](#).

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:

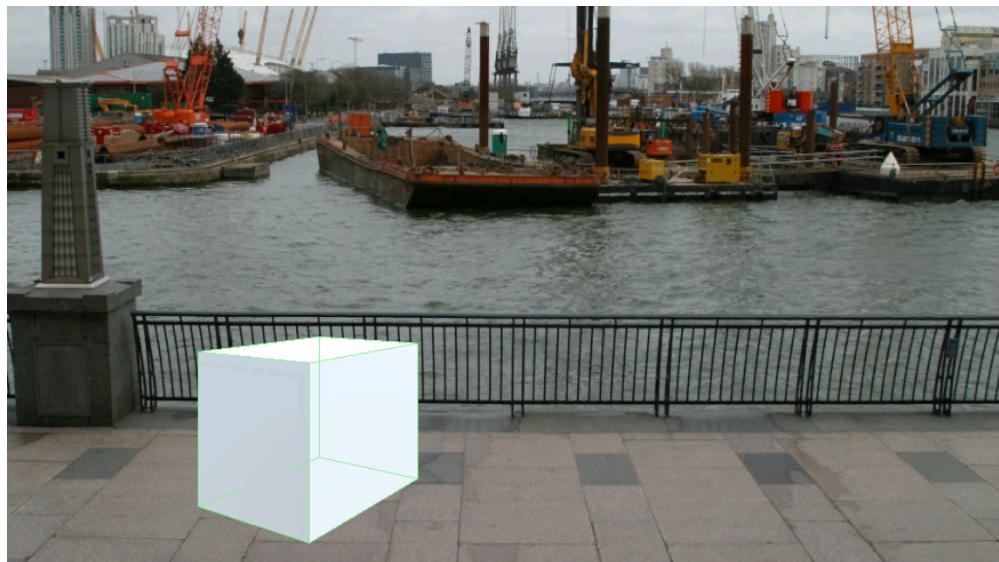
We must now adjust the camera so that it matches the position and rotation of the image's perspective. A **Perspective offset** can also be applied via the GameCamera's Inspector. This may take some trial-and-error, and is often easier to do in conjunction with creating a NavMesh.

**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



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

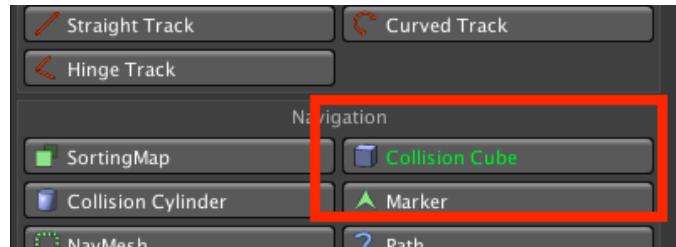
To switch camera during gameplay, use the [Camera: Switch Action](#) (see [Actions and ActionLists](#)). If we have multiple PlayerStarts in our scene, we can associate each one with a specific camera from their Inspectors.



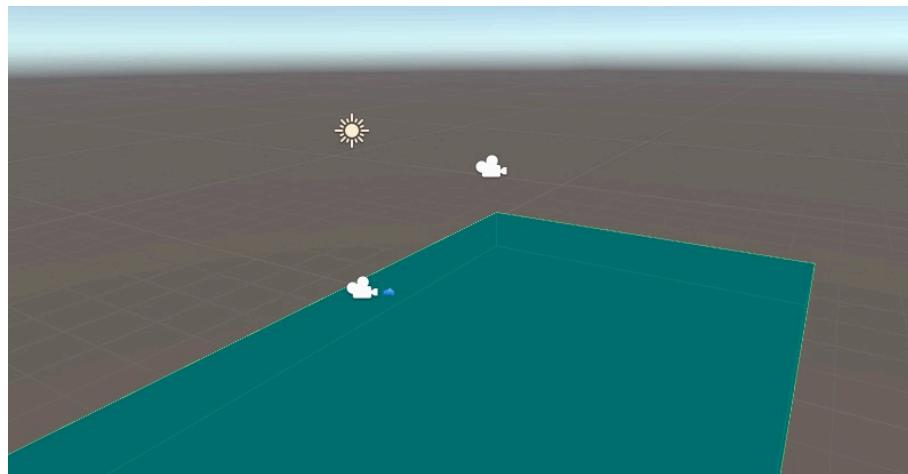
**PROTIP:** Though the 2.5D camera can't move, you can still have scrolling cameras in your 2.5D scene. That camera type is really just for convenience, and you can just drop in a **GameCamera2D** prefab if you want to have a moving one instead. For more on scrolling in 2.5D games, see [this tutorial](#).

### 1.7.3. 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.



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.



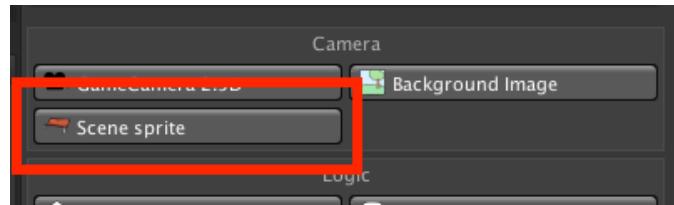
**PROTIP:** The 3D Demo game has wall colliders even though it uses point-and-click movement. This is so that you can experiment with different movement types in the scene to see which one suits your own game.

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 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**.

#### 1.7.4. 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.

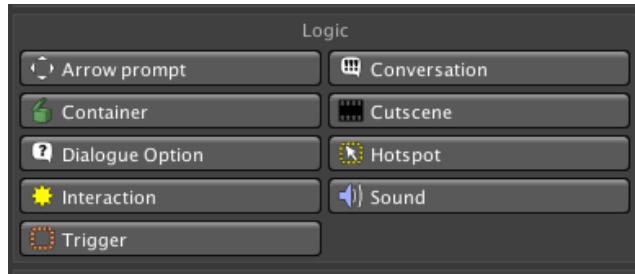
## 1.7.5. Adding interactivity

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:



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.

## 1.8. 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 asset 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” section after updating - this details any changes made to AC that you may need to be aware of to retain your game’s earlier behaviour.

## 1.9. 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**:



**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 may 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.

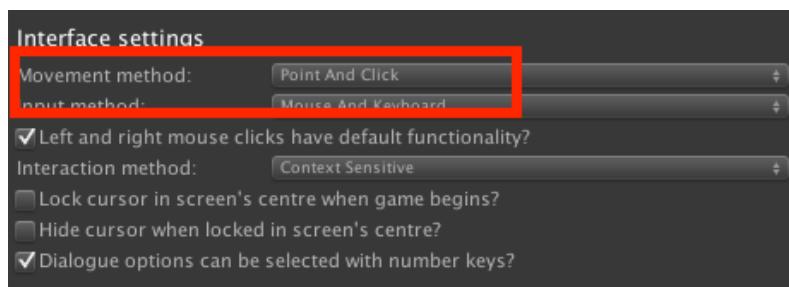
### Straight-to-cursor

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**:



**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](#).



**PROTIP:** The NavMesh object to click on must be on the **NavMesh** layer, but objects on other layers (except **Ignore Raycast**) will block clicks by default to prevent clicking through e.g. walls to inaccessible rooms. The layers involved in the process can be configured with the **LayerMask** field in the **GameEngine** object's **PlayerMovement** component.

## 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's movement is blocked by Colliders. In 2D scenes, you can optionally check the Player's **Auto stick to NavMesh?** option to have them be constrained to the confines of the NavMesh. In 3D scenes, such constraint requires a **NavMesh Agent** component - see [Unity Navigation pathfinding](#).

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.

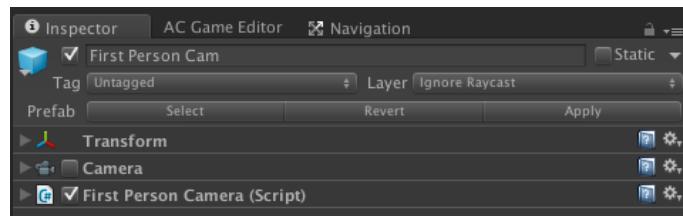
To aim with the mouse, map those last two axes to the X and Y axes respectively.



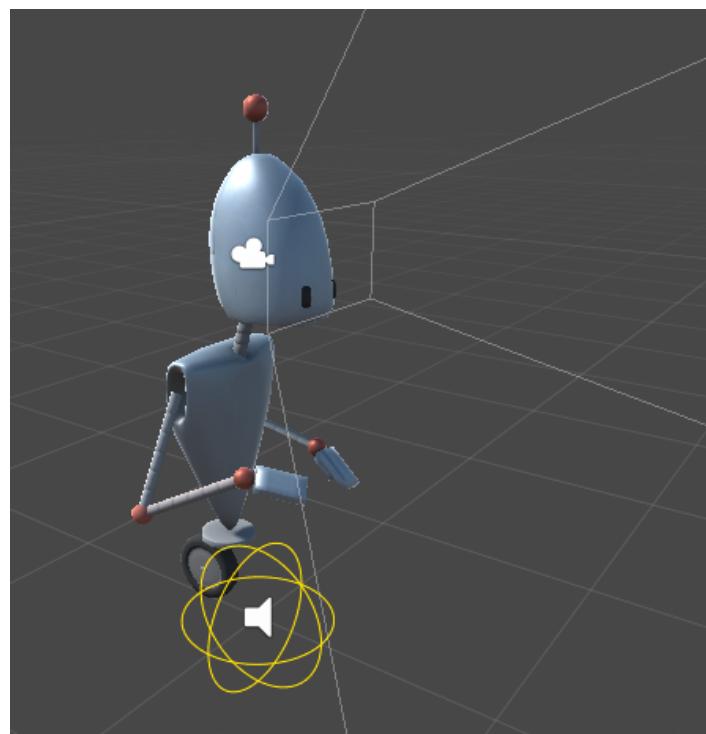
**PROTIP:** A pre-made first-person Player prefab is available to install as a [Template](#).

**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:



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:





**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.



**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.

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.

## 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 **InteractionA**. 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](http://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.

## 2.3. Input methods

Adventure Creator provides three methods of input:

### Mouse and keyboard

Which allows for mouse control, with optional keyboard control for movement.

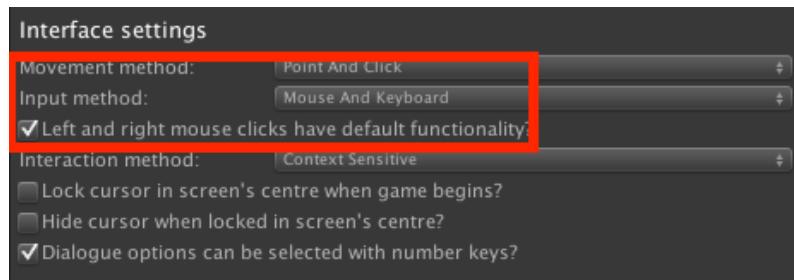
### Keyboard or controller

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**:



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](#).

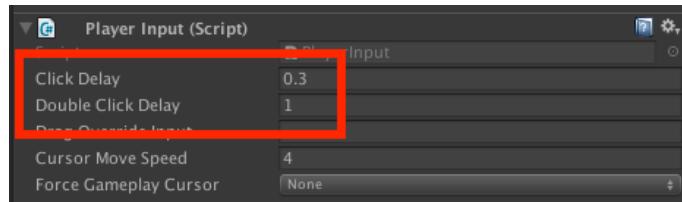
### 2.3.1. Mouse and keyboard input

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:



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 **Mouse clicks have default functionality?** in the Settings Manager.

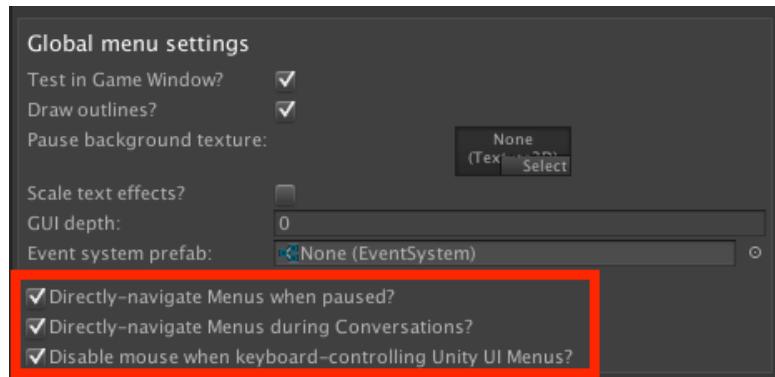
## 2.3.2. Keyboard or controller input

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 by the [Settings Manager's Simulated cursor speed](#) field.

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

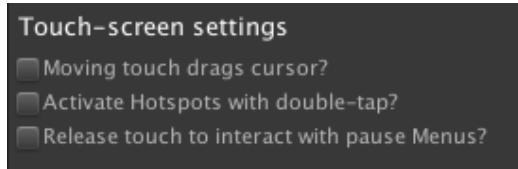
This input method is used to enable AC-made games to work on iOS and Android.

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](#):



**PROTIP:** A ready-made mobile joystick template can be found in the “UI Template: Mobile Joystick” package on the [Downloads](#) page.

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



**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. You can change this behaviour to have Hotspots react to a touch-down, or a touch-up, via the **Hotspot input mode** field.

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

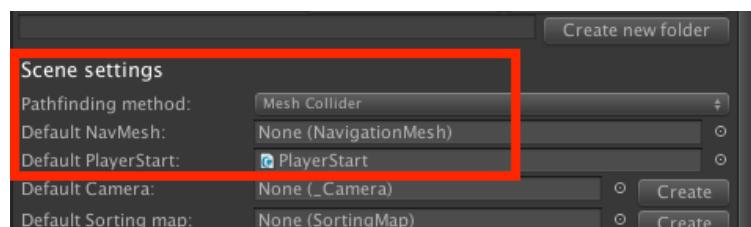
Which uses Unity's Polygon Collider 2D component, and is used for 2D games.

### A\* 2D

An implementation of the A\* algorithm, and is also used for 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 meter. 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 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 be necessary if your game features NPCs moving around, so that the Player can avoid them dynamically.

## 2.4.1. Unity Navigation pathfinding

Unity Navigation-based pathfinding relies on Unity's built-in [Navigation tools](#). It requires that you bake a NavMesh using Unity's provided tools.



**NOTE:** The workflow for baking a NavMesh varies with Unity version. If you're using 2022.2 or later, you'll need Unity's [AI Navigation](#) package from the Package Manager, and adding a **NavMesh Surface** component to the scene. Otherwise, it's a case of using the **AI → Navigation** window in the top toolbar. A tutorial that covers both of these methods can be found [here](#).

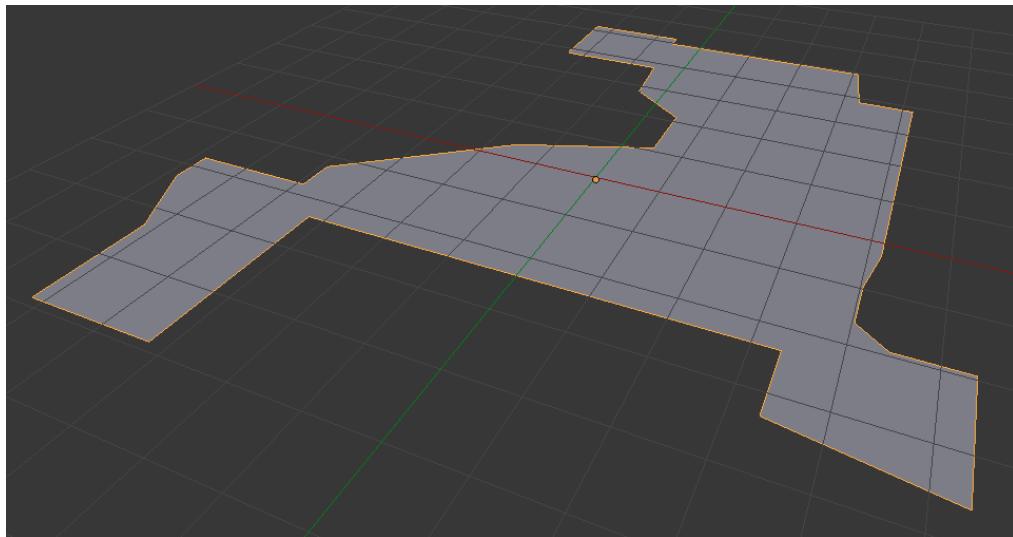
Once a NavMesh is baked, characters will rely on it when pathfinding. However, [Point-and-click](#) movement requires an additional step: the floor collider must be on the **NavMesh** layer.



**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. When using these components, a Player's position is bound to the NavMesh even when using [Direct movement](#).

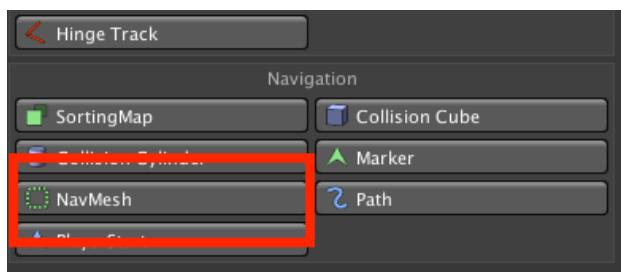
## 2.4.2. Mesh Collider pathfinding

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](#):



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:



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



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.



**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.

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.

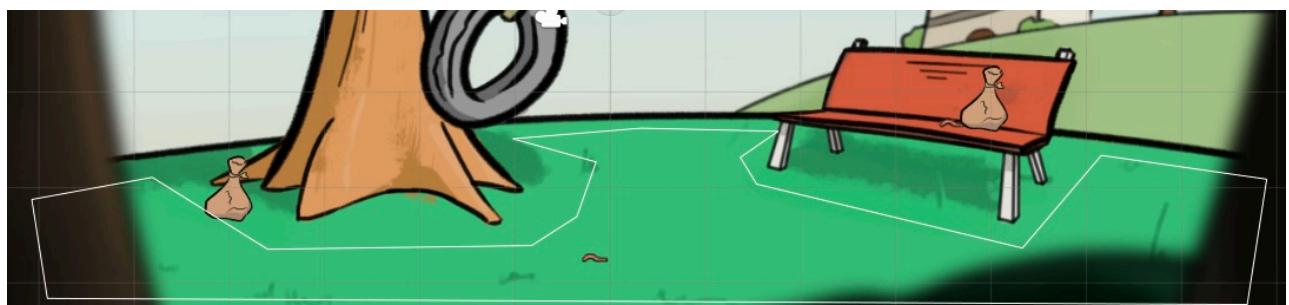
### 2.4.3. Polygon Collider pathfinding

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:



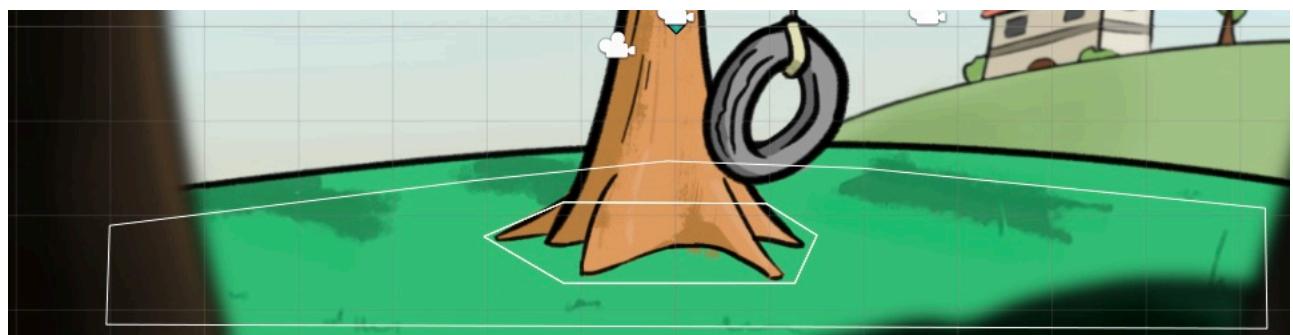
It will appear in your scene as a pentagon. You can use its [Polygon Collider](#) component to reshape it to fit the scene's walkable area:



**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.



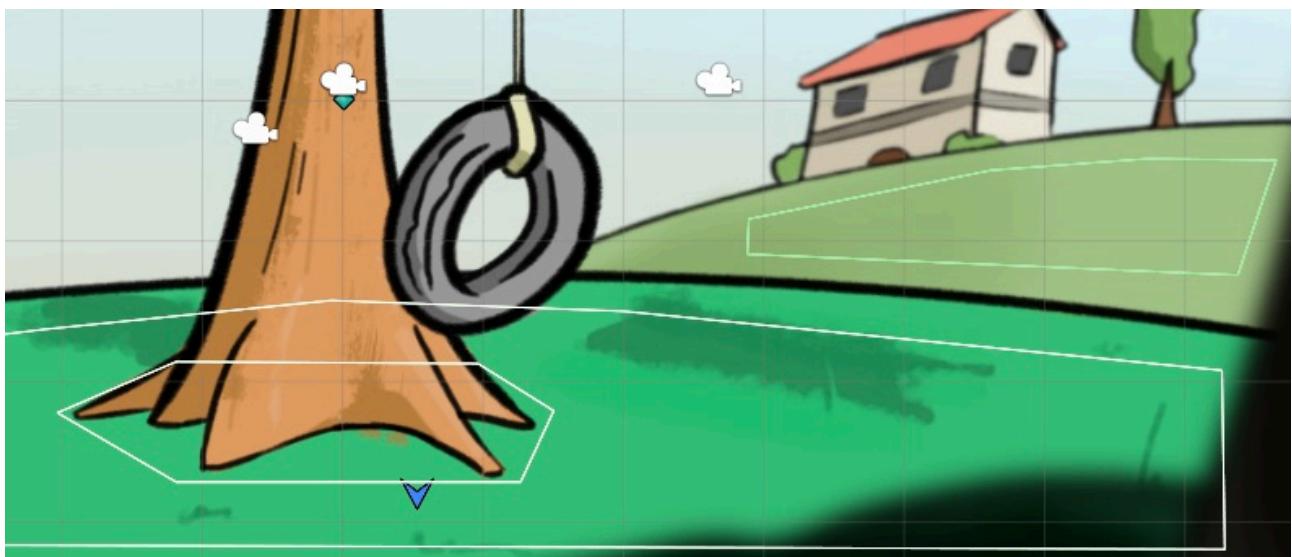
**PROTIP:** To improve scene startup time, NavMesh holes can be “baked” into the NavMesh. Just click “Bake” in the NavMesh’s Inspector, then disable the hole objects.

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.



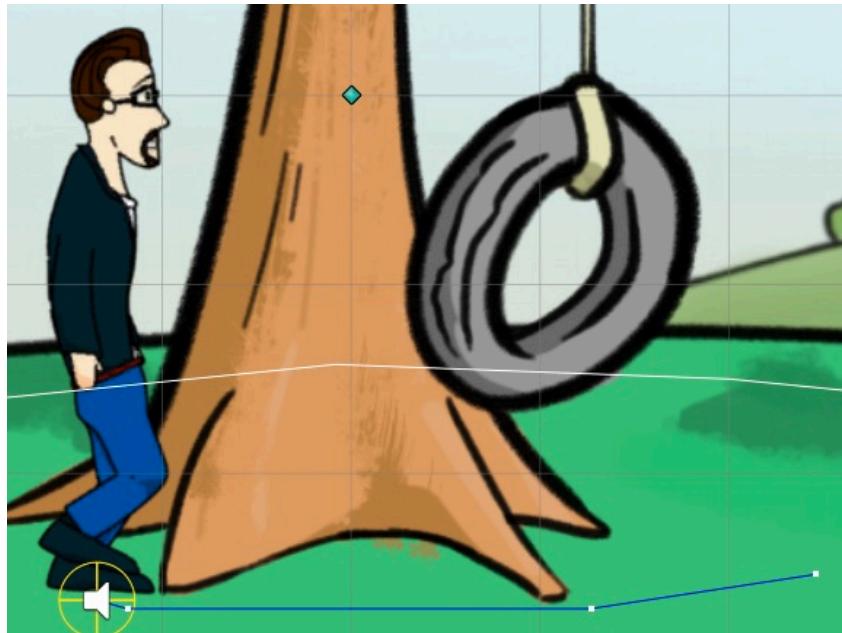
**NOTE:** This method does not allow for other objects to dynamically affect pathfinding. If the NavMesh connects two rooms, but the door between them is closed, characters will attempt to walk through the door. You can get around this by changing the NavMesh when your scene layout changes.

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. Two methods of evasion are available, each with their own benefits: **Carve** involves cutting holes around characters the NavMesh, which favors accuracy over performance, while **Push** involves pushing characters as they get too close, which favors performance over accuracy. In either case, for a character to 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 when set to Carve, 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. A\* 2D pathfinding

A\* 2D pathfinding is an alternative to the Polygon Collider option when navigating a 2D scene. It too involves using the shape of Unity's [Polygon Collider](#) component as a NavMesh, and can be modified during gameplay.

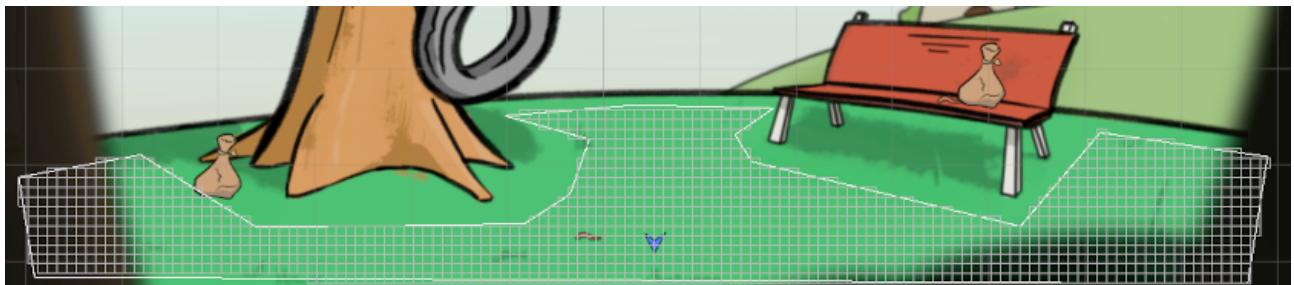


**PROTIP:** Which is best for a 2D game? Polygon Collider can sometimes give slightly more natural movement when complex paths are involved, but A\* is considerably faster. If your NavMesh is large, go with A\*.

Once the **Pathfinding method** field in the Scene Manager has been set to **A Star 2D**, the Navigation panel will allow you to create a NavMesh2D prefab:



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:

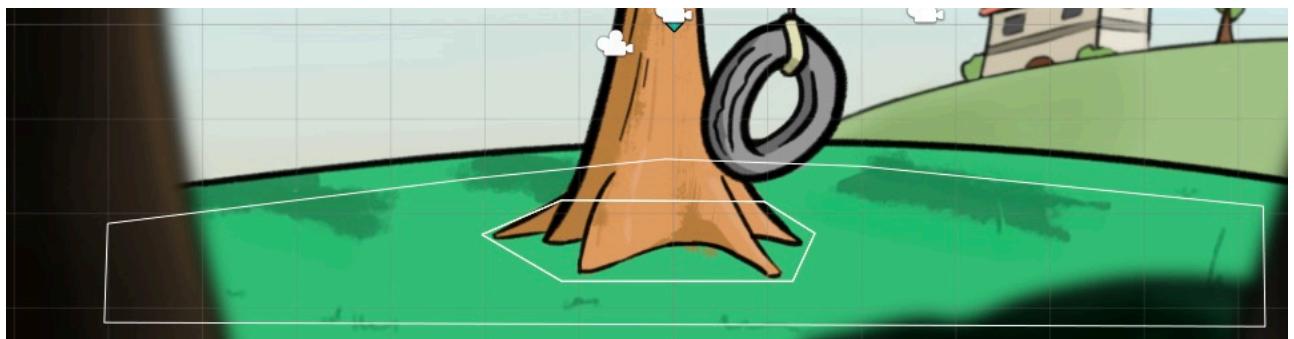


**PROTIP:** You're not limited to using a Polygon Collider - this mode can make use of any 2D Collider - including a Tilemap Collider.

The A\* algorithm works by dividing this NavMesh into a grid - you can adjust the accuracy by increasing the **Cell size** Inspector field - try to keep it the largest value it can be while still accurately describing the shape of the collider.

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

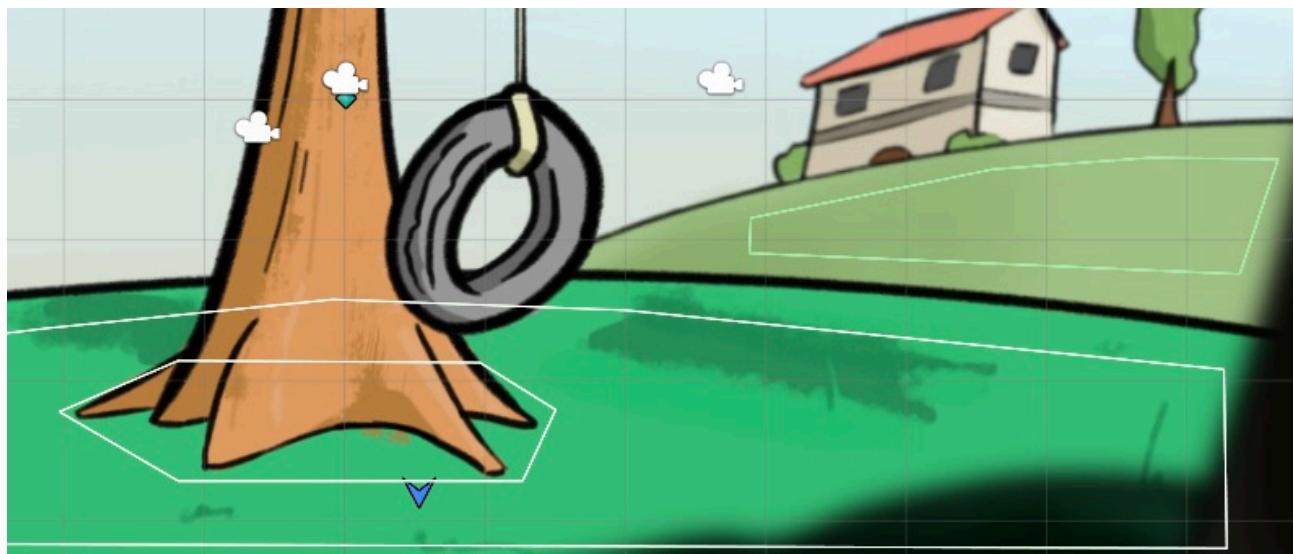
Holes in your NavMesh can be created with other Polygon Colliders. Attach a Polygon Collider 2D to an empty GameObject, shape it as a hole, and then add it to the **Navigation Mesh** component after increasing the **Number of holes** value by 1. When the game begins, the hole will be incorporated into 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.

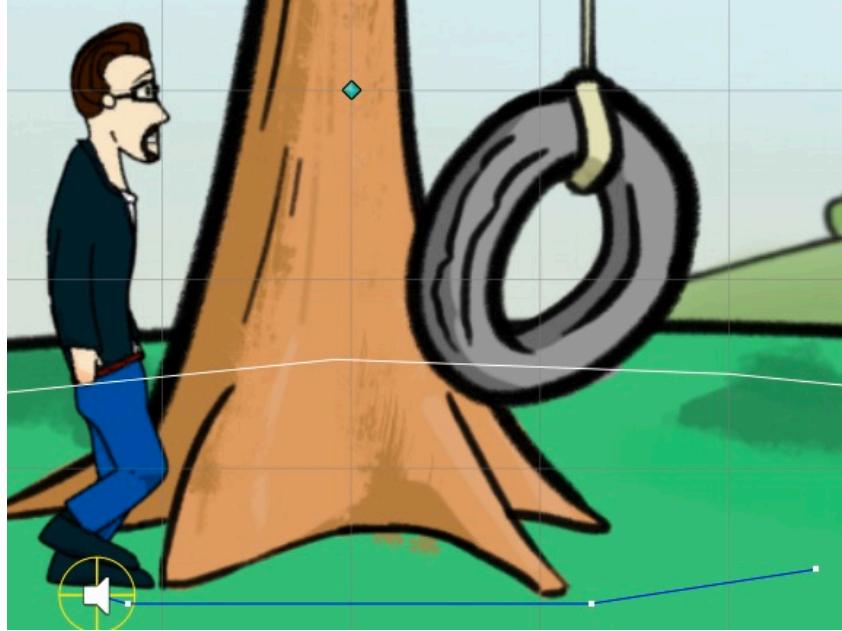
The active NavMesh, and the number of holes it has, can be changed during gameplay with the [Scene: Change setting](#) Action. This can be used to e.g. allow the player to walk where a removed object was once placed in the scene.

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 to be evaded, they must have a Circle Collider 2D component at their feet on their root object

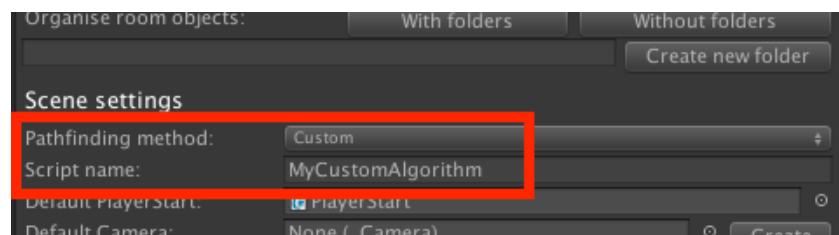


**NOTE:** For completely dynamic pathfinding around moving characters, be sure to set a non-zero **Pathfind update time** value in the [Settings Manager](#). This will force a recalculation of a character's path while on the move, so that they can account for any changes in the scene.

## 2.4.5. 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:



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.



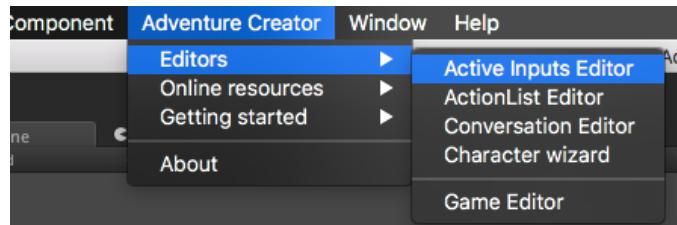
**PROTIP:** It is also possible to limit the software cursor's range of movement to the boundary of a Menu. This can be done by setting the PlayerCursor script's LimitCursorToMenu property through script.

## 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.

## 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.

Delegates are mapped to functions within your own script to override them. To do so, register with them with the appropriate List inside `PlayerInput`. For example, the cursor position can be overridden with:

```
void OnEnable ()
{
    AC.KickStarter.playerInput.Input.mousePositionDelegates.Add
    (Custom.mousePosition);
}

void OnDisable ()
{
    AC.KickStarter.playerInput.Input.mousePositionDelegates.Remove
    (Custom.mousePosition);
}

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



**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:

Unity function	PlayerInput List	Delegate override
<code>bool Input.GetButtonDown (string name)</code>	<code>InputGetButtonDownDelegates</code>	<code>bool InputGetButtonDownDelegate (string name)</code>
<code>bool Input.GetButtonUp (string name)</code>	<code>InputGetButtonUpDelegates</code>	<code>bool InputGetButtonUpDelegate (string name)</code>
<code>bool Input.GetButton (string name)</code>	<code>InputGetButtonDelegates</code>	<code>bool InputGetButtonDelegate (string name)</code>
<code>float Input.GetAxis (string name)</code>	<code>InputGetAxisDelegates</code>	<code>float InputGetAxisDelegate (string name)</code>
<code>Vector2 Input.mousePosition</code>	<code>Input.mousePositionDelegates</code>	<code>Vector2 Input.mousePositionDelegate (bool cursorIsLocked)</code>

Unity function	PlayerInput List	Delegate override
Vector2 Input.GetTouch (int index).position	InputTouchPositionDelegates	Vector2 InputTouchPositionDelegate (int index)
Vector2 Input.GetTouch (int index).deltaPosition	InputTouchDeltaPositionDelegates	Vector2 InputTouchDeltaPositionDelegate (int index)
TouchPhase Input.GetTouch (int index).phase	InputTouchPhaseDelegates	TouchPhase InputGetTouchPhaseDelegate (int index)
bool Input.GetMouseButtonDown (int button)	InputGetMouseButtonDownDelegates	bool InputGetMouseButtonDownDelegate (int button)
bool Input.GetMouseButton (int button)	InputGetMouseButtonDelegates	bool InputGetMouseButton (int button)
Vector2 (Input.GetAxis ("CursorHorizontal"), Input.GetAxis ("CursorVertical"))	InputGetFreeAimDelegates	Vector2 InputGetFreeAimDelegate (bool cursorIsLocked)

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.



**NOTE:** Because delegates are registered with the corresponding List, multiple overrides for a given function can be assigned at once. When this is the case, the highest value wins.

### 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.



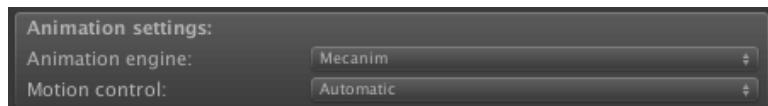
**PROTIP:** A character's type cannot be changed at runtime, but can be converted between an NPC and Player while in Edit mode via the Inspector's cog menu.



**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.



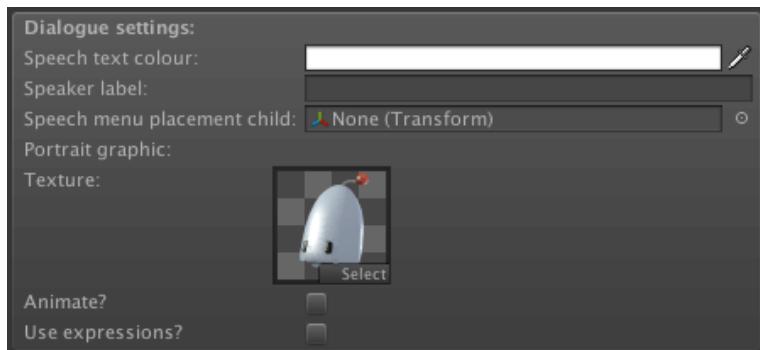
**NOTE:** If a character relies on a Rigidbody (3D or 2D) for movement, their rotation will automatically freeze at all times. If **Freeze Rigidbody when Idle?** is checked, then their position will also be frozen when standing still. Otherwise, you are free to freeze individual position axes - though 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. 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.

## 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 convert a model- or sprite-based GameObject into a [Player](#) or an [NPC](#). It automatically assigns the key components to a model or sprite to allow it to become a character. It can be run by choosing [Player](#) or [NPC](#) from the [Scene Manager's Prefabs](#) panel, or by clicking the + icon beside the [Player](#) field in the [Settings Manager](#). It can also be opened from the top toolbar, under **Adventure Creator → Editors**.

When the wizard opens, you will be prompted to supply a name, or a base GameObject that represents the character. This is typically a Skinned Mesh Renderer for 3D, or a Sprite Renderer for 2D. This object must be in the scene's Hierarchy - it won't accept a prefab or an asset file.

The wizard will then infer from this which type of animation engine - see [Character animation](#) - to use, and may request further details related to collision or motion.

It is also possible to have the wizard automatically generate an Animator Controller asset with default states that match the chosen animation engine. These states will be blank - the character won't play any animation by default - but you can select them in the Animator window and assign Animation Clips to quickly get started.

Once complete, the wizard will generate the character, adding and configuring its components with the requested changes. These components can be tweaked further to suit.

### 3.1.2. Players

A Player character is your game's 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 in the **Characters** panel in the [Settings Manager](#), so that they are automatically added to the scene at runtime. This is the usual method.
2. By having them saved within the scene file itself. This can be useful if you need to need a Player to have a unique appearance or behaviour for that scene.

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.



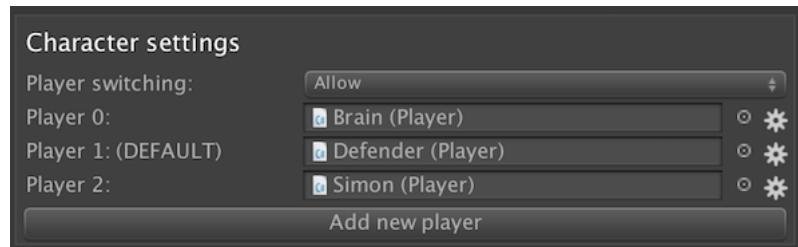
**PROTIP:** Players are normally non-interactive, in that you can't click on them directly. You can add interactivity, however, by adding a Hotspot component and trigger-Collider onto him, and placing it on the Default layer, as you can with an [NPC](#). If your Player is a prefab added at runtime, be 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.

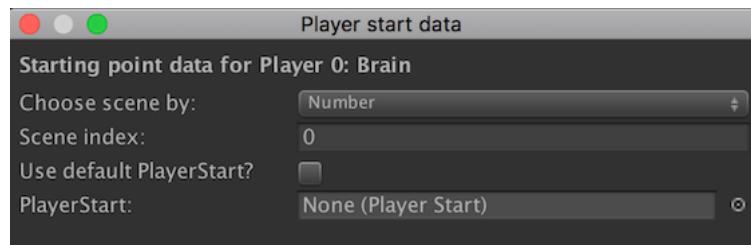
### 3.1.3. Player switching

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 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.

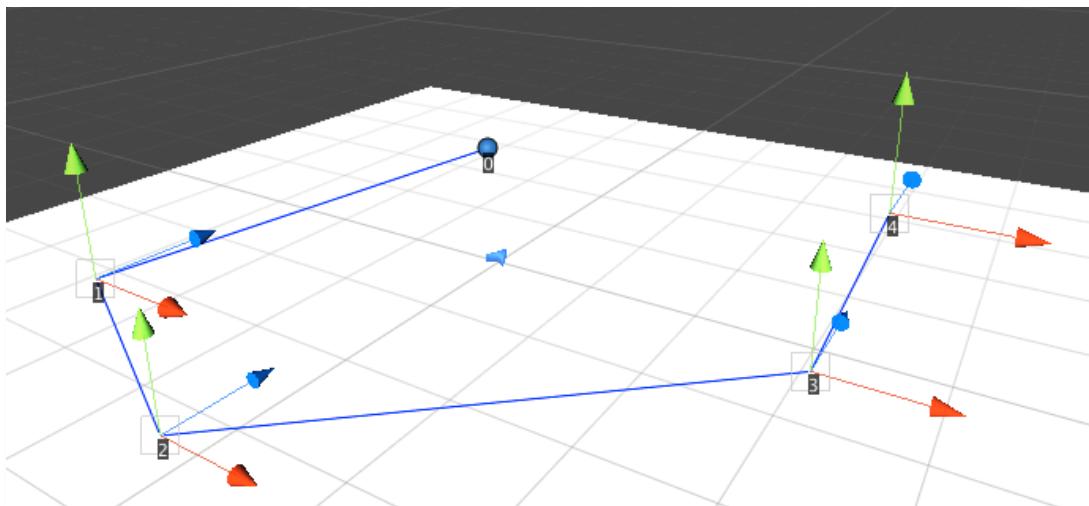
Characters can move in two ways:

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](#) asset 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.

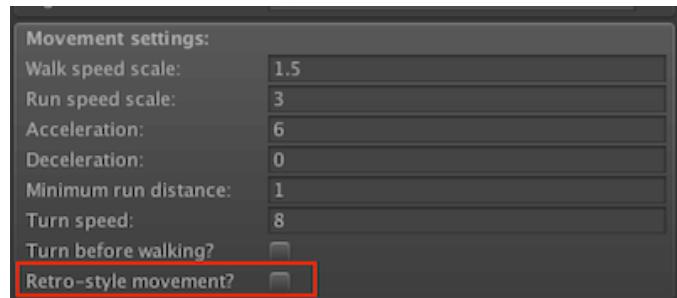


**PROTIP:** If you are making a low-resolution 2D game and want pixel-perfect pathfinding, consider using [Retro movement](#).

### 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 pre-set 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:

```
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](#).



**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.

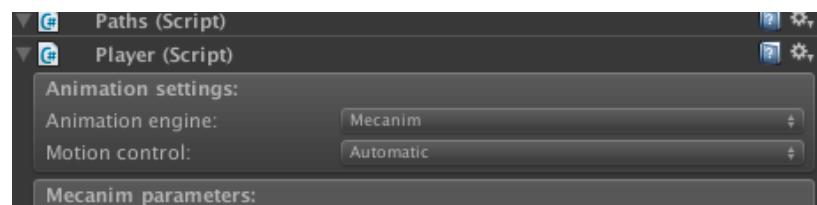
### Sprites 2D Toolkit

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



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**

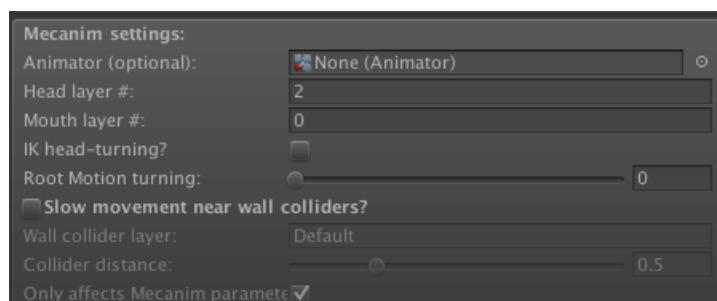
Set to True in the one frame that a jump is initiated ([Players](#) only)

### **'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.



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

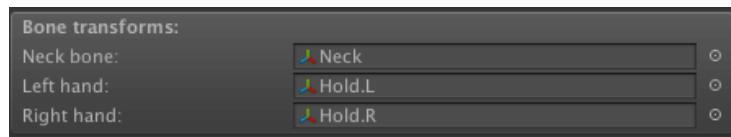
1. The Animator's Base layer must have **IK Pass** enabled in its properties.
2. The character must have a **Neck bone** assigned in their Inspector, or a **Capsule Collider** must be placed on their root.

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](#). By default, the first two Attachments points refer to the left- and right-hands respectively, but a character can have any number of additional points.

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)

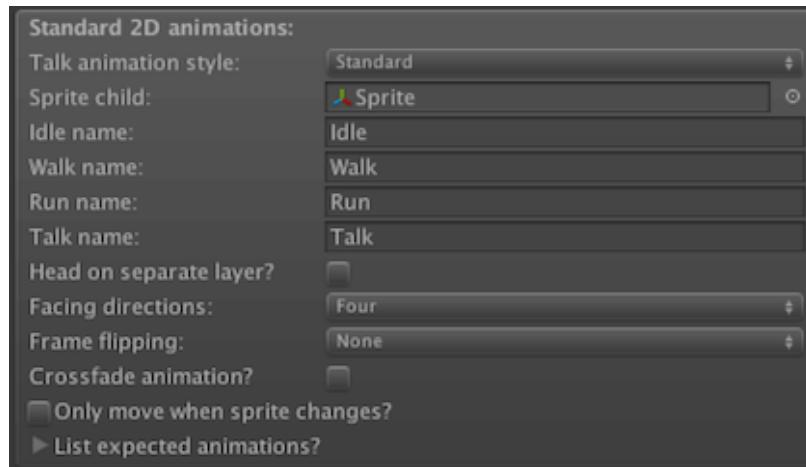
The Sprites Unity engine is a convenient way of working with 2D characters because it plays animations according to a naming convention, as opposed to transitions or parameters. If you have a character that can animate in all eight directions, this can be very time-consuming.



**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



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.

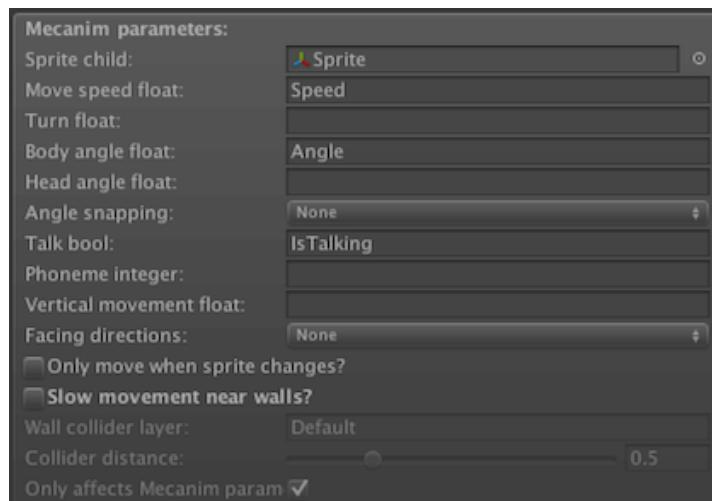
Rather than requiring the names of animation clips for Adventure Creator to automatically call upon, Sprites Unity Complex works by giving AC control over certain parameters in the character's Animator Controller – this allows the designer to make use of them however they like.



**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



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 only values supported by the character's **Facing angles** option:

- 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.



**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



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

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”.

### 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](#).

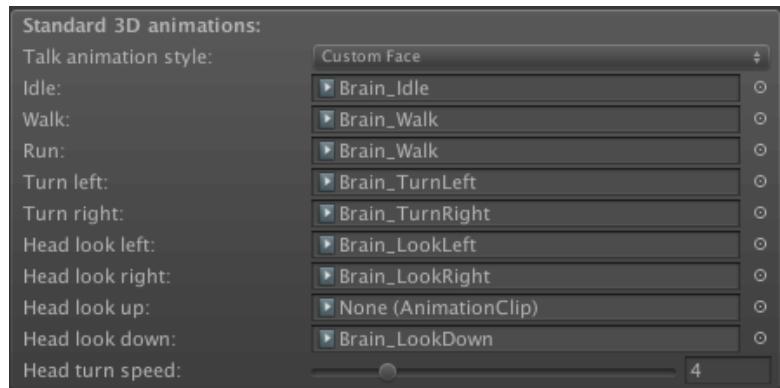
Characters that use this engine must have an **Animation** component on the root GameObject, but it can be assigned to a child object if necessary.



**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



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.

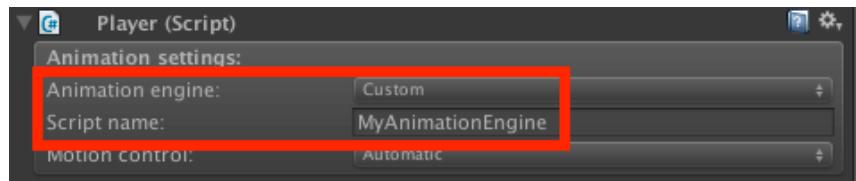
Adventure Creator also features a number of ways to animate your [lip-syncing](#), including making use of [FaceFX](#).

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. 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**:



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](#).

### 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.

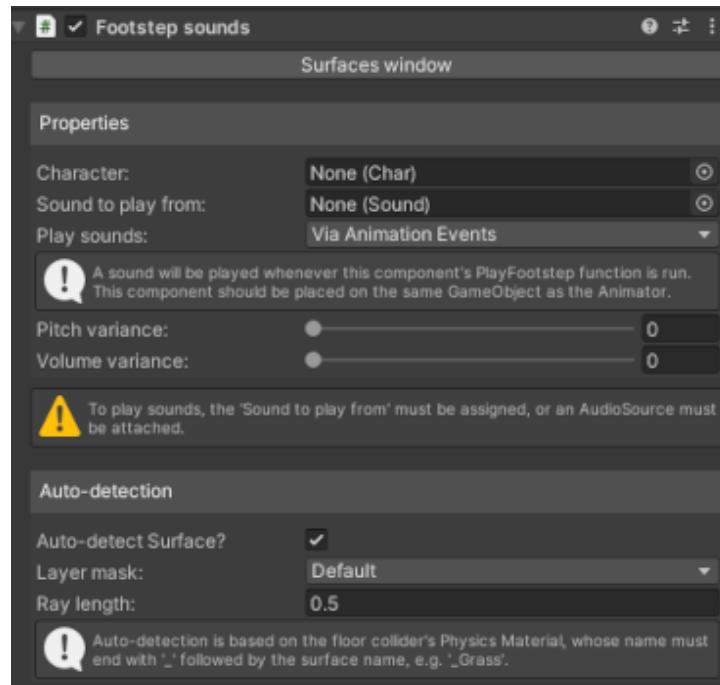
An additional "HiddenHead" animation is also listed - this should be a single-frame animation in which the head is removed from view, typically by replacing it with an invisible sprite. This is a convenient way of returning to a single-sprite system when a special full-body animation is required, and 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 character's 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

Footstep sounds that play when a character moves are a subtle but effective way of enhancing the immersion of a scene. The **Footstep Sounds** component allows you to control their playback.



The various sounds that can be played are defined in Surfaces. To begin editing them, click the **Surfaces window** button to bring up the Surfaces editor:



For each surface, multiple walk and run sounds can be assigned - one will be chosen at runtime when played.

Back inside the Footstep Sounds component, the additional fields let you map the sounds to a specific [Character](#), and a [Sounds](#) component to play them from.

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.

Changing the component's active Surface can be done in a number of ways:

1. Using the component's **Auto-detect Surface?** option to fire a raycast at the character's feet. This will search for floor colliders that have a [PhysicMaterial](#) asset whose name ends with “\_”, followed by the name of the intended Surface.
2. Using the [Sound: Change footsteps](#) Action.
3. Altering the component's **CurrentSurface** property through custom script. This is best set inside a hook to the [OnRequestFootstepSounds](#) [custom event](#), which is fired just before a sound is to be played.

### 3.1. 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.EndPath ();
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.IsTurning ();
myCharacter.IsMovingAlongPath ();
```

The character system has the following events:

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

```
OnCharacterRecalculatePathfind (Char character, ref Vector3  
    destination)  
OnCharacterHoldObject (Char character, GameObject object, int  
    attachmentPointID);  
OnCharacterDropObject (Char character, GameObject object, int  
    attachmentPointID);  
OnRequestFootstepSounds (FootstepSounds footstepSounds);
```

## 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



#### Standard

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



#### Array

A camera that interpolates between multiple sub-cameras based on the target's position.



#### Third-person

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



#### Stationary

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



#### Standard

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

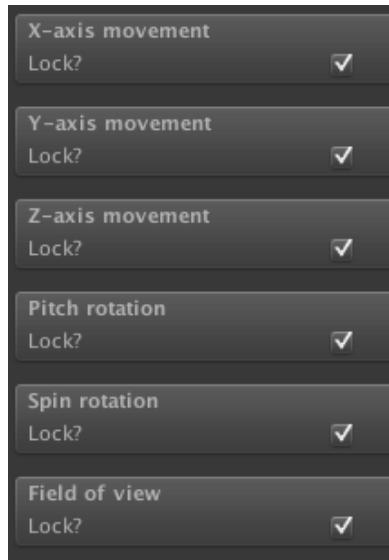


#### Drag

A camera that can be dragged around using the mouse.

### 4.2.1. GameCamera

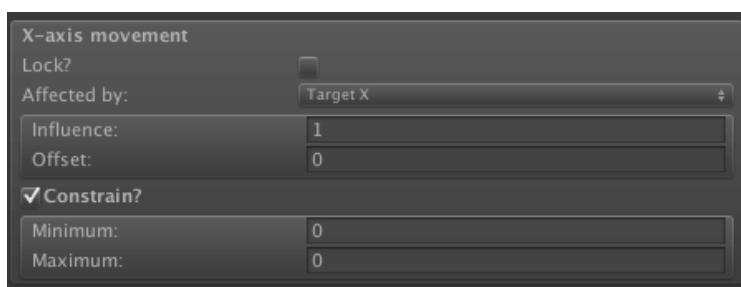
The **GameCamera** is the default camera type when working in 3D. Position, spin, pitch and field of view can all be controlled independently by unchecking the **Lock?** toggle beside each:



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.



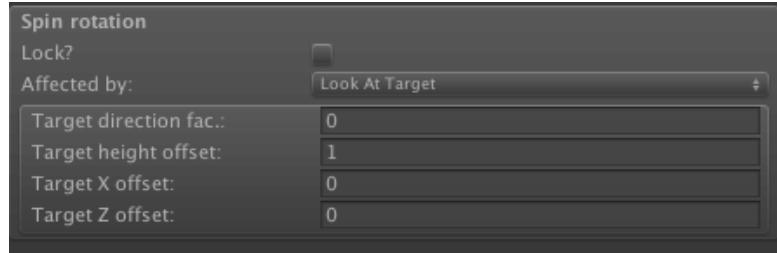
When an axis becomes unlocked, the method by which that axis is affected can be set. For example, the X-axis movement can be based on the target's X-axis position, Z-axis position, position across the viewport or position away from it. The way in which this “input” results in the axis' final position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



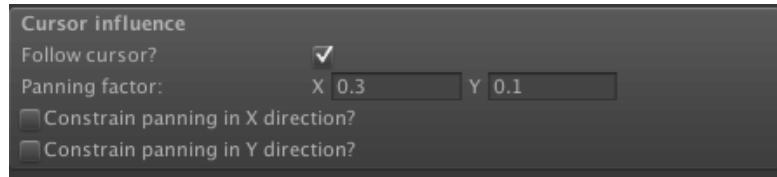
Alternatively, a Collider can be assigned to act as the camera's boundary.

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.

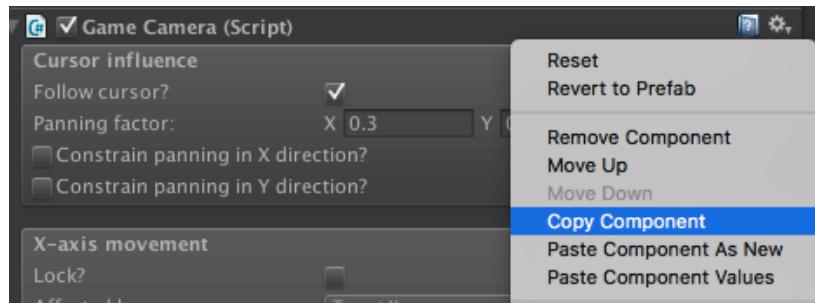
The **Spin rotation** panel has an additional option: **Look At Target**, which is a simple way of ensuring the camera is always centred on the target:



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



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:



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:

```
AC.Kickstarter.mainCamera.GetFocalDistance();
```

## 4.2.2. GameCamera Array

The **GameCamera Array** camera type works by interpolating between any number of Camera node, each of which represent a target's position. This allows you to easily, yet finely, control how the camera moves in relation to the Player.

Each node is a child Camera parented to the GameCamera Array based prefab, with a **Camera Node** component attached.

The weight of each node's influence is based on how close the target - by default, the Player - is to it's assigned target position. This position is represented by a red sphere in the Scene window, and can be manipulated either by moving its gizmo, or by adjusting its Inspector.

The GameCamera Array will automatically detect any Camera nodes parented to it at runtime - to create more, duplicate the existing node and adjust as needed.

This camera type is demonstrated in the [3D Sample Scene Template](#).

### 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.



**PROTIP:** Getting jittery movement when the Player moves? Try adjusting the camera's **Update mode** field.

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, if 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

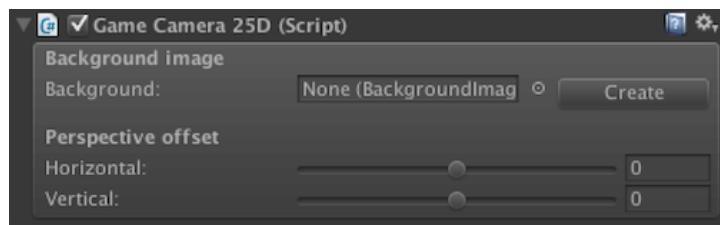
The **GameCamera 25D** camera type facilitates the development of games that use a mixture of pre-rendered (or photographic) backgrounds and 3D characters.

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.



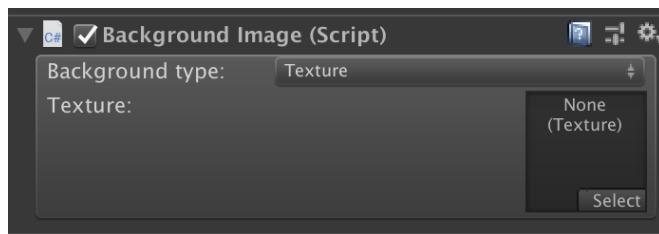
**NOTE:** If you require scrolling, you can still use the [GameCamera 2D](#) camera type in combination with sprite-based backgrounds. The **GameCamera2D** prefab can be found in [/ AdventureCreator/Prefabs/Camera](#). A tutorial can be found [online](#).

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:

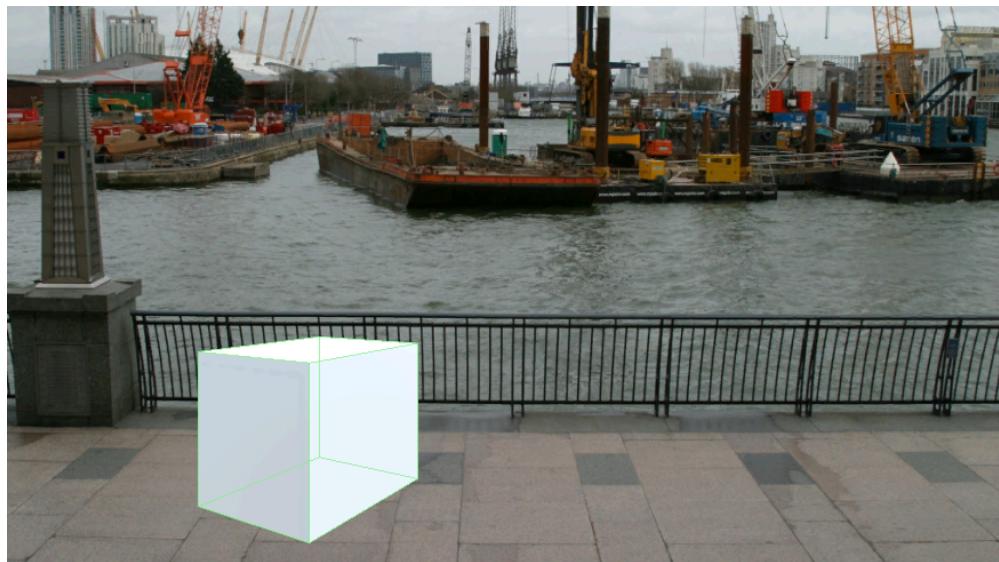


**NOTE:** Using URP? Unity's Universal Render Pipeline uses its own technique to overlay cameras, so you'll need [this wiki](#) script to have it work with AC's 2.5D cameras.

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:



**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](#).

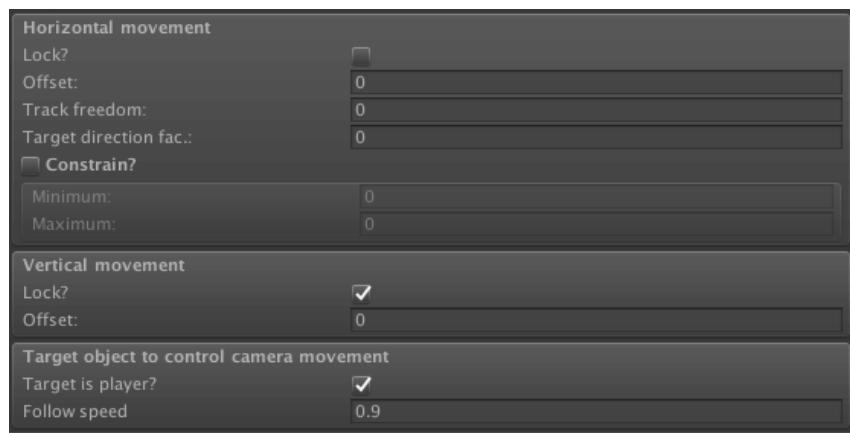
## 4.2.6. GameCamera 2D

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.

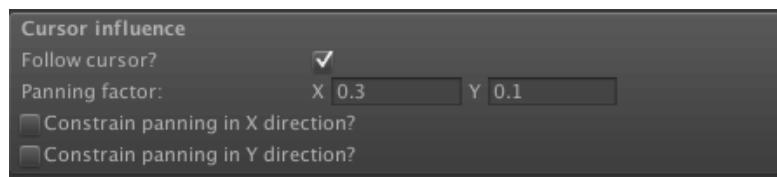
A **GameCamera 2D** can move horizontally and vertically, or be locked in either direction. When at least one axis is unlocked, options to control the camera's target will appear:



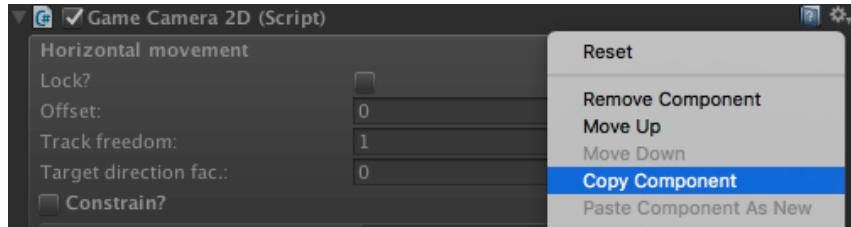
The **Track freedom** variable determines how far, in Unity co-ordinates, the target must move from the camera's screen-centre before the camera begins to follow. A freedom of zero will keep the target in the centre of the screen at all times.

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:



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](#).



**PROTIP:** A cursor graphic to make use of while dragging this camera type can be assigned in the [Cursor Manager](#).

#### 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:

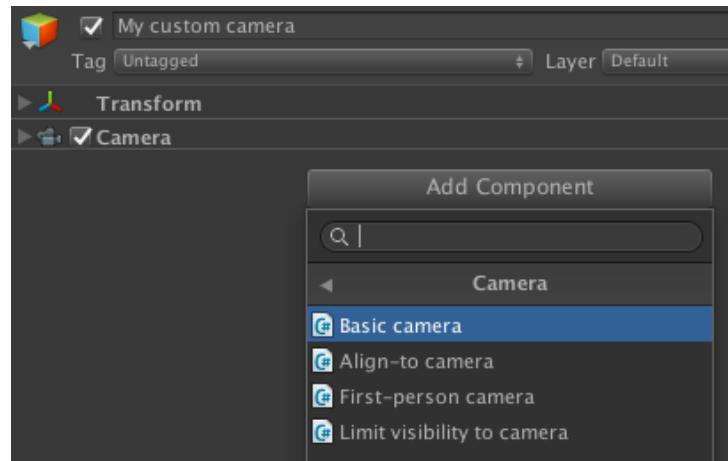


As clicks will still be used to initiate player movement, this camera type is recommended for games that do not make use of [point-and-click](#) movement.

### 4.3. Adding custom cameras

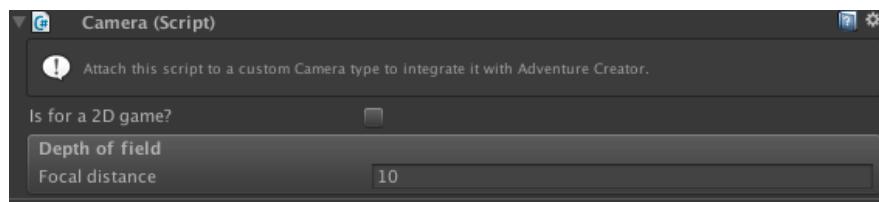
Although a variety of camera types are provided, it may be that you require or prefer to use other types - whether it be another camera asset from Unity's Asset Store, or your own script.

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:



**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:

```
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/Prefs/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 **Input.mousePositionDelegate** - 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**.



**PROTIP:** An integration package, containing helper scripts and example scenes to link Cinemachine with AC can be found on the AC website's [Downloads](#) page.

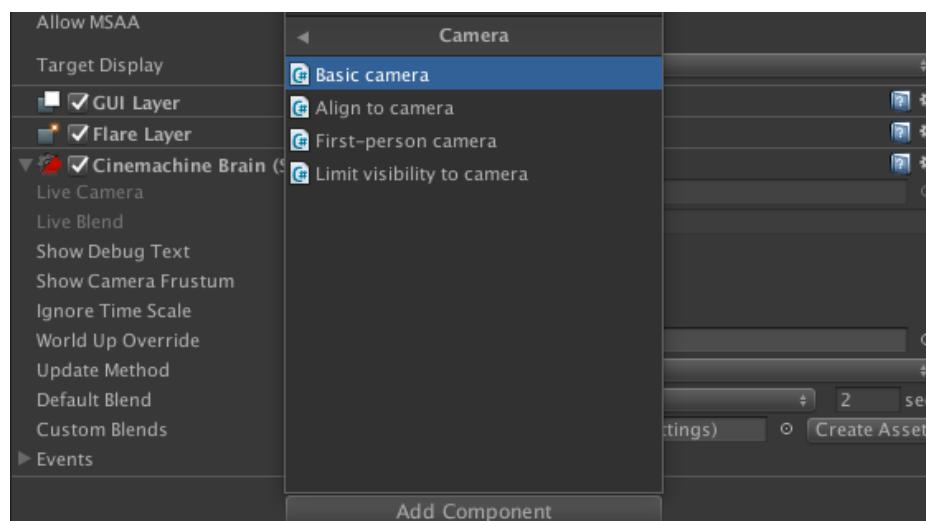
Cinemachine can be integrated with AC in two ways, depending on whether or not you want to also make use of AC GameCameras.

### Using Cinemachine exclusively

If you want to rely solely on Cinemachine, attach the Cinemachine Brain component to AC's existing MainCamera, and rely on Cinemachine VirtualCameras instead of AC GameCameras. The integration package mentioned above includes a **Camera: Cinemachine** Action that can be used to control the active VirtualCamera, as well as a **Remember Cinemachine Virtual Camera** component that can be used to save its data.

### Mixing AC and Cinemachine cameras

If you instead wish to be able to switch between Cinemachine VirtualCameras and AC GameCameras, keep AC's Main Camera and Cinemachine's Cinemachine Brain components on separate GameObjects - each with their own Camera component. On the Cinemachine Brain object, remove the AudioSource and attach AC's **Basic Camera** component (see [Adding custom cameras](#)):



The Cinemachine Brain will then be available 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 VirtualCamera 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.

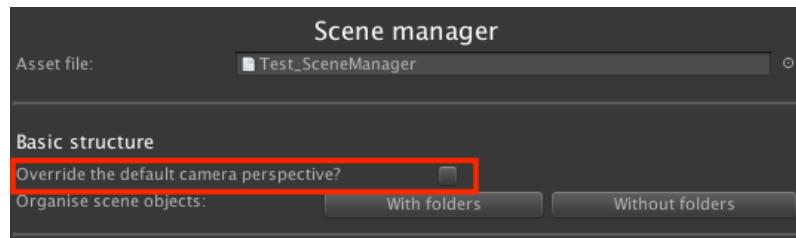
## 4.6. Overriding perspective

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.

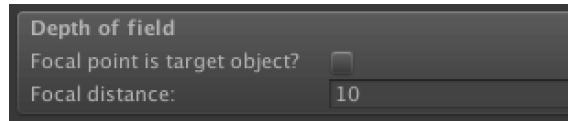
```
private void OnEnable ()
{
    EventManager.OnSwitchCamera += SwitchCamera;
}

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:

```
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:

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

And subsequently re-enabled with:

```
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);
OnCameraSplitScreenStart (_Camera camera, CameraSplitOrientation
    splitOrientation, float splitAmountMain, float splitAmountOther,
    bool isTopLeftSplit);
OnCameraSplitScreenStop (_Camera camera);
```

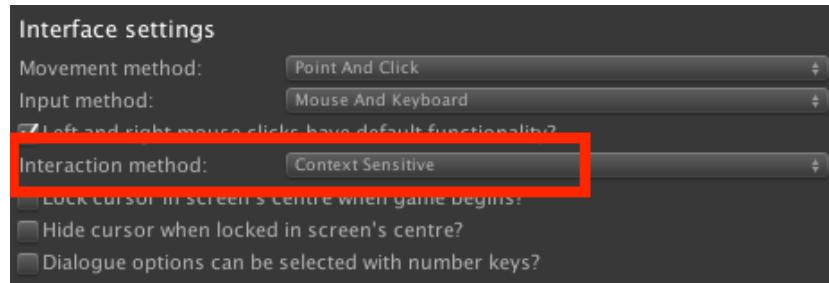
## 5. Interactions

## 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:



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

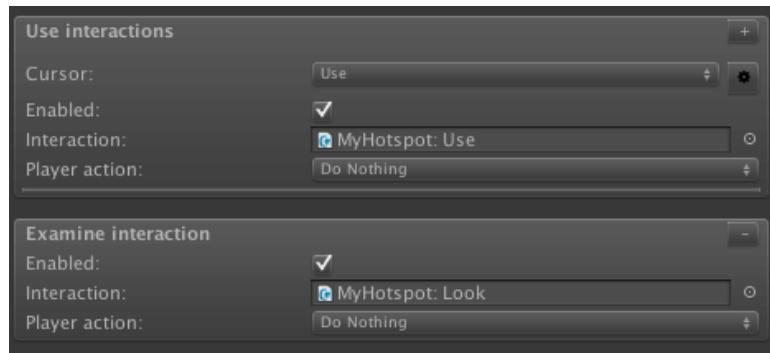
In this mode, each Hotspot has a single "Use" interaction, and (optionally) a single "Examine" interaction.

- 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](#).

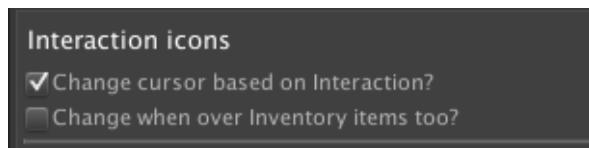
Interactions are defined in a Hotspot's Inspector:



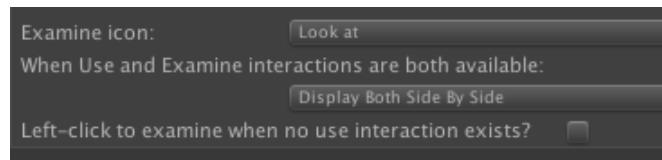
Hotspots can have multiple "Use" interactions defined, but only the first enabled one can be triggered. The [Hotspot: Change interaction](#) Action can be used to disable and enable interactions during gameplay.

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:



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.

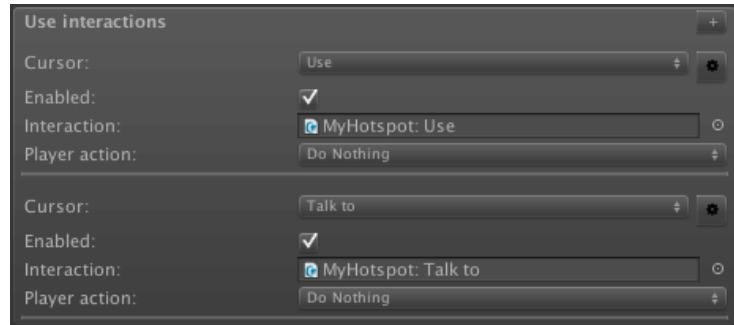
When an inventory item is selected, it can be used on other items or on Hotspots by clicking on them.

## 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:



In this mode, a Hotspot can have as many "Use" interactions as you wish:



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:

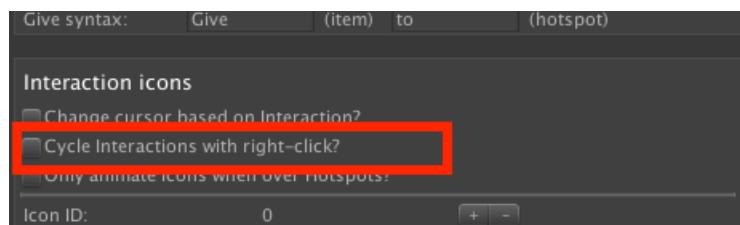
- By pressing either the right-mouse button or an input button named **CycleCursors** to cycle through the available icons. (The last-selected [Inventory item](#) can also optionally be included). Backward-cycling can be performed by pressing an input button named **CycleCursorsBack**.
- By pressing 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.

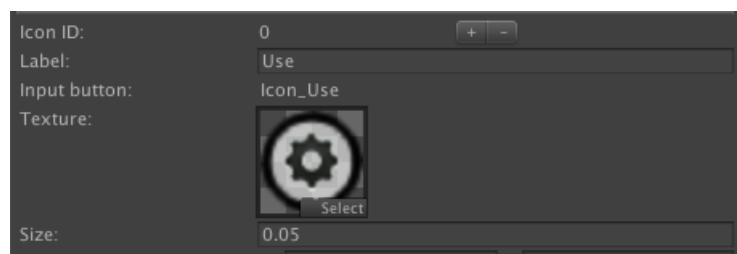
You can enable the right-mouse button cycling of cursor icons in the Cursor Manager:



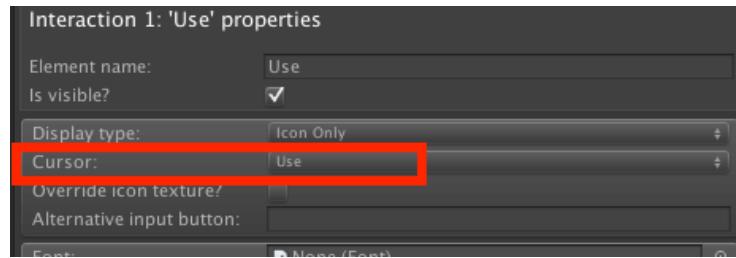
The **Leave out of Cursor cycle?** option for each icon allows you to have individual icons ignored when cycling.

To represent a “Walk to” cursor inside Interaction elements and menus, a separate Interaction icon can be defined and referenced via the **Sync with interaction?** field.

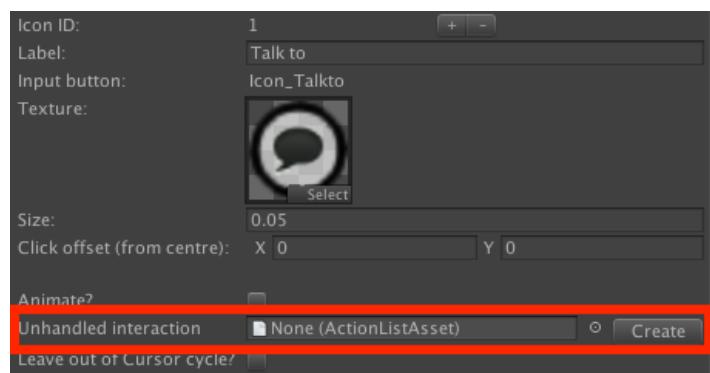
Additionally, each icon has an associated **Input button** name that, when clicked, will cause it to be selected:



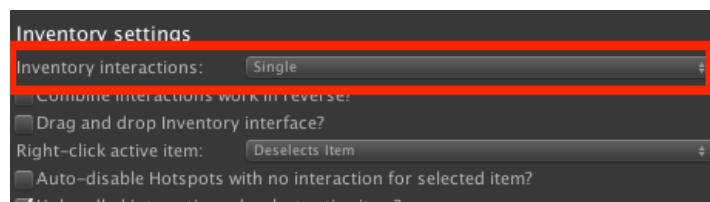
To associate an icon with an [Interaction menu element](#), change the element's **Cursor** field in its list of properties:



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.

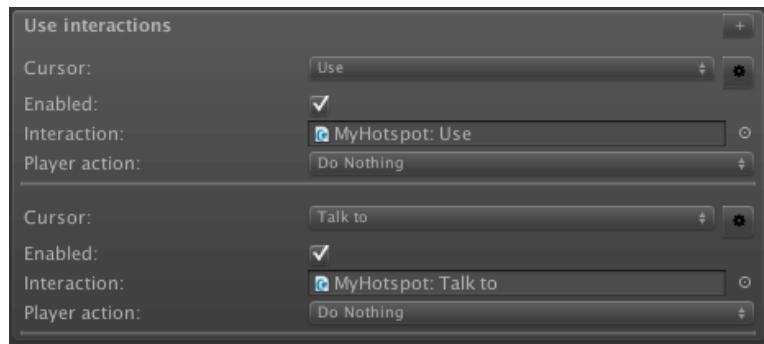
### 5.1.3. Choose Hotspot Then Interaction

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](#).

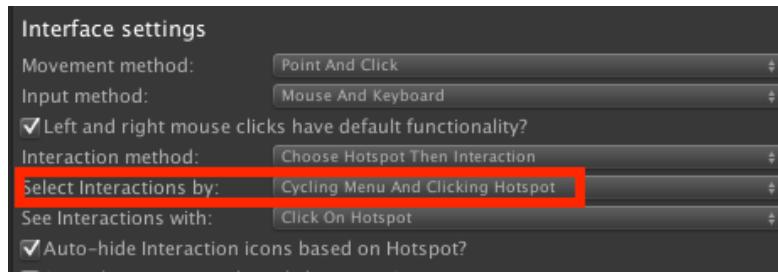
A Hotspot can have as many "Use" interactions as you like:



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:



It has the following options:

#### **Clicking Menu**

Which involves clicking an icon from a Menu that pops up

#### **Cycling Menu And Clicking Hotspot**

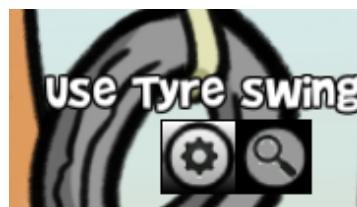
Which involves using input buttons to cycle through icons in a Menu that pops up

#### **Cycling Cursor And Clicking Hotspot**

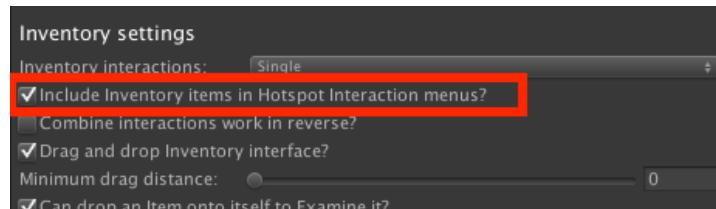
Which involves using input buttons to change the cursor's icon

### **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.

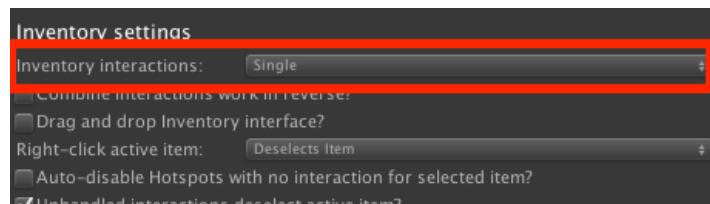
## Cycling Cursor And Clicking Hotspot

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.

`RunInteraction (Button button)`

Runs the interaction associated with the supplied [Button](#) - see below.

`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:

```
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 **OnMenuItemClick** custom event to run your own code as appropriate.

A typical event reads as:

```
private void MyElementClick (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:

[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**.

[RunExamineInteraction \(\)](#)

Runs the [Inventory item's](#) 'Examine' interaction, if the [Settings Manager's](#) **Inventory interactions** field is set to **Single**.

[CombineWithItem \(InvItem otherInvItem\)](#)

Combines the Inventory item with another

[Select \(\)](#)

Selects the inventory item, but does not use it

[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`



**NOTE:** Entries in this List can be null - therefore you should always do a null check when reading entries in this List.

The currently-selected inventory item can be read with:

```
AC.KickStarter.runtimeInventory.SelectedItem;
```

And can be deselected with:

```
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:

```
AC.KickStarter.playerInput.ResetMouseClicked();
```

## 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

A component, run when the scene begins or when called by another ActionList.

#### Interaction

A component, run when the player clicks on a Hotspot. See [Interaction methods](#).

#### Trigger

A component, run when the player or some other object passes through a volume in the scene.

#### DialogOption

A component, 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.



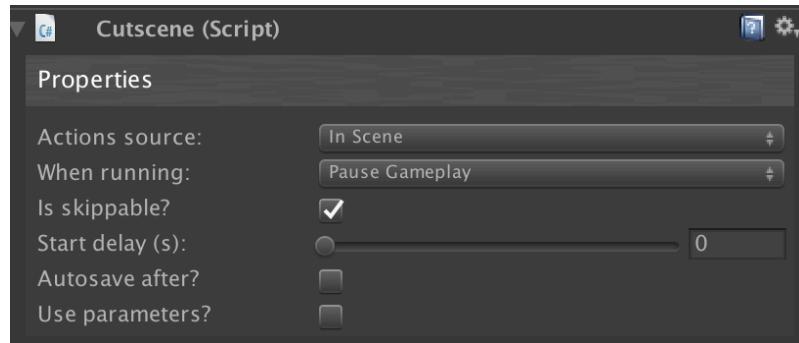
**PROTIP:** [Custom Actions](#) are a powerful way of extending functionality, as they allow you to run your own code within any ActionList. A series of tutorials on writing them can be found [online](#).



**NOTE:** Actions cannot exist in prefabs. If you want an ActionList to exist outside of a scene, use an [ActionList asset](#).

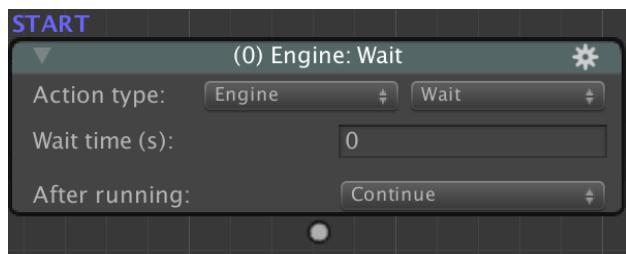
ActionLists can be run from logic objects (such as [Hotspots](#)), when a scene starts via the Scene Manager, when the game begins via the Settings Manager's **ActionList on start game** field. They can also be run from custom scripts, by invoking their **Interact** method - this is true for both scene-based 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:



**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 can be edited by clicking **Edit Actions** underneath. This will bring up the [ActionList Editor](#), where Actions can be added, removed, and modified.



“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** in its 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.

### 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](#)
- [Physics](#)
- [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.



**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](#).

## 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.

## Camera

These Actions deal with the camera system - see [Cameras overview](#) for more.

### **Check active**

Use to determine if a specific camera is currently active.

### **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 attachment point (i.e. 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 also allows a held object to be dropped - with the option to remove it from the scene. The dropped object can be assigned to a GameObject parameter if one is defined - see [ActionList parameters](#).



**NOTE:** If the object is a Scene Item, you can record the holding of objects on the Player character by attaching the [Remember Scene Item](#) component.

## 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 currently full.

### 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.



**PROTIP:** If Unity’s **Localization** package is installed, this Action can directly reference a string table to get its speech text from. If the linked entry has associated **AC Speech Metadata**, it can be used to assign speech audio and lipsync files.

## Rename option

Renames a conversation’s dialogue option label.

## Start conversation

Runs a conversation, and displays its available dialogue options via a Conversation Menu. This will be automatic for any [Menu](#) with an **Appear Type** of **During Conversation** and a **DialogList** element. Alternatively, it can be set to display in a specific Menu.



**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. Unity's "Time.fixedTimeScale" can also be optionally adjusted, in case the physics system needs to work in slow motion as well.

## 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 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.



**NOTE:** To record the playback state of a Playable Director in save games, attach the [Remember Timeline](#) script to it.

## End game

Ends the current game, either by loading an autosave, resetting the scene, resetting all data, restarting the game, 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.



**NOTE:** If the **Movement method** is changed, the Settings Manager asset file will be modified - so you should set the game's default value in your Settings Manager's **ActionList on start game**. This change will not be stored in save game data either, and you should use Variables to keep track instead.

## Wait

Waits a set time before continuing. If a negative time, the Action will wait for one frame.



**PROTIP:** If the ActionList's **When running** field is set to **Run In Background**, this will act as a

## 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.

### Check selected

Checks if a specific Hotspots is currently selected. If a [GameObject parameter](#) is defined, it can optionally be set to the active Hotspot.

### 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.

### Run interaction

Runs a given Hotspot Interaction manually, without requiring input from the player. The Interaction's "Player action" field can optionally be ignored.

# 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.

## Simulate

Simulates the pressing of an input button or axis. The input name must be one recognized by AC in order to take effect - see [Input descriptions](#) for a list of available inputs. Note that the input's recognition is still dependent on the game's current state - so gameplay inputs (e.g. [FlashHotspots](#)) will need to be simulated from [background logic](#) in order to take effect.

## 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). The effects can either be applied to all Crafting elements, or a specific one. See [Crafting](#).

## Property to Variable

Converts an item's [property](#) value to a [Variable](#), or vice-versa. The item in question can either be a specific one, or the one currently selected by the Player. If converting a property to a Variable, 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.

## Scene item

Transfers an Inventory item into the scene, or vice-versa, by referencing its **Linked prefab**. See [Scene items](#). If the ActionList has a GameObject [parameter](#) defined, that parameter's value can optionally be set to the spawned object.

### 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.

### Update content

Alters the an element's label text, the background graphic of Adventure Creator elements, or the texture shown by Graphic elements. The new content can be overridden with an Inventory item or Document [parameter](#).

### 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.

Regardless of the menu's control style, this Action can also be used to simulate the clicking of the specified element.

### 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.

# Object

These Actions deal with scene objects and miscellaneous scripts.

## Add or remove

Instantiates or deletes GameObjects within the current scene. If the ActionList has a GameObject [parameter](#) defined, that parameter's value can optionally be set to the instantiated object.



**PROTIP:** If the project uses Addressables, you can optionally reference the object to spawn by their Addressable name.



**NOTE:** To record the state of added GameObjects in save games, follow the steps outlined in [Saving asset references](#).

## 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.



**NOTE:** This Action cannot pass parameters to its target function. To pass an integer parameter, use the **Object: Send message** Action.

## Change material

Changes the material on any scene-based mesh object.



**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](#).

## 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.

### Check tag

Use to determine if a GameObject or prefab has a particular tag.

### Check visibility

Use to determine if a particular Renderer 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. UI Canvas Group components can also be checked.



**NOTE:** If the visibility within the view of the camera is being checked, the condition will be met if it is also visible with the Scene window.

### Fade sprite

Fades a sprite in 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 UI Canvas and Canvas Group components.



**NOTE:** To record an object's visibility in save games, attach the [Remember Visibility](#) component.

## 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.

## Physics

These Actions make use of Unity's provided physics system.

### **Raycast**

Fires a Raycast (or a SphereCast if the radius is non-zero), either in a given direction, or between two points. Two outputs are provided - the top being used if the ray hit an object in the supplied LayerMask. If the ActionList has GameObject and Vector3 parameters defined, they can optionally be mapped to the hit GameObject and hit position respectively.

## Player

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, or Cutscene On Start. 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.



**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

### **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.

# Sound

These Actions deal with the playback of [Sounds](#) and [Music](#).

## Change footsteps

Changes which Surface is referenced by a character's [Footstep Sounds](#) component.

## 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](#).

### 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.  $2 + 3 * 4$ ), which can also include tokens of the form [var:ID] and [localVar:ID] to denote the value of a Variable - see [Speech tokens](#).

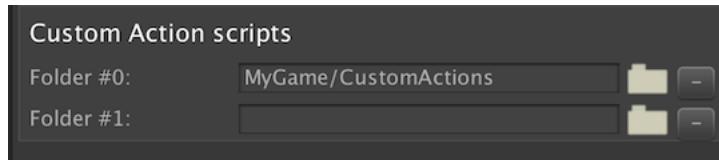
## **Set Timer**

Starts, stops or resumes a [Timer](#). When resuming, the Timer's ticker can optionally be reset.

## 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:



**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. By default, this will only be called once, so that the skipping process occurs over a single frame. If this Action must be run over multiple frames even when skipping, set the Action's **RunNormallyWhenSkip** property to True.

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](#).

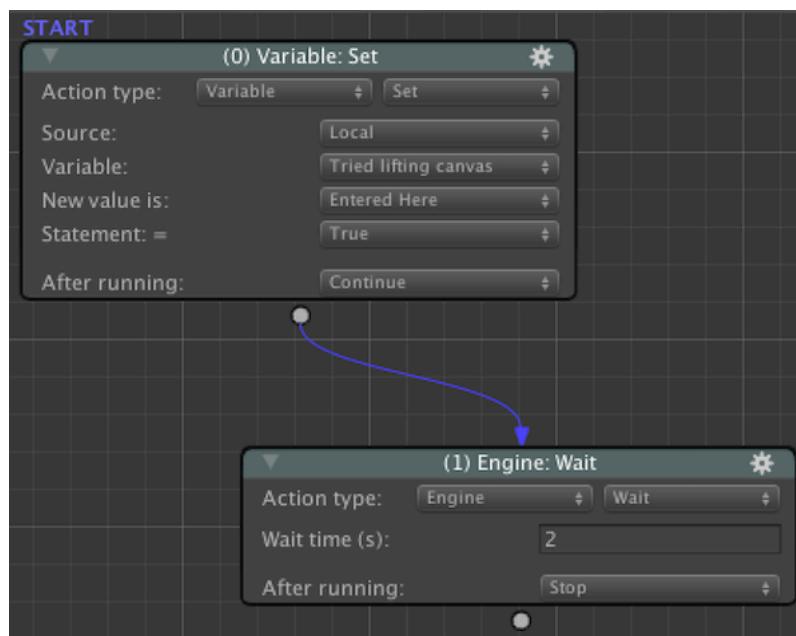
### 5.2.3. The ActionList Editor

The ActionList Editor is the main window that ActionLists are edited from. It provides a node-based workflow that makes the flow of lists easy to understand..

It can be opened in any of the following ways:

- By clicking the **Edit Actions** 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:

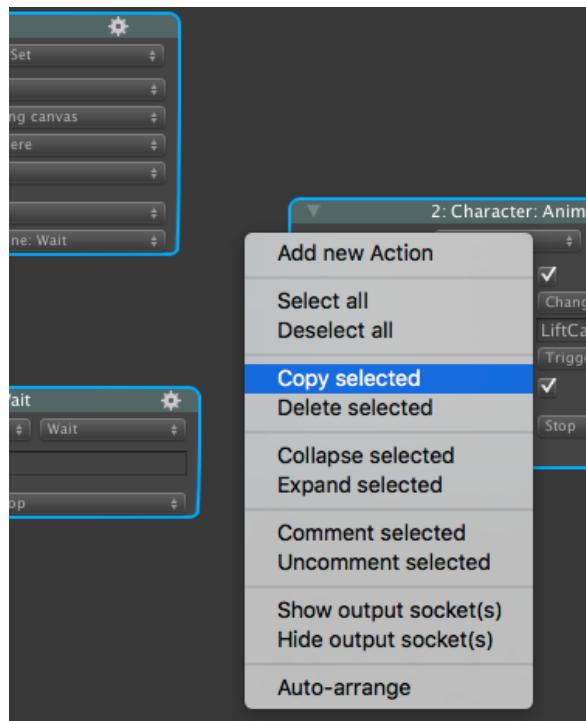


Actions can be collapsed and expanded by clicking the top-left arrow:



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 **Grouping** options allow you to group multiple Actions together. This is useful if they serve a common task, such as updating a series of variables. Like Actions, groups can be moved by dragging them around the window. Right-clicking their header also allows them to be named.

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.

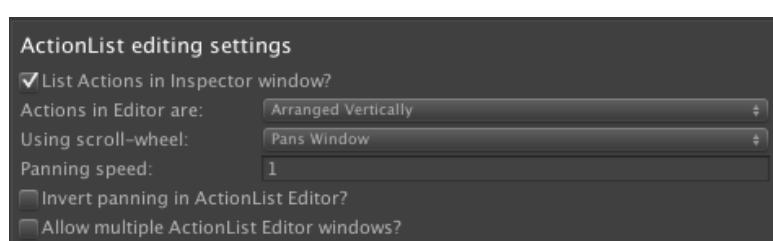
Clicking an Action's cog icon brings up its own context menu, from where you can toggle breakpoints and comments. Comments will be visible even if the Action itself is collapsed, allowing you to get an overview of what an ActionList does even if all the Actions are collapsed:



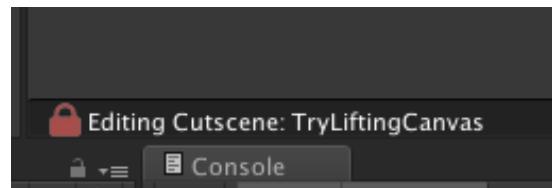
Comment boxes support both variable and parameter tokens - see [Speech tokens](#).

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:



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:



In the lower-right corner of the window are three further buttons:

#### **View all / Reset view**

Toggles between viewing all Actions and resetting the viewport.

#### **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:

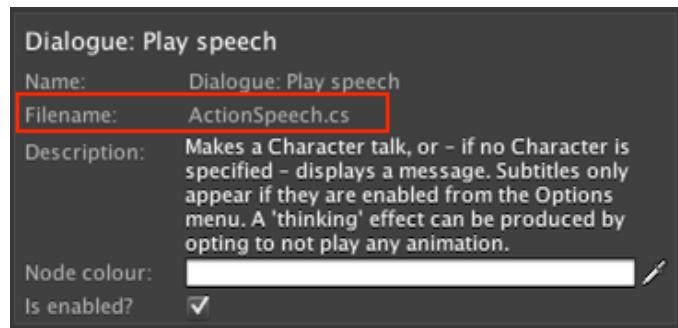
- Pre-populate an ActionList with a standard set of Actions to further work on
- Dynamically generate ActionLists at runtime
- Reduce filesizes and memory usage, since runtime-created ActionLists are not saved in a project

In order to create Actions, we first need to reference an ActionList component in which to store them, i.e.:

```
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:

```
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.



**PROTIP:** If an Action's CreateNew function includes a GameObject or component parameter, and a prefab is assigned, then the Action will rely on the instance of the prefab in the scene - provided it has an associated Constant ID component.

The returned [Action class](#) can then be placed within the [ActionList's](#) actions List:

```
actionList.actions = new List<Action> { myNewSpeechAction };
```

Actions can also be created and placed in a single command:

```
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:

```
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.

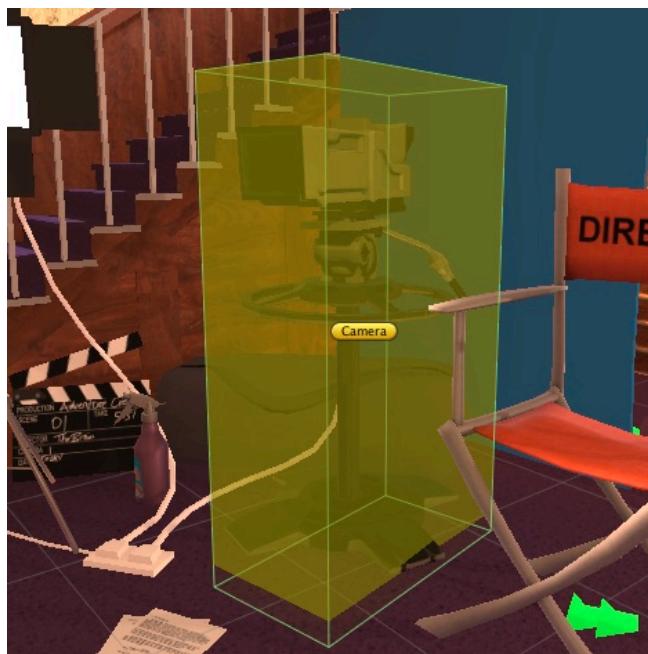
## 5.3. Hotspots

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.

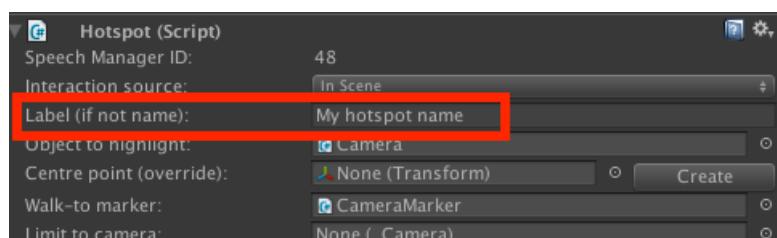


If a scene mesh or sprite is selected when creating a new Hotspot, the option **Position over selected mesh?** will appear in the Prefabs panel.



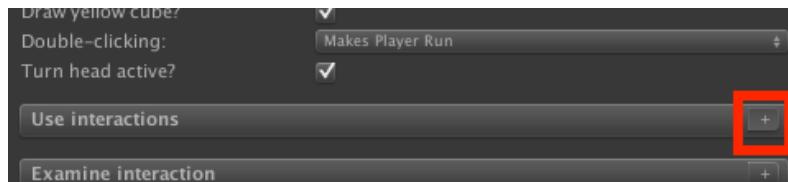
**PROTIP:** The Hotspot prefab is just a convenience tool - any object can be made interactive by attaching the Hotspot component and a collider.

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:



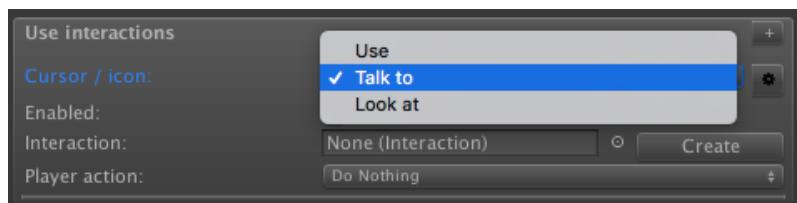
You can make an object glow when the Hotspot is selected by adding a [Highlight](#) component to it, and then referring to it from the Hotspot's **Object to highlight** field in its Inspector.

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](#).

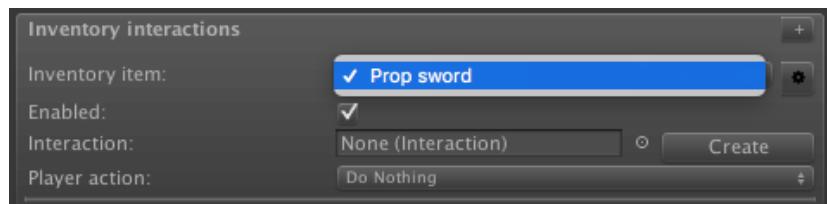
When creating **Use** interactions, the **Cursor / Icon** field lets you associate the interaction with an interaction icon:



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.

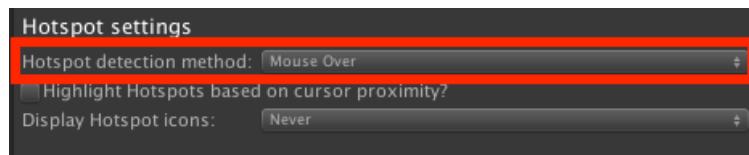


**PROTIP:** If an Inventory interaction calls a script function that has a single integer parameter, that parameter will be set to the item's ID number. This is also the case for Unhandled inventory interactions.

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 - by default - detect the one closest to the camera. In 2D, you can optionally elect to instead select the GameObject with the lower Y-position by checking **Detect lowest overlapping Hotspot?**.

## 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](#).

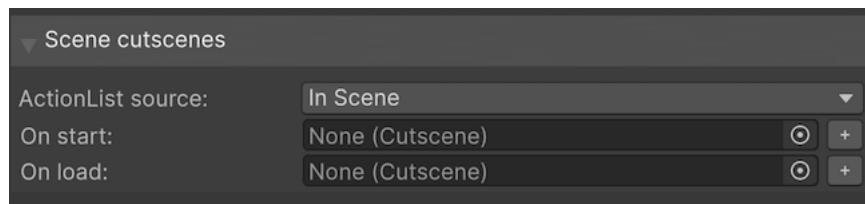
## 5.5. Cutscenes

A Cutscene is an [ActionList](#) that can be run automatically when a scene begins, as well as by any other Action or ActionList.

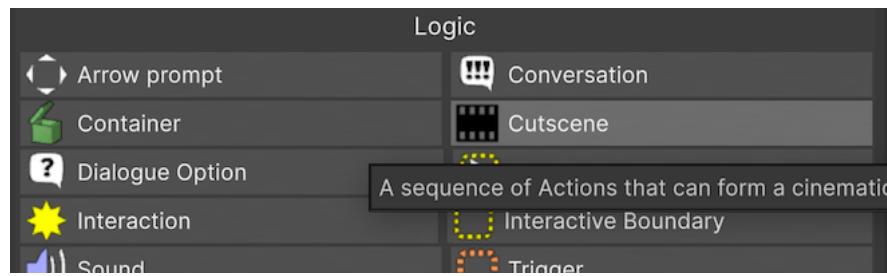


**PROTIP:** Don't let the name confuse you: a Cutscene can be used to create background processes, process logic and more - not just gameplay-blocking sequences.

Cutscenes are created in the [Scene Manager](#). They can either be created by clicking the + icon beside each of the **Scene cutscene** types:



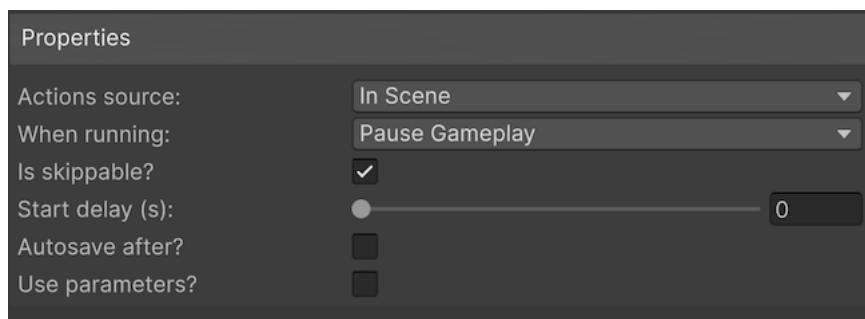
Or by clicking the **Cutscene** prefab button under the Logic panel:



**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:

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.

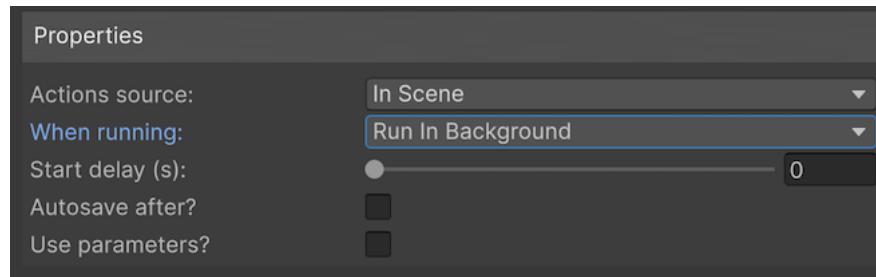


**NOTE:** When skipping the [ActionList: Run in parallel](#) Action, each chain that stems from it will be skipped in order, with each chain run to completion before the next. Therefore, you should take this into account when ordering your chains.

## 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.



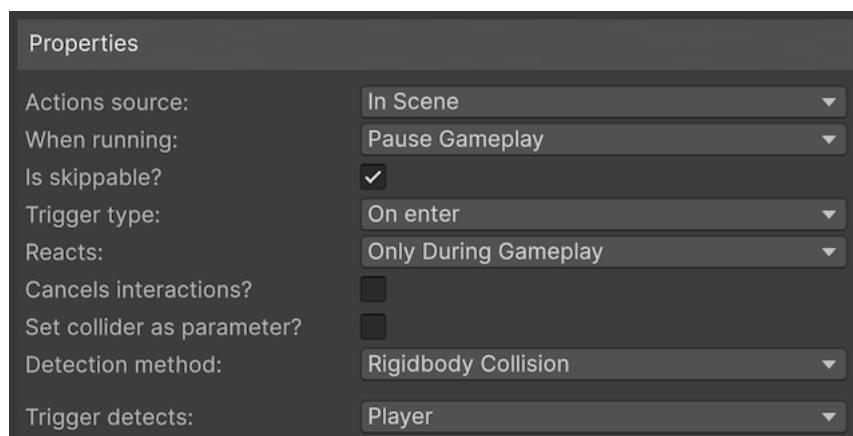
**NOTE:** If a Trigger's **Detection method** is set to **Rigidbody Collision**, then the object it is set to detect must have a **Rigidbody** component (or **Rigidbody 2D**, for 2D games).

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.

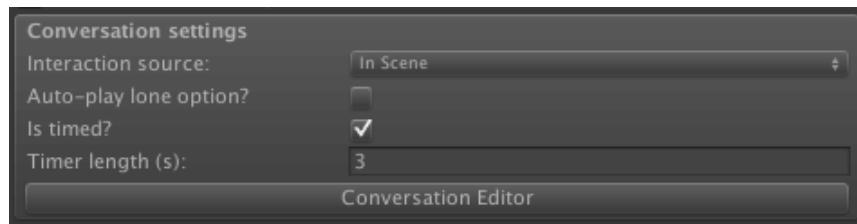


**NOTE:** A Conversation is shown on screen through the [DialogList element](#), in a Menu with an **Appear type of During Conversation**. The default interface provides you with a [Conversation menu](#).

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:

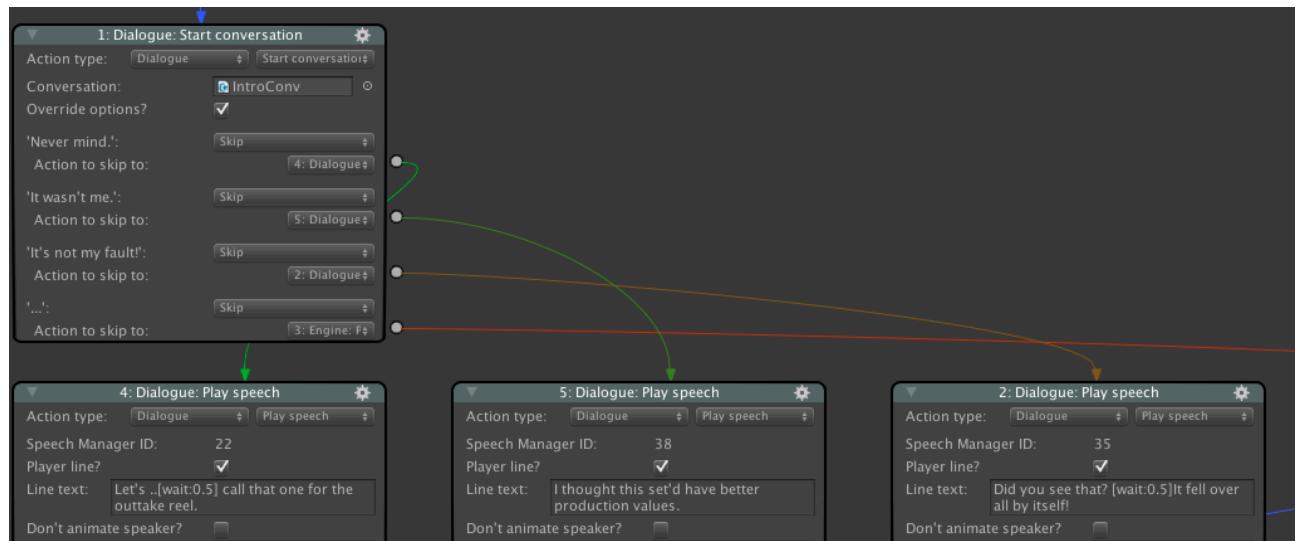


Each option can be assigned a label and a texture, but bear in mind that your [Conversation Menu](#) is what determines how they are displayed.

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:



**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.

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**.

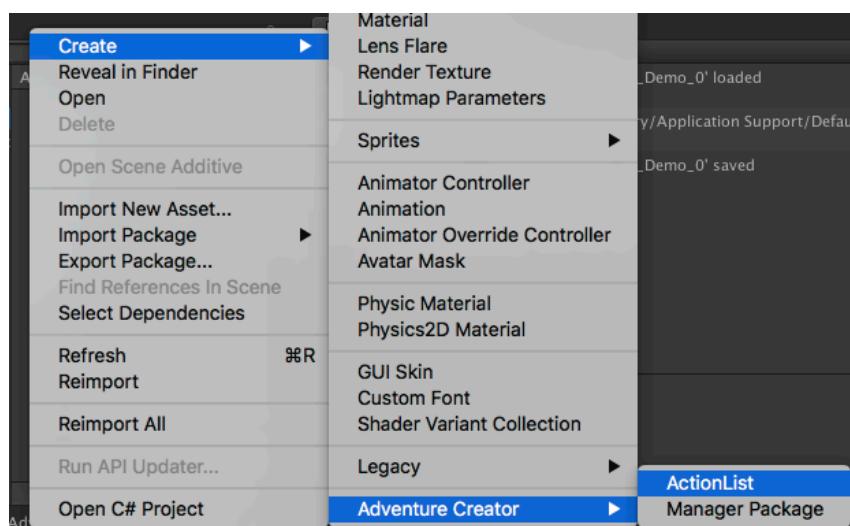


**NOTE:** Conversations normally prevent regular player movement and interactions from occurring, so that they can focus on the choice to make. However, this can be changed by checking **Allow regular gameplay during Conversations?** in the Settings Manager. Be mindful that this may create gameplay conflicts (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**:

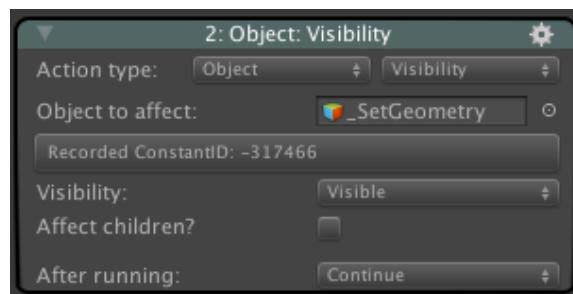


Double-clicking this asset will open it within the [ActionList Editor](#).



**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 **DeselectInventory** 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:



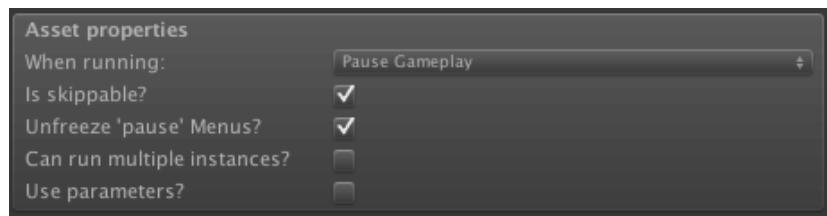
This number is stored inside the Constant ID component attached to the GameObject - be sure to save the scene after it has been added. If the scene that holds an object referenced by the ActionList is not open, the connection is not broken - what matters is the Constant ID field beneath it. Clicking **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:



**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

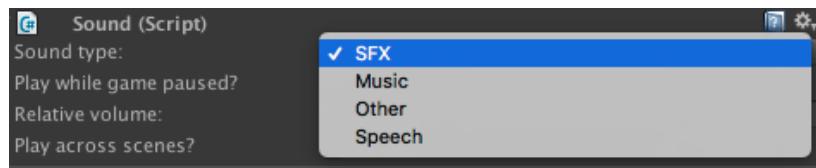
A Sound object provides AC with the ability to control the volume and playback of Audio Sources. The [Sound: Play](#) Action relies on the Sound component to work.



**PROTIP:** To easily play an audio clip without the need for a Sound component, use the [Sound: Play one-shot](#) Action.

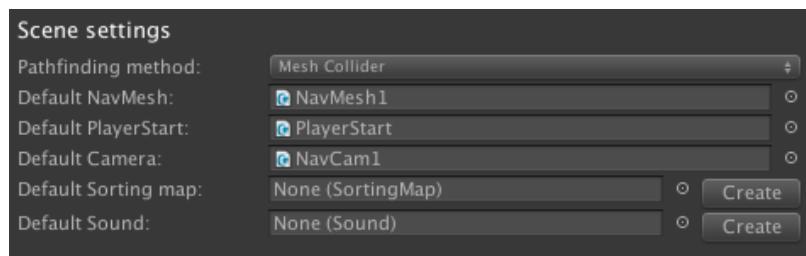
Sound objects are created by clicking the **Sound** button under the [Scene Manager's Logic panel](#) followed by **Add new**. You can set up your sound using the Audio Source component as normal, but the Volume field will be overridden. Instead, you can use the **Relative volume** field in the Sound 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:



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:



Sound objects can connect to Unity's **Audio Mixer Groups**. Mixer Groups can be set within the Settings Manager, under **Audio Settings**:



Volume (or attenuation) parameters for each sound type will also need to be 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.

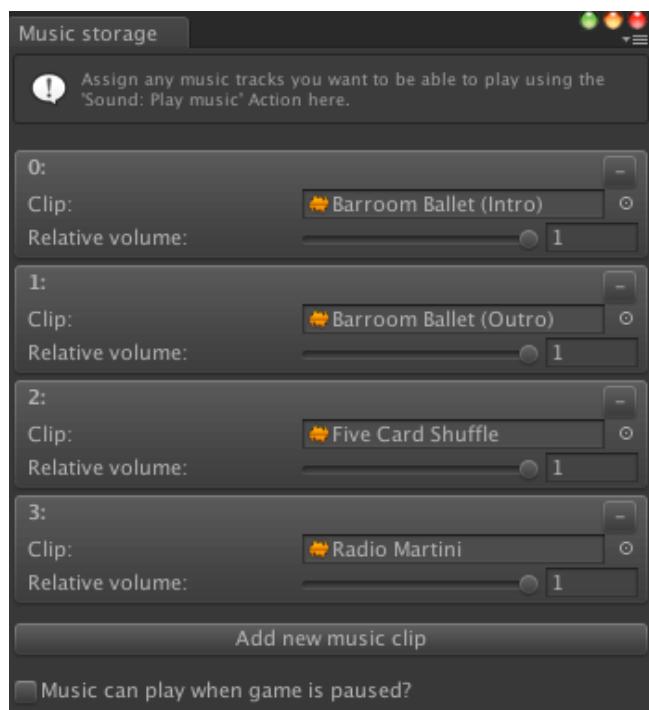
Though the Sound object can be used to play music, it is recommended to use the dedicated [Music system](#) for music playback.

## 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 to their own Mixer Group to play from.



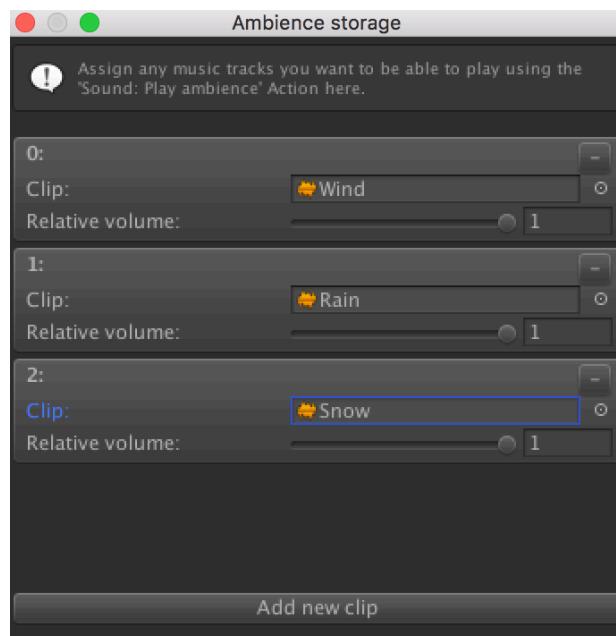
**NOTE:** When music tracks are assigned in this window, the associated data is stored in the [Settings Manager](#). Therefore, be aware that if you change your Settings Manager asset file, you will also have to update the **Music Storage window** with your tracks.

## 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**:



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.



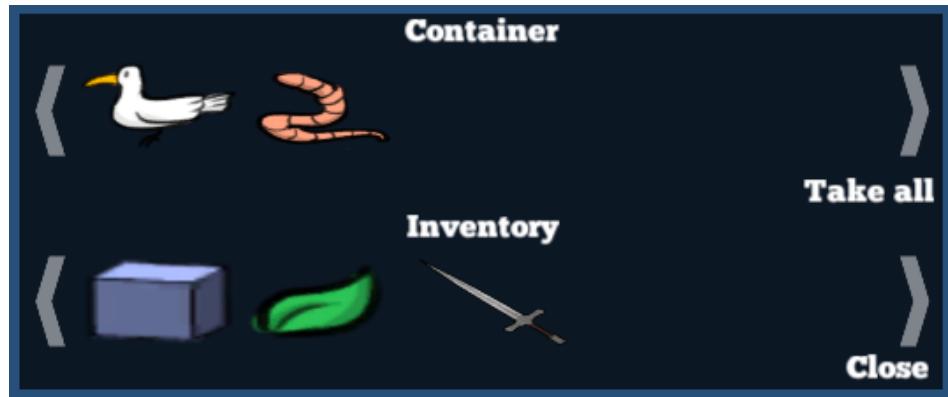
**PROTIP:** If Audio Mixer Groups are enabled (see [Sounds](#)), each track can optionally be set their own Mixer Group to play from.



**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 re-order 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

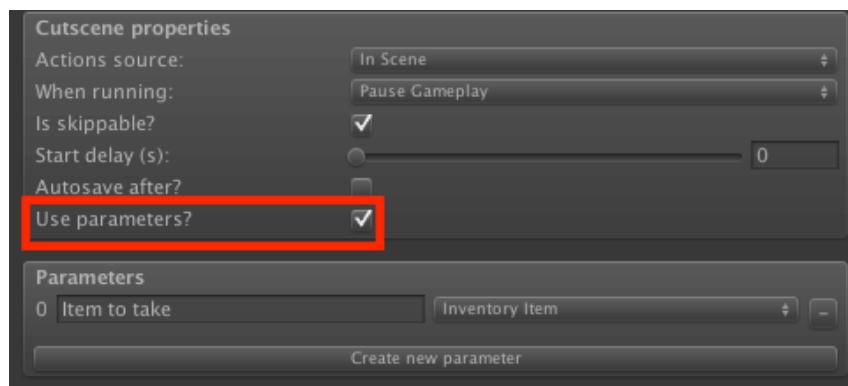
In a typical game, there'll be times we want to perform the same task multiple times on different objects. For example, whenever the player picks up an item, we'd want its associated Hotspot to be disabled, its scene graphic to be made invisible, and the item to be added to the inventory.

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.

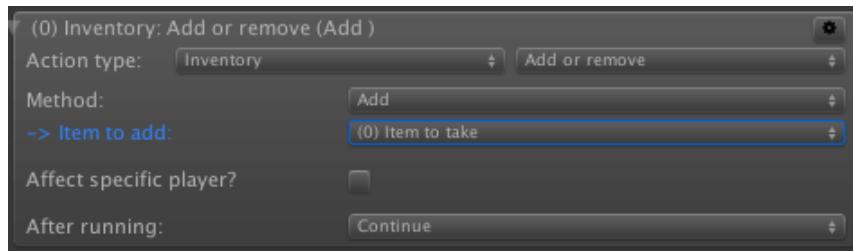
Cutscenes, DialogueOptions, Interactions and ActionList assets have a **Use parameters?** checkbox in their list of properties. Enabling this allows you to define what parameters the ActionList can use:



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)
- Game Object (e.g. Camera, NPC)
- Unity Object (e.g. Material / AudioClip assets)
- Vector3
- PopUp
- Document
- Objective

If an Action contains a field that matches a define parameter's type, you can override it with that parameter by clicking the **P** icon beside it:



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
- By using [Events](#) to run an ActionList automatically based on some condition



**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.

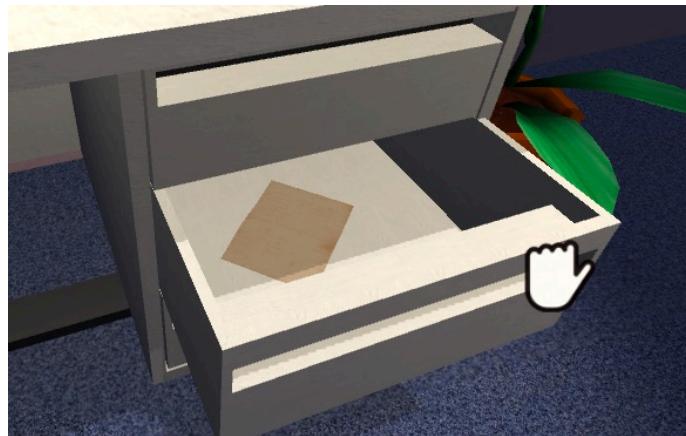
When a [Cutscene](#) sources its Actions from an [ActionList asset](#) which uses parameters, the Cutscene will also make use of those parameters. You can choose to either use the parameter values from the asset file ([Sync parameter values?](#)), or the scene object ([Set local parameter values?](#)).



**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.

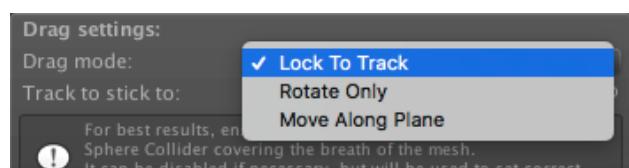


**PROTIP:** The [Physics Demo](#) features cupboards, drawers and tumbler Draggables. A practical guide to creating such a Draggable from scratch can be found in the [Making a first-person game](#) tutorial.

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.

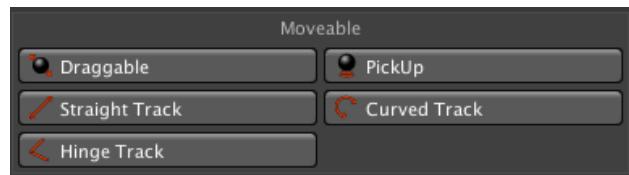
### Lock To Track

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:



### 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.



**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 Dragables 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 Dragables 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

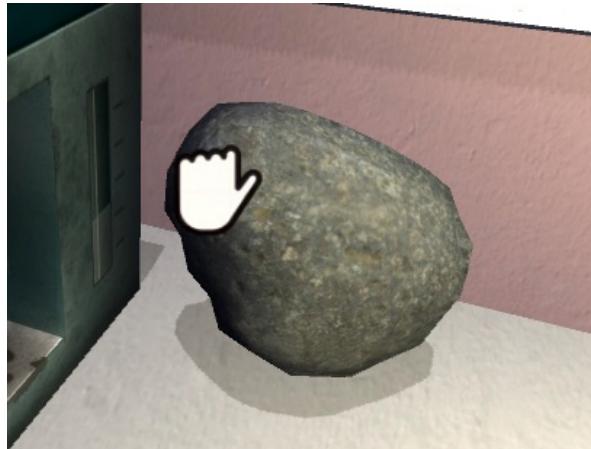
interactive. This volume is marked by a Box Collider by default, but this can be replaced with any collider component.



**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 affect 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.

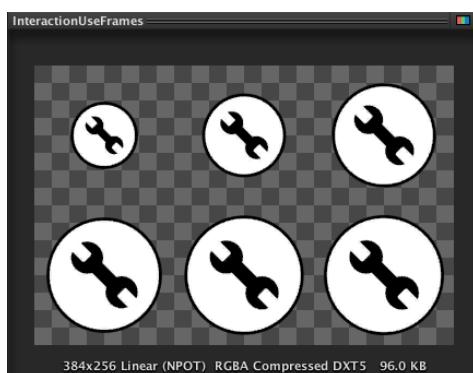


**NOTE:** If **Hardware** rendering is used to draw cursors, the cursor graphic assets must have their **Texture type** fields set to **Cursor** in order to correctly display.

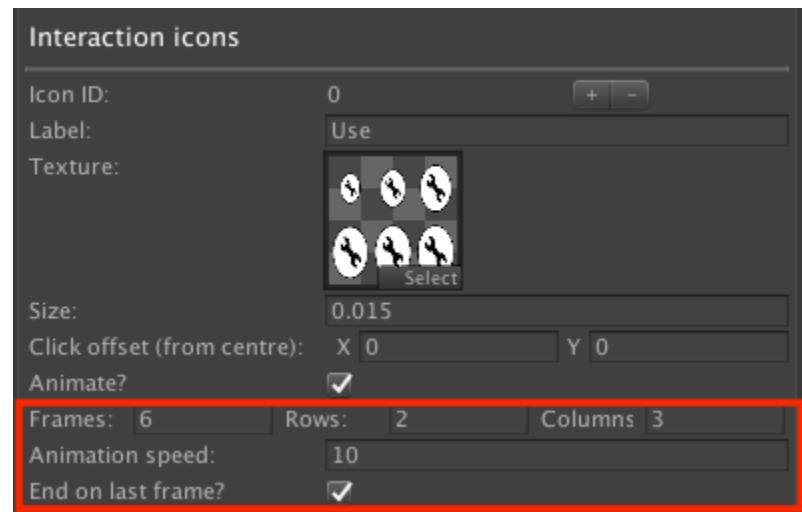
The “click offset” can also be set for each cursor. In Software mode, this offset represents how far the click point is from the cursor's centre, as a decimal of its size. In Hardware mode, the offset represents how far the click point is from the cursor's top-left, in exact pixels.

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:



## 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:

```
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 Trigger parameters be present:

- **Win**
- **Lose**
- **Hold** or **Hit** (the Action will describe which states it requires).

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:

```
KickStarter.stateHandler.EnforceCutsceneMode  
KickStarter.stateHandler.EnforcePauseMode
```

Scene-based ActionLists and [ActionList assets](#) can be run with:

```
myActionList.Interact ();  
myActionList.RunFromIndex (int index);  
myActionListAsset.Interact ();  
myActionListAsset.RunFromIndex (int index);
```

And ended with:

```
myActionList.Kill ();  
myActionListAsset.KillAllInstances ();
```

If an ActionList uses [Parameters](#) (each an instance of the `ActionParameter` class), then can be retrieved with:

```
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:

```
AC.KickStarter.actionListManager.EndCutscene ();
```

Conversations can be triggered with:

```
myConversation.Interact ();
```

And ended with:

```
KickStarter.playerInput.EndConversation ();
```

The currently-selected Hotspot can be retrieved with:

```
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);
OnHotspotsFlash ();

OnRunTrigger (AC_Trigger trigger, GameObject collidingObject);

OnEnableInteractionMenus (Hotspot hotspot, InvItem invItem);
OnPointAndClick (ref 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);
OnDelaySceneChange (SceneInfo sceneInfo, System.Action callback);
OnAfterChangeScene (LoadingGame loadingGame);
```

```
OnCompleteScenePreload (int preloadSceneName);
OnStartScene ();

OnChangeCursorMode (int cursorID);
OnSetHardwareCursor (Texture2D texture, Vector2 clickOffset);
OnCursorLock (bool isLocked);

OnQTEBegin (QTEType qteType, string inputName, float duration);
OnQTEWin (QTEType qteType);
OnQTELose (QTEType qteType);

OnActiveInputFire (ActiveInput activeInput);
```

## 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.

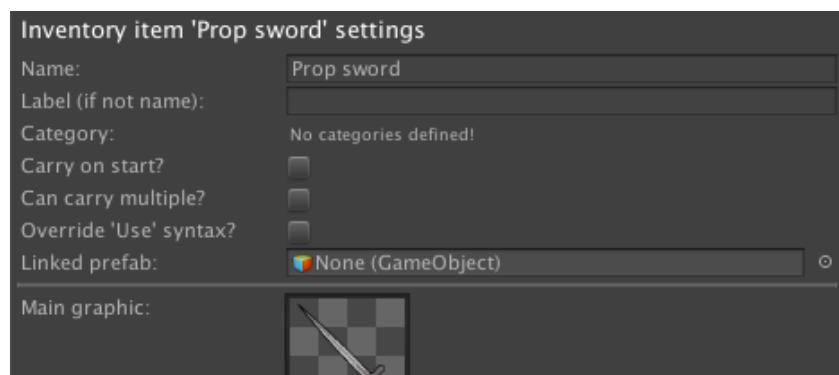


**PROTIP:** Inventory items don't need to be "items" in the physical sense - they can also refer to things like spells or abilities that the player can possess.

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:



### 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 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 can be used to represent the item in the scene. For details on its usage, see [Scene items](#).

#### **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](#).

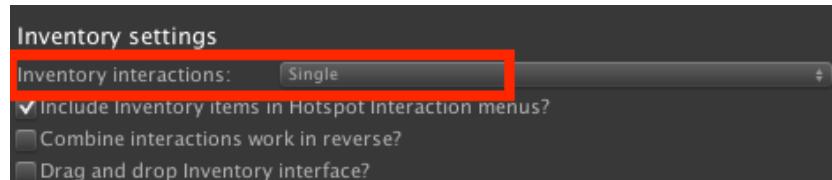
The maximum number of Inventory items the Player can hold can be set at the very top.



**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**:



**NOTE:** When in [Context sensitive](#) mode, this field is hidden and set to **Single** - see below.

This field has two options: **Single** and **Multiple**.

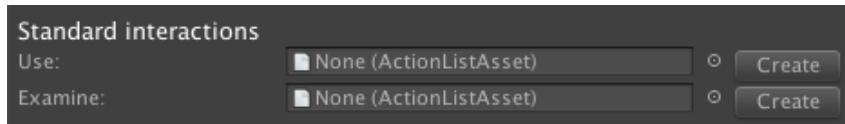
### Single

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](#):



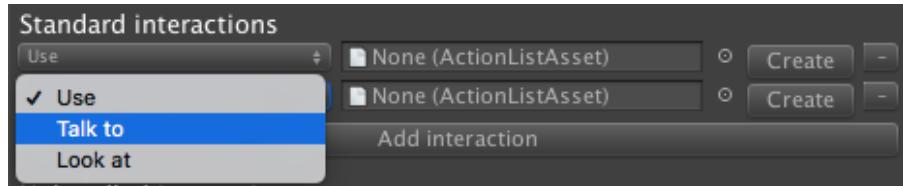
If an item has a "Use" interaction, then left-clicking the item will run that instead of selecting it. If you wish to select the item as part of the ActionList, you can use the [Inventory: Select](#) Action.

### 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.

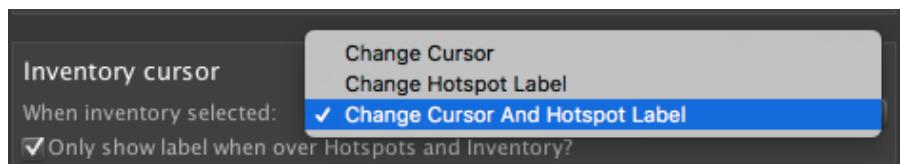
Each item's **Standard interactions** panel in the [Inventory Manager](#) allows you to define multiple "Use" ActionList asset - with each one associated with a different **Interaction icon** defined in the [Cursor Manager](#):

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:

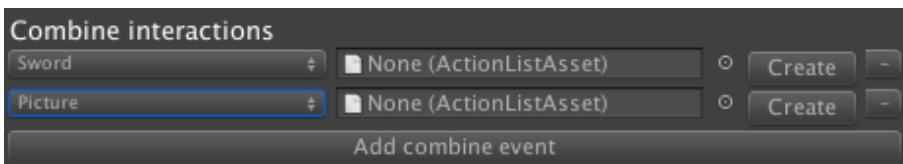


**NOTE:** If you wish to instead signify an item's selection via a static icon, you can create an [InventoryBox element](#) of the type **Display Selected**. This technique is covered in the [Custom inventory interface](#) section of the [First-person tutorial](#).



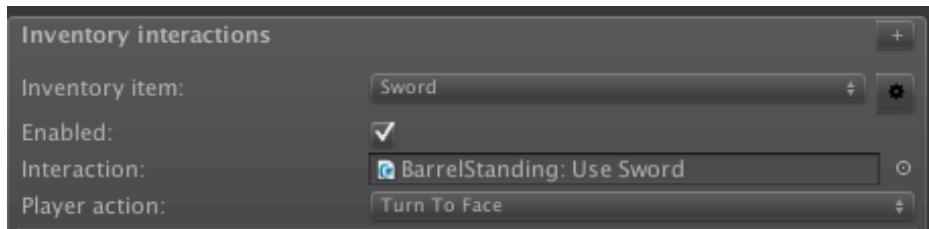
**PROTIP:** Clicking or tapping again will cause the item to become de-selected. However, this can be changed to releasing the initial click or tap by checking [Drag and drop Inventory interface?](#), under [Inventory settings](#) in the Settings Manager.

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](#):



**PROTIP:** To avoid having to create two sets of interactions for each item (i.e. "Use A on B" and "Use B on A"), just check **Combine interactions work in reverse?** in the Settings Manager.

Interactions with [Hotspots](#) are defined in the 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 “Unhandled” 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:



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.



**PROTIP:** If your chosen [Interaction method](#) is set to either [Choose Hotspot Then Interaction](#) or [Choose Interaction Then Hotspot](#), Inventory interactions can be marked as "Give" when interacting with NPCs. In a NPC's Hotspot Inspector, a **Use/Give** popup box will appear beside Inventory interactions. By default, items are selected in "Use" mode, but this can be changed with the [Inventory: Select](#) Action or through script.

## 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:

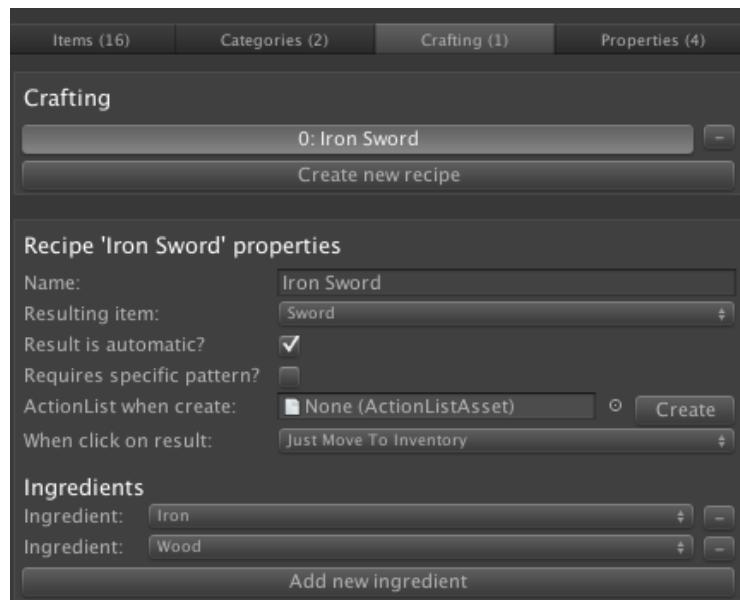
```
AC.KickStarter.runtimeInventory.localItems;
```

## 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](#):



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.

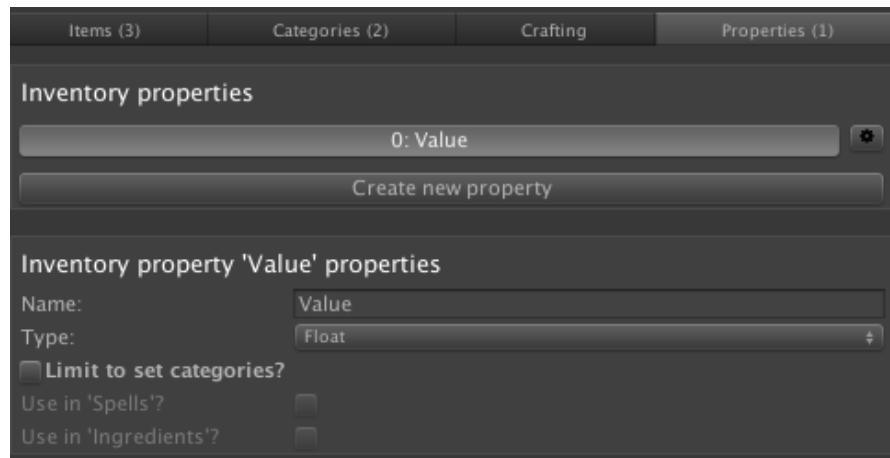


**NOTE:** The [default Crafting Menu](#) has an **Appear type** of **Manual**, meaning it will not open unless it is told to with the [Menu: Change state](#) Action.

## 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

### **Vector 3**

A group of three numbers that can represent a position, scale, rotation or direction

### **Game Object**

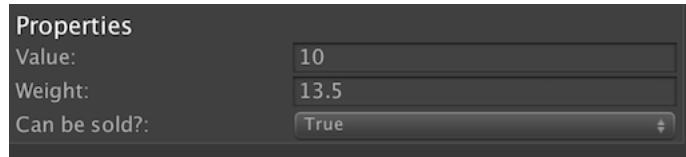
In the case of Global variables, this is a prefab. For Local and Component variables, this can either be a prefab or an object in the scene.

## Unity Object

A Unity asset or prefab available in the Project window.

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:



They can also be assigned to [Documents](#) and [Objectives](#), provided they are both in the same **Category**.

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. Scene items

The **Scene Item** component allows an Inventory item to be represented by a GameObject in the scene. This is useful for mechanics such as:

- Inspecting items from the Inventory with a "close up" mechanic
- Equipping items in the Player's hand, for interacting with the environment
- Dropping items from the Inventory into the scene, while allowing them to be picked up again later

To establish a link between a GameObject and an Inventory item, attach the Scene Item component, make it a prefab, and assign it in the item's **Linked prefab** property field. If the object is going to be present in the scene before it is moved to the Inventory, add the [Remember Scene Item](#) component as well, and set its Default Inventory item field to match the intended item.

Once an item has a Linked prefab assigned, the [Inventory: Scene item](#) Action can be used to transfer it from the Inventory to the scene, and vice-versa. If this Action is used to spawn in a linked prefab that has no Scene Item component, one will be added automatically.

When transferring to the scene, the **Remove original?** option can be used to take the item out of the Inventory - as though it were being dropped in the scene. Unchecked, the item will remain in place, but the Scene Item will still represent it.

If the parent ActionList has a GameObject parameter defined, then the resulting Scene Item can be mapped to this parameter's value. This means that Actions that follow can further manipulate the spawned object - for example, by parenting it to the Player's hand with the [Character: Hold object](#) Action.

To save the presence of a spawned Scene Item held by the Player, attach the [Remember Scene Item](#) component.

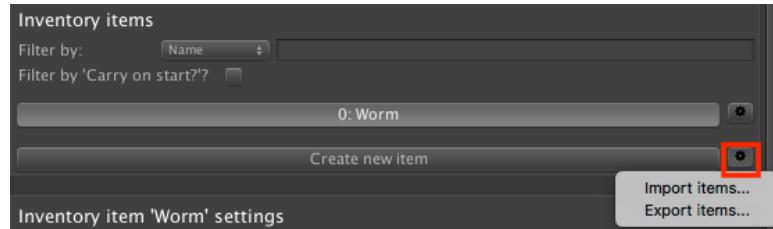
The advantage of using this technique, over the [Object: Add or remove](#) Action, is that the link between Inventory item and GameObject is retained. If changes are made (through scripting) to the Item's properties, for example, then those changes can be accessed from the Scene Item component. The [Remember Scene Item](#) component will also update the item with the contents of any any other Remember component attached to it - allowing a change made to the Scene Item to be restored upon removing it from, and then re-adding it to, the scene.

To save the position and presence of a Scene Item in the scene, attach the [Remember Transform](#) component.

## 6.7. 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.

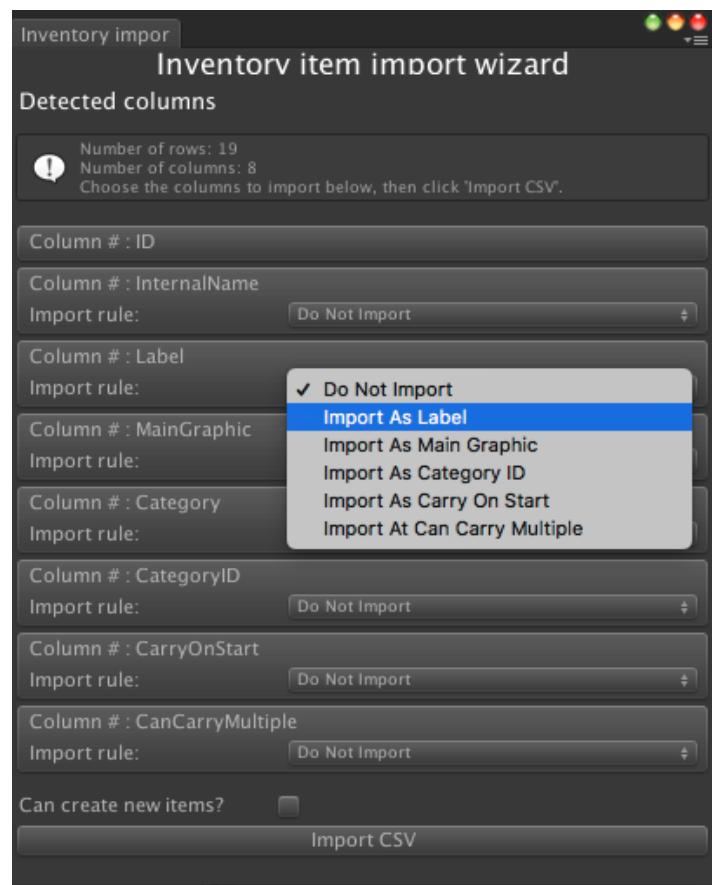
To export them, go to the [Inventory Manager's Items](#) tab, click on the cog icon to the right of the **Create new item** button and choose **Export items...**:



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**:



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.



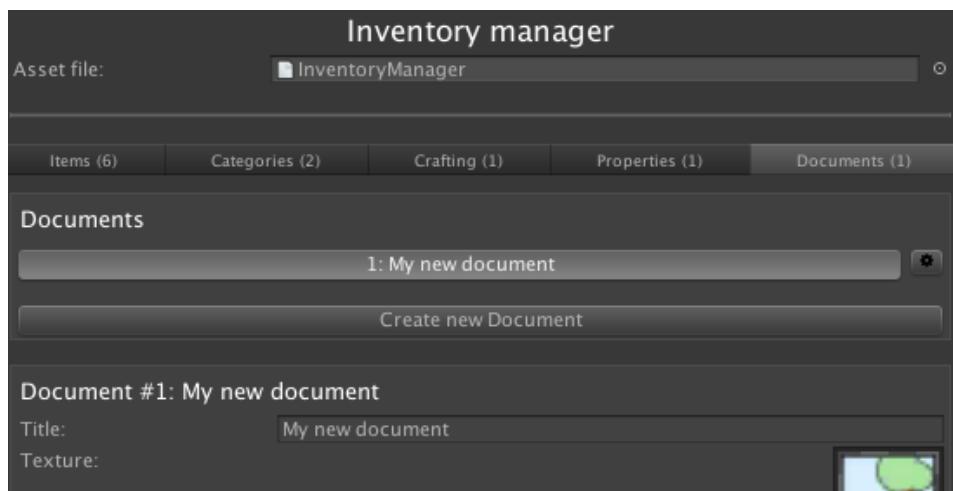
**NOTE:** The existing inventory data won't be cleared by this process, but data for items that have matching ID numbers will be overwritten. Therefore, you should back up your project before attempting this process.

## 6.8. 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:



Here, they can be given a title and a texture, as well as a series of pages that each have their own text and 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**
- A [Graphic element](#) with a **Graphic type** of **Page Texture** (if pages have textures)

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.

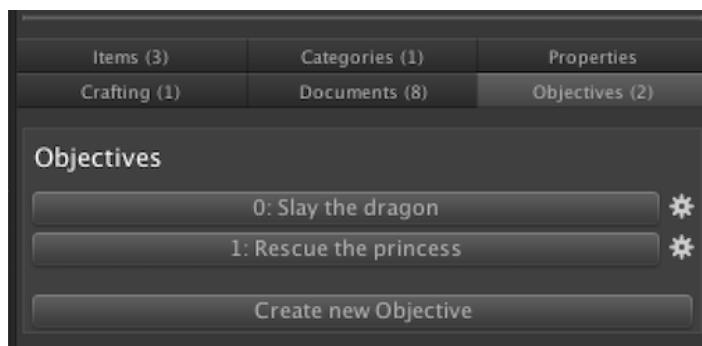
## 6.9. Objectives

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 progresses in this task, the Objective's state is updated accordingly.

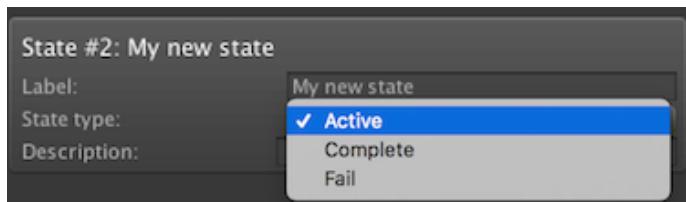


**NOTE:** Objectives are purely a way of conveying a task's status to the player, and do not have any "logic" associated with them.

Objectives can be defined in the [Inventory Manager](#), under the **Objectives** tab:



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.



For each state, an [ActionList asset](#) can be assigned that runs when the state is entered.

A category can also be assigned, if created in the **Categories** tab. An [InventoryBox elements](#) that display Objectives can be filtered by category - allowing for the separation of e.g. "main" and "optional" Objectives.

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](#).

## 6.9.1. Sub-objectives

If an Objective has states that include multiple steps, or has different ways it can be completed, it can help to break it down into sub-Objectives - such that completing the sub-Objective(s) automatically affects the “parent” Objective.

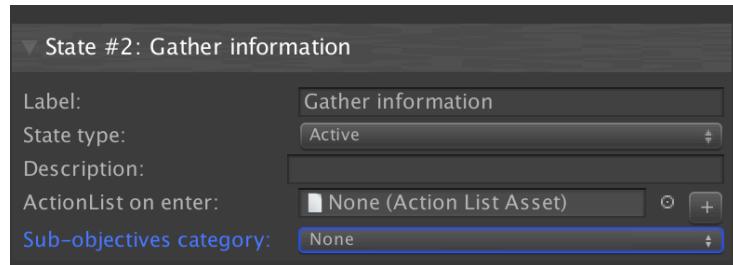


**PROTIP:** A tutorial covering this topic can be found [online](#).

This is useful when the player must complete multiple Objectives to complete a task - or alternatively, complete only one from a list of Objectives.

For example, let’s say we have an Objective named “Gather intel”, which involves asking Tom, Dick and Harry for information. We could break these down into individual sub-Objectives (“Talk to Tom”, “Talk to Dick” etc), and then link them to “Gather intel”. We could then have the “Gather intel” Objective auto-complete either when we talk to all three, or only one.

Sub-Objectives are defined by grouping them into Objective [categories](#). In our example above: we would go to the Inventory Manager’s **Categories** tab, and then create a new Category - with **Available to Objectives?** checked - named “Talk to townspeople”. Once an Objective category has been defined, it can be assigned in an Objective state’s **Sub-Objectives category** dropdown:



Once assigned, the automatic behaviour of these Objectives can then be set:

**Auto-start sub-Objectives when enter?** will cause all Objectives in the sub-Objectives category to become active when the “parent” Objective state is entered.

Beneath that, the “parent” Objective can be made to switch its own state automatically when the sub-Objectives meet a given condition:

- All are completed
- Any is completed
- All are failed
- Any are failed

To display sub-Objectives to the player, an [InventoryBox element](#) can be used to list the selected Objective’s sub-Objectives. Alternatively, sub-Objectives can be accessed through [scripting](#).

## 6.10. 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:

```
invInstance = new InvInstance (invItem);
invInstance = new InvInstance (itemName);
invInstance = new InvInstance (itemID);
```

If you have an `InvInstance` class, you can get its associated item with:

```
invInstance.InvItem;
```

Items can be interacted with using functions within `InvInstance`:

```
invInstance.Select ();
invInstance.Deselect ();
invInstance.Use ();
invInstance.Use (int iconID);
invInstance.Examine ();
invInstance.Combine (InvInstance otherInvInstance);
```

Item textures can be accessed and modified at runtime with:

```
invInstance.Tex
invInstance.ActiveTex
invInstance.SelectedTex
```

Inventory properties can be modified per-instance at runtime, and can be accessed with:

```
invInstance.GetProperty (int propertyID)
```

If your chosen `Interaction method` supports it, you can access an instance's selection mode with:

```
invInstance.SelectItemMode
```

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:

```
KickStarter.runtimeInventory.PlayerInvCollection;
```

Items in a collection can be modified and accessed with:

```
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:

```
KickStarter.runtimeInventory.SelectedItem;
```

And de-selected with:

```
KickStarter.runtimeInventory.SetNull ();
```

The unselected item underneath the cursor can be retrieved with:

```
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:

```
KickStarter.runtimeDocuments  
KickStarter.runtimeObjectives
```

The Inventory system involves the following [events](#):

```
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);  
OnInventoryHover (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);  
OnRequestInventoryCountText (InvInstance invInstance, bool  
isSelectedCursor);  
  
OnContainerOpen (Container container);  
OnContainerClose (Container container);  
OnContainerAdd (Container container, InvInstance invInstance);  
OnContainerRemove (Container container, InvInstance invInstance);  
OnContainerRemoveFail (Container container, ContainerItem  
containerItem);
```

```
OnCraftingSucceed (Recipe recipe, InvInstance invInstance);

OnDocumentOpen (DocumentInstance documentInstance);
OnDocumentClose (DocumentInstance documentInstance);
OnDocumentAdd (DocumentInstance documentInstance);
OnDocumentRemove (DocumentInstance documentInstance);

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](#).

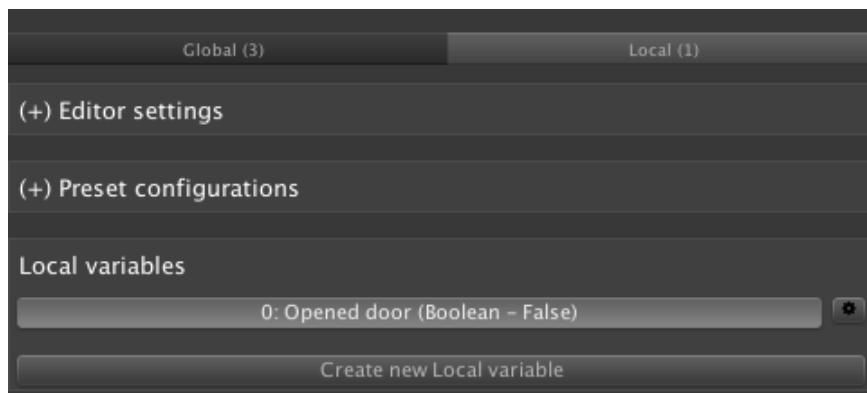
### Local

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:



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.



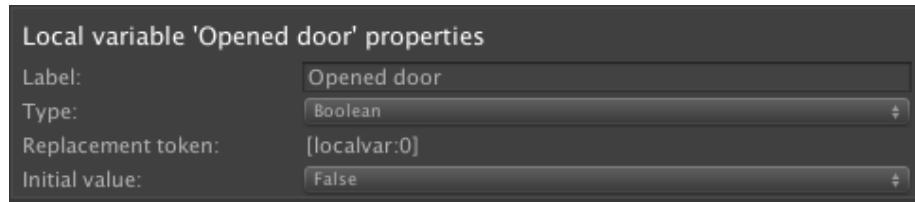
**PROTIP:** Global, Local or Component? To avoid clutter, a variable should be placed according to where it needs to be accessed. If it must be accessed across multiple scenes, it should be Global. If it is only accessed within a single scene, it's best off as Local. Component variables are best relied 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:



### **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.

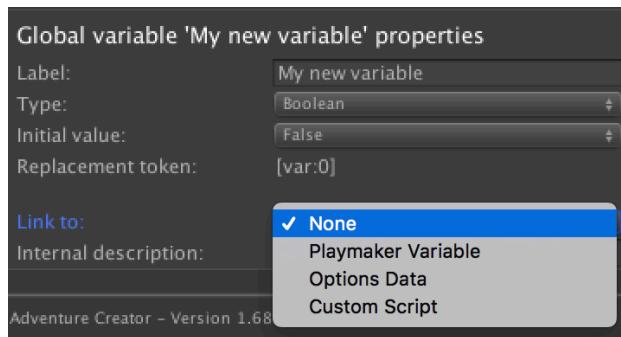
Variable values can also be both read and written to through scripting - see [Variable scripting](#). They can also be automatically synced with other values or assets - see [Variable linking](#).

## 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)
```

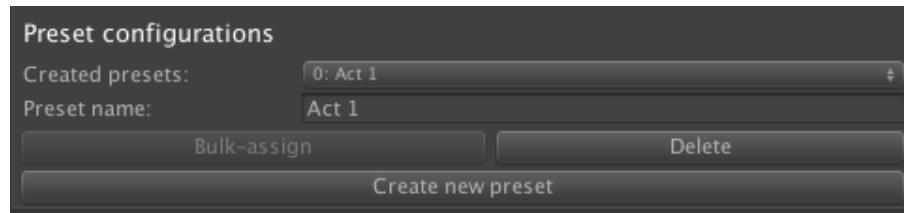
This event will be triggered before AC reads the variable's value, when requested through e.g. the [Variable: Check](#) Action. Therefore, a custom event can use this to transfer the value of the custom script's variable to AC.

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.

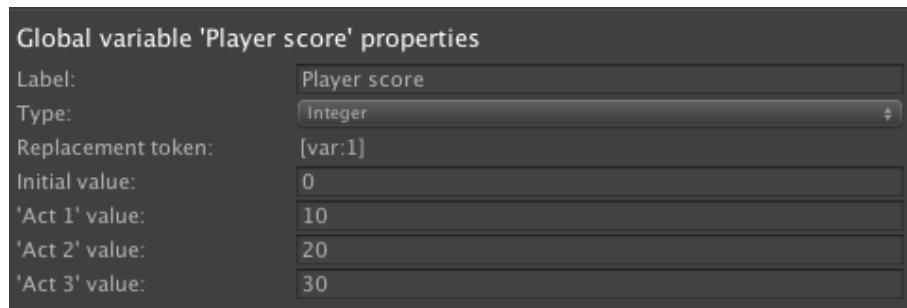
## 7.4. Variable presets

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:



You can assign each Variable's preset values, or prevent it from being included, within the its **Properties** panel:



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. Timers

Timers are special variables that automatically change by a fixed amount over time. They can be used to keep track of timed sequences, or aid with mechanics such as an oxygen meter if the Player is underwater.

Timers are defined in the Timers Editor, which can be accessed from **Adventure Creator → Editors → Timers Editor** in the top toolbar.

Each Timer has its own properties related to its minimum and maximum values, how frequently it updates, and more. ActionLists can optionally be assigned when it is updated, or reaches its limit. Timers can also be linked to Integer, Float and PopUp Global variables.

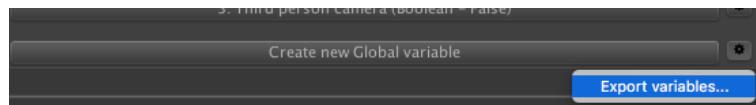
To control a Timer, use the **Variable: Set Timer** Action, which can start, stop and resume Timers. A Timer's state is saved automatically in save-game files.

A Timer's value can be presented in [Timer elements](#), or within Label elements and speech with the **[timer:ID] text token**.

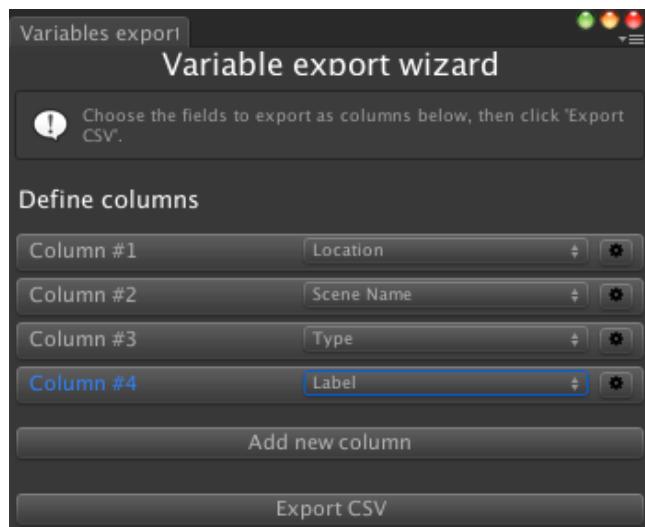
## 7.6. Exporting variables

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.

## 7.7. Scene attributes

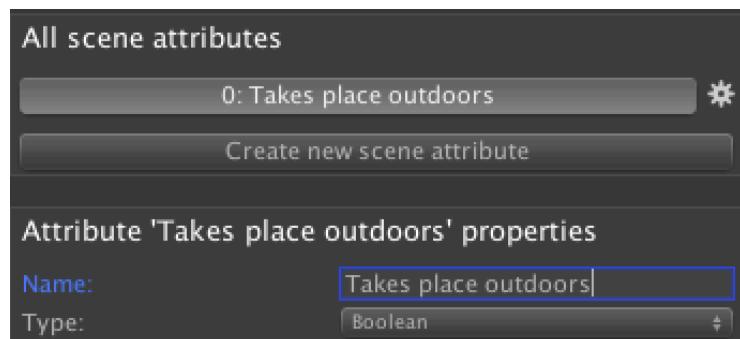
Scene attributes are a special set of variables that exist in all scenes, but can't be written to. They allow you to set properties about a scene that can later be read using the [Scene: Check attribute](#) Action.

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:



A scene attribute's current value can also be displayed in Menus using the **[scene:X]** token - see [Text tokens](#).

## 7.8. 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:

```
GVar myVar = GlobalVariables.GetVariable (int id);  
GVar myVar = GlobalVariables.GetVariable (string name);
```

Similarly, a Local Variable can be retrieved with:

```
GVar myVar = LocalVariables.GetVariable (int id);  
GVar myVar = LocalVariables.GetVariable (string name);
```

To access Component Variables, a reference to the Variables class is needed:

```
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:

```
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:

```
myVar.GetValue ();
```

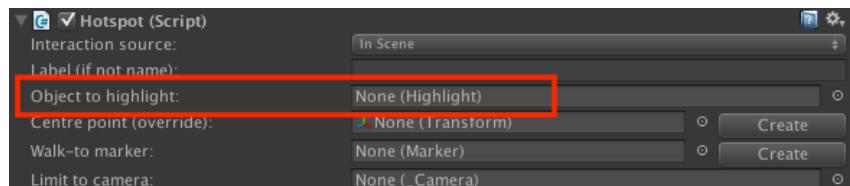
The variable system has the following `events`:

```
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.



**NOTE:** The default brightening effect is performed by modifying a Material's "`_Color`" property, which is available when using Unity's Standard shader, or "`_BaseColor`" property if present. The property to affect can be overridden via the **Highlight material override** field - either per-component or globally in the [Settings Manager](#).

### 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.

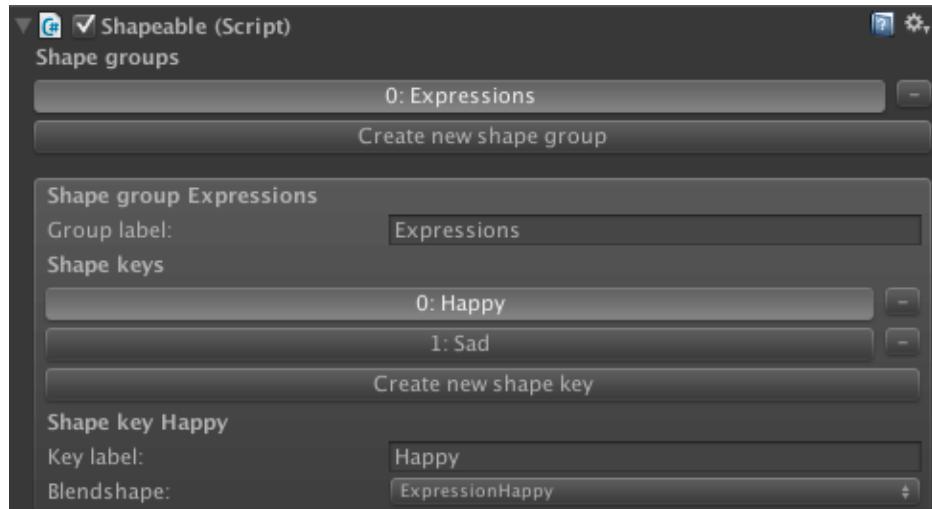
However, it is often the case that some shapes won't be used together - and as one set is made active, another must be made inactive. This is often the case when using blendshapes for expressions or mouth phonemes.

The **Shapeable** component allows you to group blendshapes together so that their weights can be controlled in bulk, by only allowing for one key 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 set blendshapes:



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 used 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.

If the Moveable has a Rigidbody component, it can optionally be used to predict if movement commands given to it will result in a collision - and cancel the command if so.



**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.

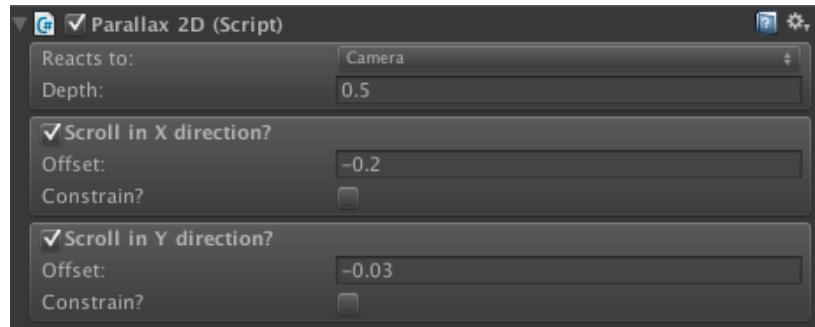
As this happens, all objects in the scene will move across the game window at the same rate, regardless of their distance from the camera.

To combat this, the **Parallax 2D** component is used to achieve a depth effect 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.

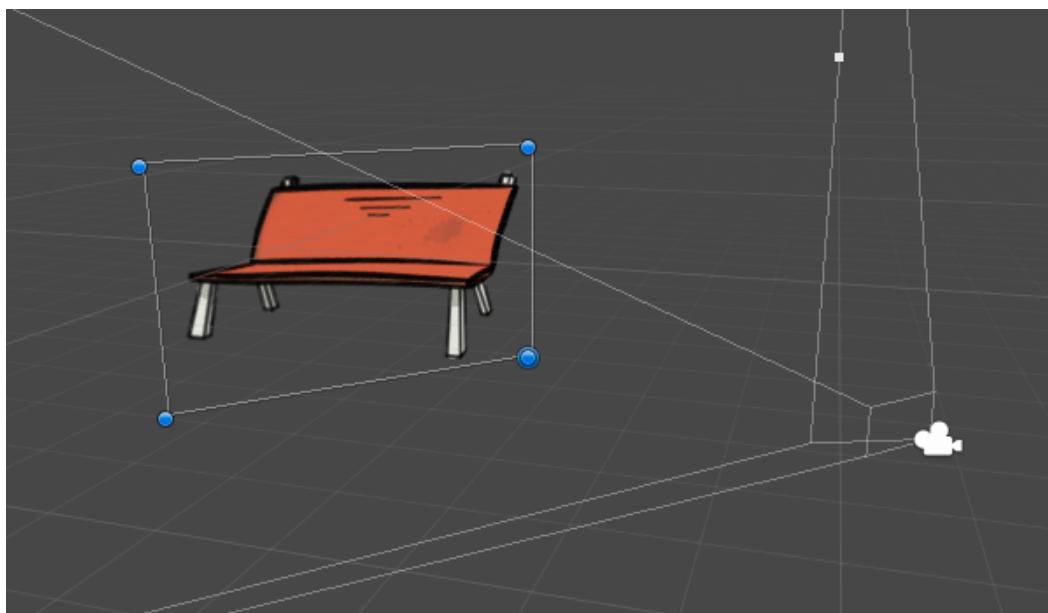


**PROTIP:** This component also works with Video Player components, and works by setting the Alpha value of the video to either 1 or 0, based on the active camera.

## 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 a Light on and off easily with the [Object: Send message](#) Action. When attached to a Light component (or Light2D, if using Unity's 2D Universal Render Pipeline), the **Turn On** and **Turn Off** messages will perform as expected. Alternatively, it can be attached to the parent of multiple Lights and affect them all together.



**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 control 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. 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.

## 8.11. 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.

## 8.12. 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.

## 8.13. 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.

## 8.14. Set Event Runner Parameters component

The **Set Event Runner Parameters** component allows you to set values for all [parameters](#) defined in an [Event Runner](#)'s ActionList. Note that it will be overridden by any parameter values that the Event itself sets.

## 8.15. Set Drag Parameters

The **Set Drag Parameters** component allows you to set values for all parameters defined in a [Drag](#) or [Pickup](#)'s **Interaction on drop** and **Interaction on move** asset files, provided that the **Actions source** field is set to **Asset File**.

## 8.16. 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 root, and assign the **Transform to control** to the RectTransform that it should reposition. Typically this should be the Menu's **Rect transform boundary**, an immediate child of the Canvas that describes the boundary of all other UI components - so that manipulating it affects the whole UI's display.

In its 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.

## 8.17. Link Variable To Animator

This component can synchronise a Global or 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 either a Global Variables, or a Variables component (with either a Bool, Int, PopUp or Float variable defined), as well as an Animator component with a parameter of the same type and name defined. Then attach the **Link Variable To Animator** component, and fill in the fields in its Inspector.

A two-way link can be established by then selecting the Variable, and setting its **Link to** field to **Custom Script**.

If instead left as **None**, then the link will be one-way only - changing the Variable's value will affect the Animator parameter, but not the other way around.

This script relies on the technique covered in [Linking with custom scripts](#) chapter.

## 8.18. Survive Scene Changes

Attaching this component to a GameObject will cause it to be moved to the **DontDestroyOnLoad** section of the Hierarchy while in Play mode, preventing it from not being destroyed when the active scene is changed.

This is useful for creating objects and logic that should be persistent or accessible at all times, but which cannot be kept outside of the scene as an asset or prefab. For example, a series of Containers that holds separate equipment items.

To avoid duplicates of such objects being created when re-entering their original scene, the Settings Manager's **ActionList when start game** asset can be used to run an **Object: Add or remove** Action that spawns in objects that should be persistent.

[Remember components](#) attached to such objects will work, but will be saved as "global data", independent of any scene data.

## 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.

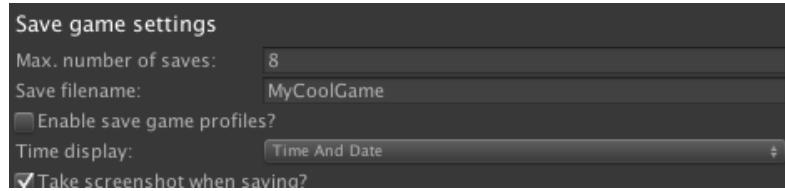
### Scene data

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, its 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 filename

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 screenshot texture

If save screenshots are enabled (above), a Render Texture can optionally be assigned here, to use as its basis. Otherwise, a default full-screen screenshot will be taken instead.

### 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.

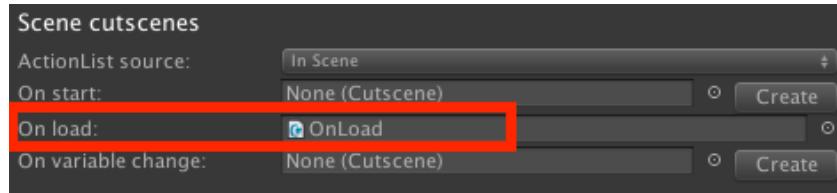
When reading a save file, AC reads this data and returns the player to the correct scene automatically. When switching scene through gameplay, scene data will also be loaded automatically.



**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.KickStarter.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.



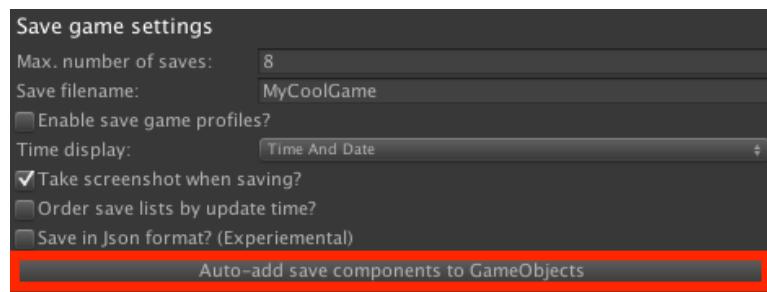
**PROTIP:** It is possible to save custom global data by storing them in Global Variables. A tutorial for doing so can be found [online](#).

### 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](#):

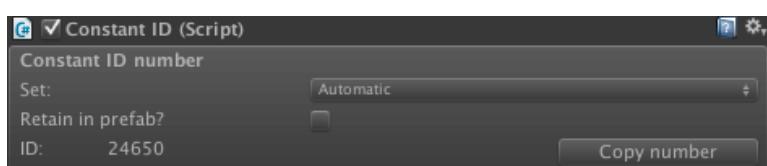


**NOTE:** You should back up your project before running this operation, but this will work for most games that don't rely on [custom save data](#). However, you should still be aware of the procedure to prepare objects manually should your game have particular save requirements.

When a GameObject has such a component, a disk icon appears beside it in the Hierarchy window:



The most basic save component is **Constant ID**, which is used to generate a unique number for any GameObject it is attached to:



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.

PROTIP: Pay attention to the Constant ID number when saving a scene. It will influence many of your objects.



**PROTIP:** It is possible to have the Console list how a GameObject is used in ActionLists by choosing **Find local / global references** from the save component's "cog" menu.

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 GameCamera 2D Drag**

Saves the position of a [GameCamera 2D Drag](#) camera type.

### **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 Scene Item**

Saves the state of a [Scene Item](#) component. A default Inventory item to be associated with must be defined. This component will save the object's presence in the scene - a task normally reserved for the **Remember Transform** component. However, the latter component should still be used to record the object's position and parentage.

### **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.

The **Relative load order** can be used to set the order in which it is loaded, relative to other Remember Transforms. This is useful if you have many such components parented to one another, and you need to restore data in order of their Hierarchy.

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?**.

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:

```
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

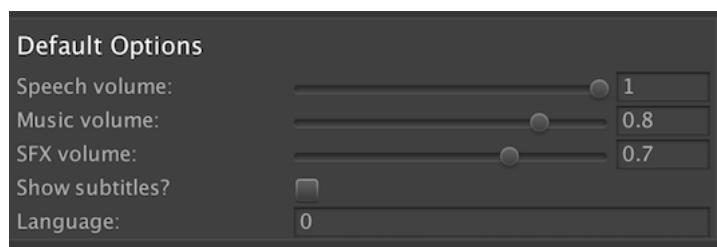
Options data is independent from save data, allowing option values to “survive” the loading of a save file. They are stored in Unity's PlayerPrefs, under a key that is based on your game's name. If you make use of [Profiles](#), then each profile has its own set of Options data.

Options data is loaded when the game begins, and saved whenever a change is made to any of them.

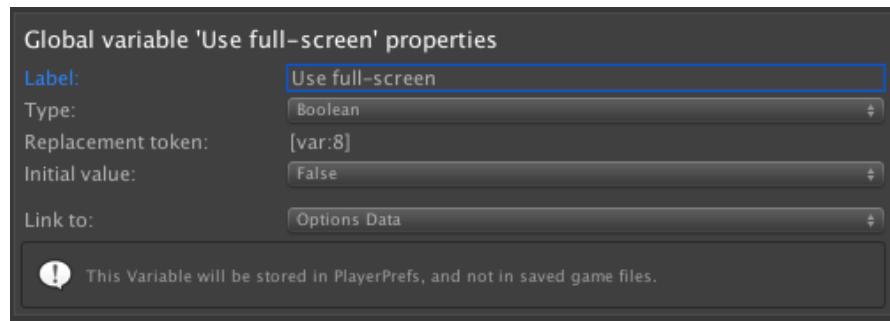
All Adventure Creator games have five options by default:

- 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](#):



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**:



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.



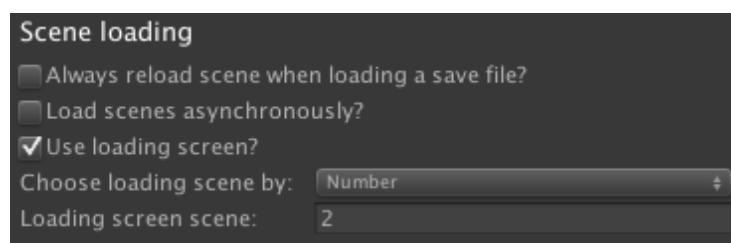
**PROTIP:** A tutorial on creating custom options can be found [online](#).

## 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 as 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:



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:

```
AC.Kickstarter.sceneChanger.ActivateLoadedScene ();
```

A “Complete Loading Example” script that demonstrates this can be found on the [AC wiki](#).

It is also possible to delay the process of loading a scene until a callback is invoked, so that e.g. any necessary files can be downloaded beforehand. This can be achieved by hooking a custom script into the **OnDelayChangeScene** [custom event](#).

## 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.

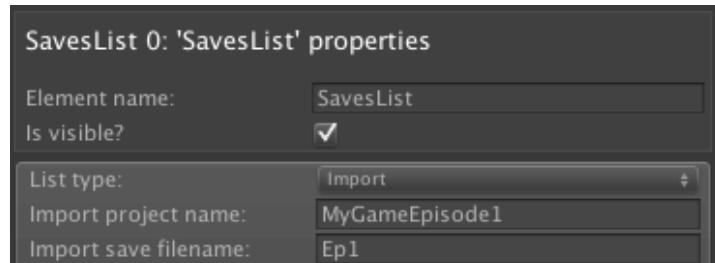


**NOTE:** This feature has three requirements:

- 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](#)):



**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.

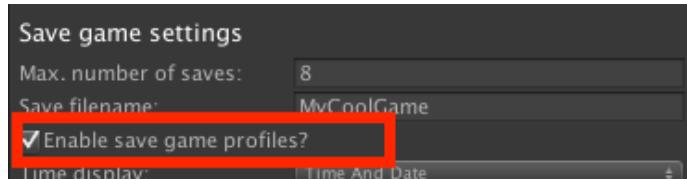
## 9.6. Save profiles

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](#).

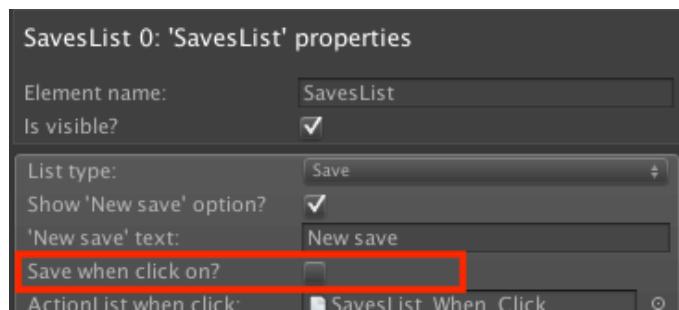
A basic [Profiles](#) menu is included in default interface. To make use of it, select the default **Pause** menu, and un-hide the **ProfilesButton** from its list of elements.

## 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 so 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:

```
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:

```
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:

```
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 negative 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:

```
SaveSystem.SaveAutoSave ();  
SaveSystem.LoadAutoSave ();
```

To manage [Save profiles](#), use:

```
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:

```
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:

```
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:

```
GVar variable = Options.GetProfileVariable (int profileID, int
variableID);
```

You can also modify another profiles [OptionsData](#) class with:

```
Options.LoadPrefsFromID (int profileID);
Options.SavePrefsToID (int profileID, OptionsData optionsData);
```

A save file's [Global Variables](#) data can be read with:

```
SaveFile saveFile = KickStarter.saveSystem.GetSaveFile (fileID);
SaveSystem.ExtractSaveFileVariables (saveFile,
System.Action<List<GVar>> callback);
```

The saving of individual Remember components can be disabled with:

```
GetComponent <Remember>().SavePrevented = true;
```

To restart the game and clear all temporary data (such as collected inventory items):

```
KickStarter.RestartGame (bool rebuildMenus, int newSceneIndex);
```

Saving, loading, and options involve the following [events](#):

```
OnBeforeSaving (int saveID);
OnFinishSaving (SaveFile saveFile);
OnFailSaving (int saveID);
OnOverwriteMainData (int saveID);

OnBeforeLoading (SaveFile saveFile);
OnFinishLoading (int saveID);
OnFailLoading (int saveID);

OnBeforeImporting ();
OnFinishImporting ();
OnFailImporting ();

OnSwitchProfile (int profileID);

OnRestartGame ();

OnChangeLanguage (int language);
OnChangeVolume (SoundType soundType, float volume);
OnChangeSubtitles (bool showSubtitles);
```

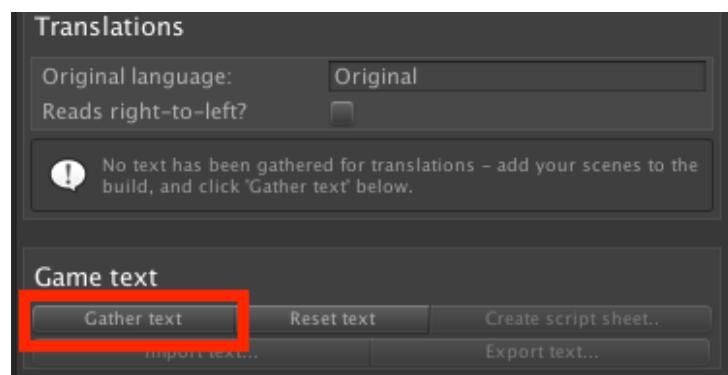
## 10. Speech and text

## 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:



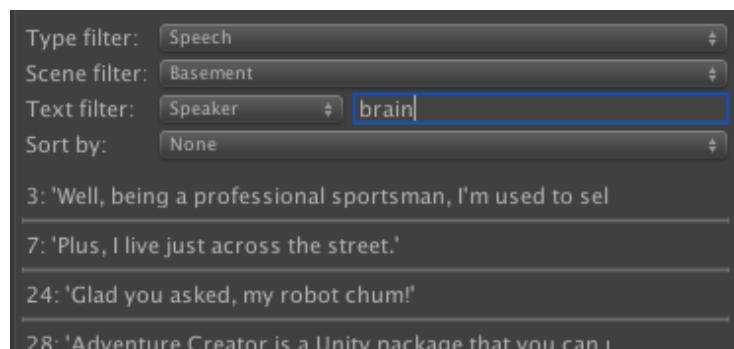
**PROTIP:** By default, all display text is translated - including subtitles, Hotspot names, and Menu labels. The **Translatable text types** field, however, lets you choose exactly what gets included in this process.

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:



Clicking on a text entry will reveal more information about it:

ID #:	21	<input type="button" value="Locate source"/>
Type:	Speech	
Original text:	Hey, little robot!	
Scene:	AdventureCreator/Demo/Scenes/Basement	
Speaker:	Brain	
French:	Hé, petit robot!	
Audio path:	Resources/Speech/	
Filename:	Brain21	
Description:		

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.

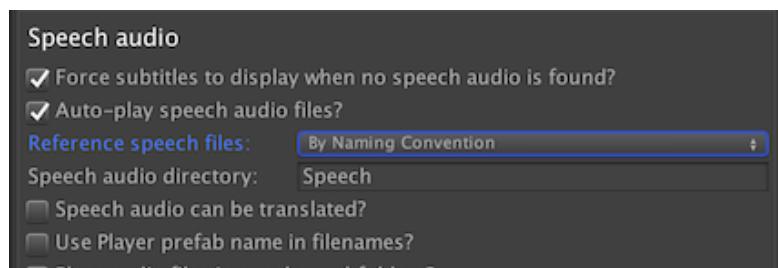
## 10.2. Speech audio

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 four 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
- 4) Manually, by attaching AC Speech Metadata to Localization tables

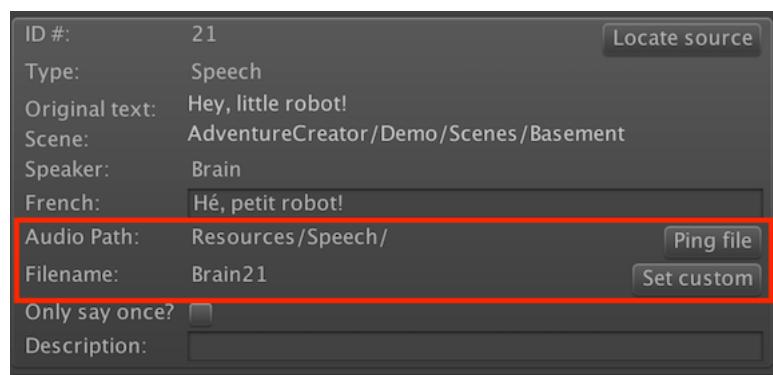
Which method is used is based on the [Speech Manager's References speech files](#) setting:



**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.

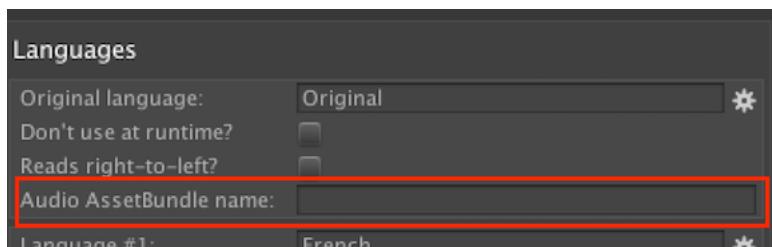


**NOTE:** If speech audio has [Translations](#), each translation has the same filename but is placed in a different sub-folder as shown.

## By Asset Bundle

This mode is similar to **By Naming Convention** in that files are loaded 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.

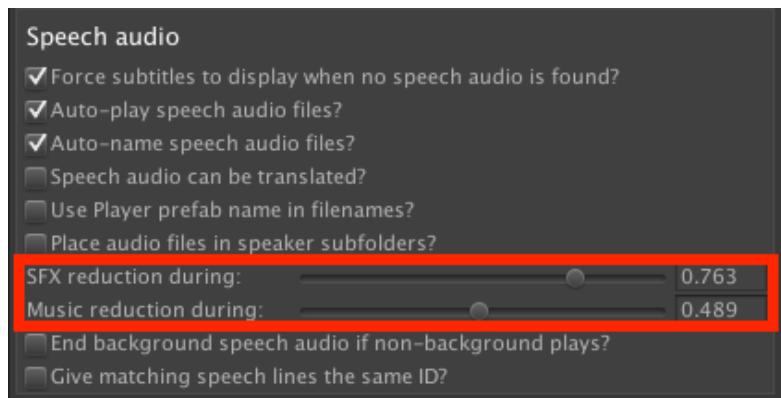
## By Direct Reference

In this mode, speech AudioClip assets must be manually assigned to each speech line's entry in the Game text panel:



**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:



To animate characters' mouths when speaking in time with their audio, see [Lip syncing](#).

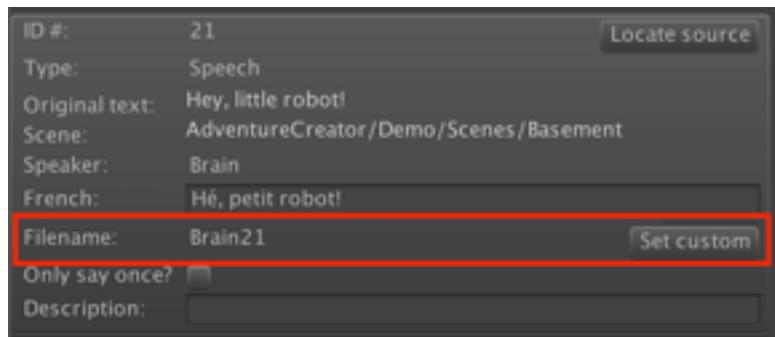


**PROTIP:** If your game makes use of [multiple Players](#), then each Player can be assigned their own audio and lipsync files for shared speech lines - i.e. ones where the [Dialogue: Play speech](#) Action has **Player line?** checked. To allow this, check '**Player** lines have separate audio for 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 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.

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:



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.

## By Metadata

If Unity's [Localization](#) package is installed, [Dialogue: Play speech Actions](#) can reference string table entries directly to get their dialogue text from. If an entry has an associated **AC Speech Metadata**, this can be used to assign speech audio and lipsync data to it, which will be played automatically if found.

## 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.

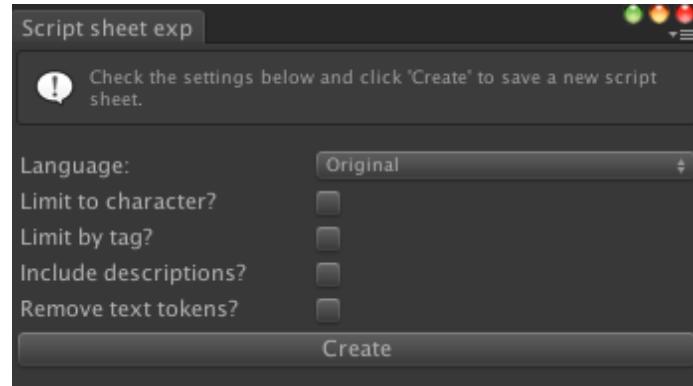
### Limit by speaker proximity

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

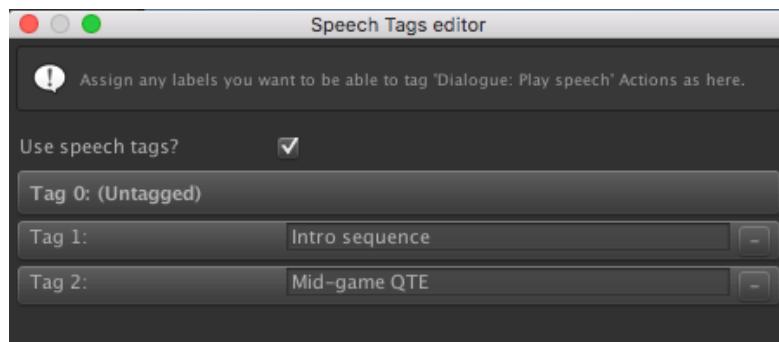
Once your game's text has been gathered, speech lines can be exported as an HTML script sheet to hand out to voice actors.

In the [Speech Manager's Game text](#) panel, click **Create script sheet...** to bring up the **Script sheet export** window:

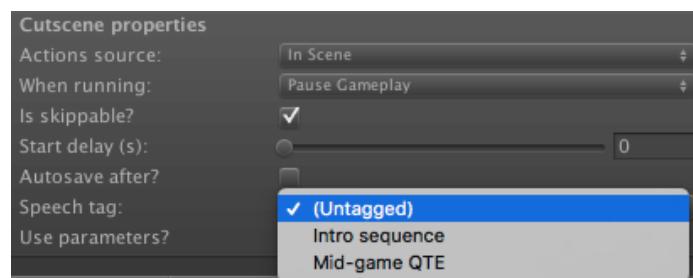


All speech lines listed in the Speech Manager can be exported as an HTML file. This will display each line's text, character, audio filename(s) and description. If the game features [translations](#), a language can be selected.

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:





**NOTE:** You will need to re-gather your game's text for the changes to be reflected in the Speech Manager.

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.

## 10.5. Translations

Once your game's text has been gathered, it can be used to handle translations.

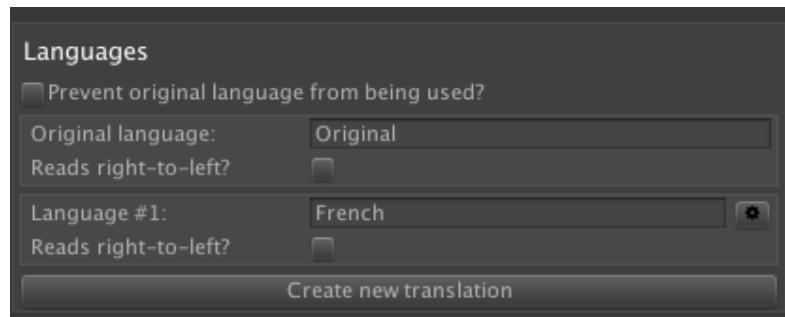


**PROTIP:** The 3D Demo game includes an example French translation.

The [Speech Manager's](#) **Gather text** button collects all display text, specifically:

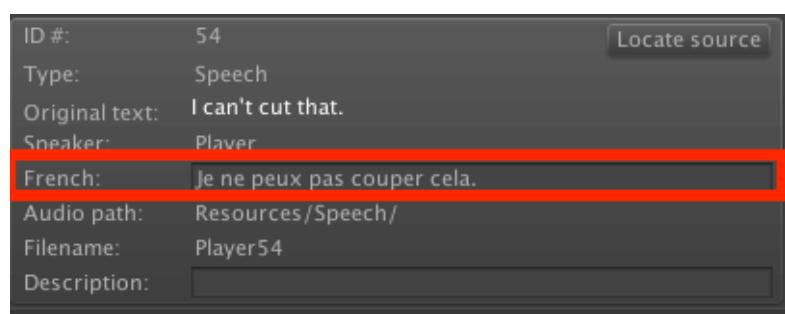
- Speech lines
- Hotspots and Dialogue Option labels
- NPC names (if set to something other than their GameObject's name)
- Menu text
- Journal entries
- Inventory Item names
- Pop-up and String Variables
- Cursor names and prefixes
- [Custom translatable](#)s

A game's translations can be managed from the **Languages** panel:



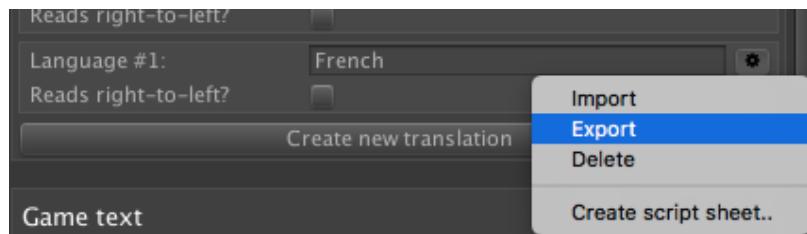
Arabic or Hebrew can make use of the **Reads right-to-left?** option. If checked, then Hotspot and inventory labels (e.g. “Use sword on barrel”) will be reversed (e.g. “barrel on sword Use”) as will [Input](#) menu elements. Speech scrolling, enabled in the **Subtitles** panel, will also be reversed.

When a new language is created, each entry in the **Game text** panel will be updated with an associated field:

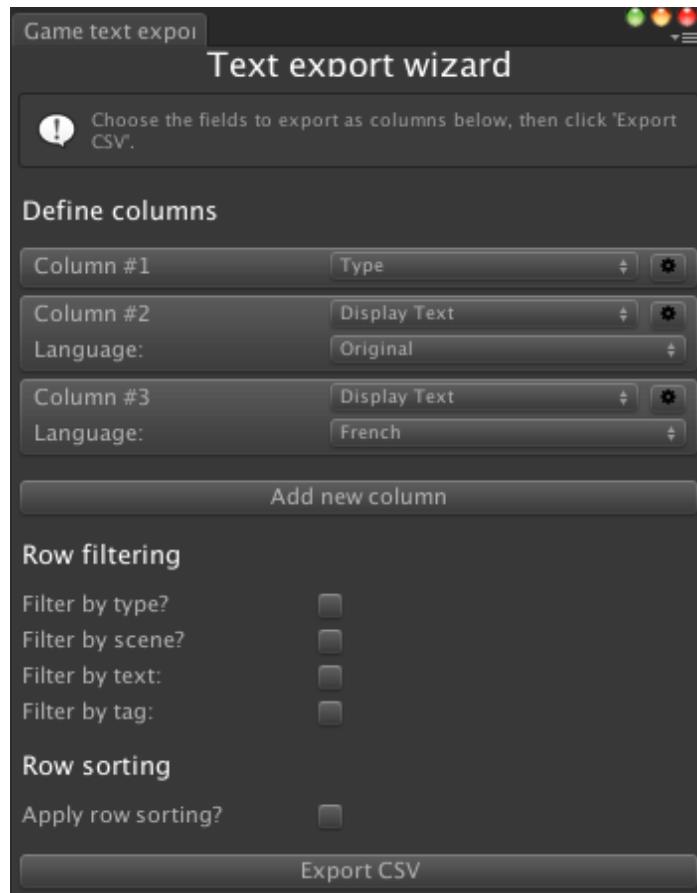


New languages have no default text - instead, a **Fallback language** can be assigned. If no text is found for a given language, the fallback's equivalent will be used instead.

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 either as a CSV file, which can be opened with a spreadsheet application such as Excel or OpenOffice, or an XML file in the SpreadsheetML format that can be read by Excel.

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 translatable

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:

```
AC.KickStarter.runtimeLanguages.GetTranslatableText (ITranslatable  
translatable)  
AC.KickStarter.runtimeLanguages.GetTranslation (int lineID)
```

When it comes to searching ActionList assets, AC will search the Managers and scenes for references made to them. In scenes, this works by searching for components that implement [iActionListAssetReferencer](#). If you have ActionList assets that are only referenced through script, you will can implement this interface in your MonoBehaviour to create a link that AC can use to include the assets in the Speech Manager.

## 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.

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.

### **[scene:x]**

Shows the current value of a Scene attribute, where X represents the attribute's ID. See [Scene attributes](#).

### **[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.

### [timer:ID]

Replaces the token with the time-formatted value of a [Timer](#), where “ID” is the ID number of the Timer. The exact formatting can be set within the Timers Editor.



**PROTIP:** A list of all tokens available to use in Character speech lines can be found at the bottom of each Character's Inspector.

## 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:

```
KickStarter.dialog.SpeechEventTokenKeys = new string[2] { "anim",  
    "look" };
```

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 ()  
{  
    KickStarter.dialog.SpeechEventTokenKeys = new string[2] { "anim",  
        "test" };  
    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:

```
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")
    {
        string[] animals = new string[5] { "Cat", "Dog", "Parrot", "Bear",
            "Monkey" };
        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")
    {
        string[] colours = new string[4] { "Red", "Blue", "Yellow", "Green" };
    }
}
```

```
    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.

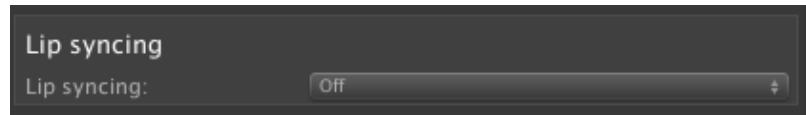
However, it's often unfeasible to keyframe an animation for every line of dialogue - so AC provides several ways to animate lips automatically. This is known as lip syncing.

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](#):



It can take the following values:

### From Speech Text

Phonemes are generated automatically based on the speech text. It won't always be a totally accurate approximation, but it will give the character's animation some noticeable variety. If a line has accompanying audio, the timing of the generated phonemes will be scaled to the length of the audio clip.

### 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 **SalsalsPresent** as a [scripting define symbol](#) – see [Supported third-party assets](#).

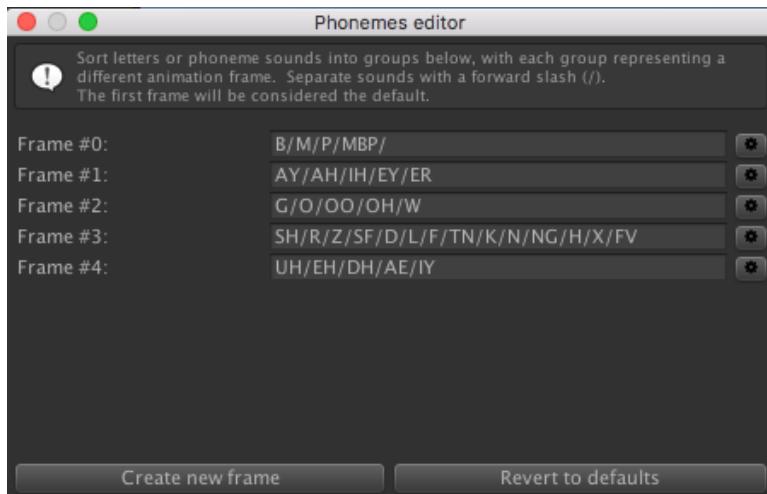
Pamela, SAPI, Rogo Digital LipSync, and Papagayo files are detected by Adventure Creator in the same way that [Speech audio](#) files are.

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**:



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.

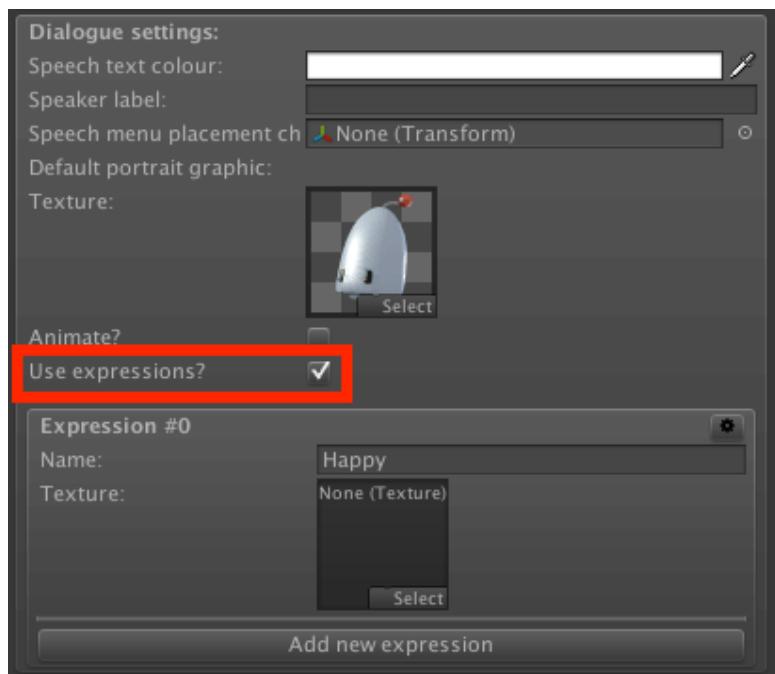


**NOTE:** A series of lip sync tutorials can be found [online](#).

## 10.8. 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 group.



**PROTIP:** A tutorial on working with character expressions can be found [online](#).

## 10.9. 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.

## 10.10. Speech scripting

Characters can be made to speak through custom scripts with either:

```
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:

```
KickStarter.dialog.KillDialog (mySpeech);
```

Or even modify the speech text at runtime:

```
mySpeech.ReplaceDisplayText ("My new speech text");
```

A log of all speech spoken since the last file load can be retrieved with:

```
KickStarter.runtimeVariables.GetSpeechLog ();
```

This returns an array of the [SpeechLog](#) class.

Translations can be modified or created at runtime by using:

```
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:

```
KickStarter.runtimeLanguages.CurrentAudioAssetBundle = value;  
KickStarter.runtimeLanguages.CurrentLipsyncAssetBundle = value;
```

The speech system has the following [events](#):

```
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.

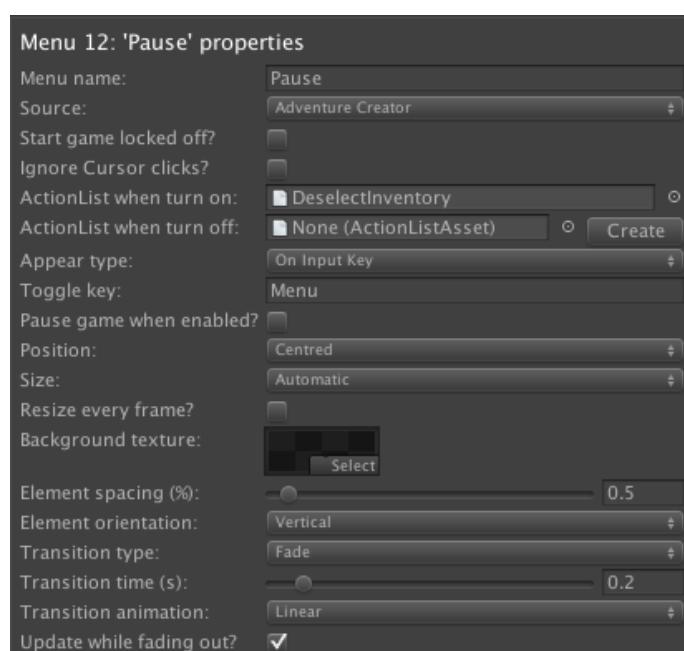
A menu is a collection of [Menu elements](#) that make it interactive. An inventory menu, for example, could feature an [InventoryBox](#) grid to show the player's items, and two [Buttons](#) to scroll through them.

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:

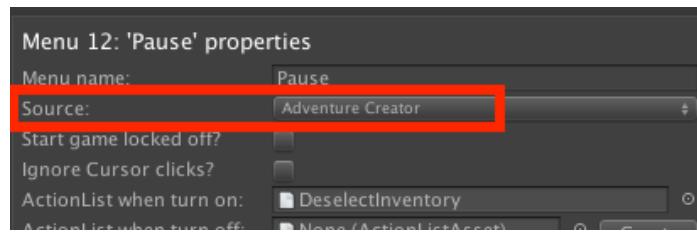
### Adventure Creator

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:



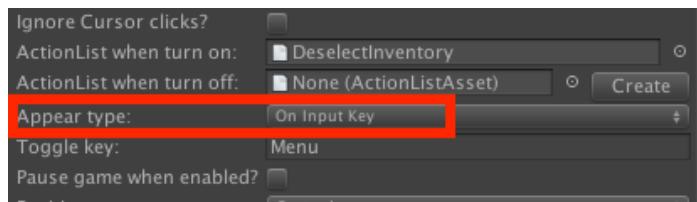
**PROTIP:** AC or Unity UI? Since AC-based menus are easier to set up quickly, but Unity UI offers more style options, it is recommended to first prototype your UI using AC menus, and then switch to Unity UI once happy with the functionality.



**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**:



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 - or when over an Inventory item in a Menu. This menu can optionally be duplicated for each Hotspot or Menu element it is displayed for.

### **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.

### Pauses game?

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.

## During Cutscenes and Conversations

The menu is shown both when in a Cutscene, and when a [Conversation](#) is active.

### **Hide in save screenshots?**

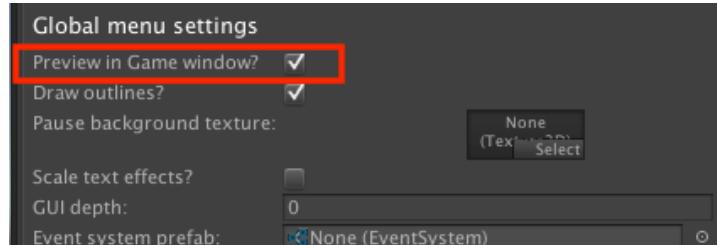
If checked, then the menu will be momentarily hidden from view while taking a save-game screenshot. For this option to be visible, **Save screenshots** must be enabled in the [Settings Manager](#).

Further options are available depending on the **Source** field.

### 11.1.1. Adventure Creator menus

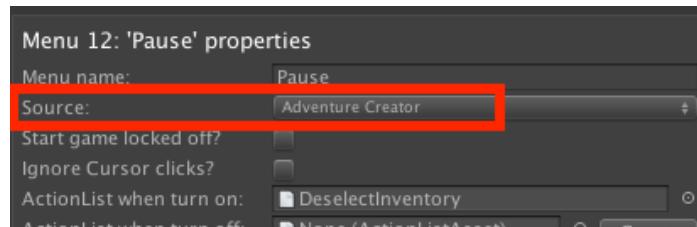
Adventure Creator menus are simple to set up as they can be made completely within the [Menu Manager](#) - without the need for any other assets or scene objects.

They can be previewed while editing by checking **Preview in Game window?** at the top of the Menu Manager:



**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:



**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 or 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

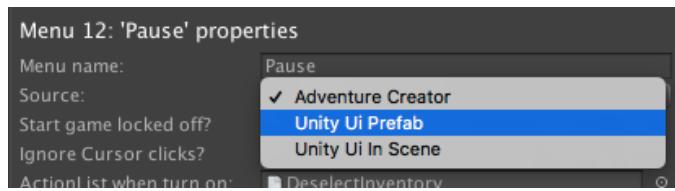
Unity UI menus allow you to make use of Unity's UI system and styling options while letting AC handle clicks and visibility.

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**:



### 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? **Unity Ui Prefab** is the standard option, with **Unity Ui In Scene** being best for 3D menus that need to be in a specific position in a specific scene. 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 as 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.

- 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.



**PROTIP:** To position a Manual menu relative to the screen's playable area, attach the [Auto Correct UI Dimensions](#) component to the RectTransform boundary.

### **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 States**

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**.

#### **Custom Animation Blend**

The menu will control the Animator component on the UI's root. The Animator must have an **OnAmount** float parameter defined - this will be set to the amount by which the Menu is "on", with 0 being fully off, and 1 being fully on. 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.

### **Use TMPro components?**

If TextMesh Pro is present, this causes Elements to rely on TMPro components instead of regular Text components - if found. For details, see [Integrations](#).

### **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**.

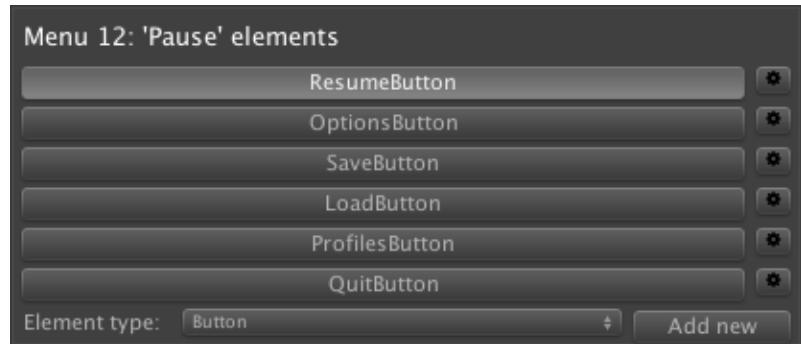
Because Unity UI canvases requires an [Event System](#) to work, AC will automatically generate one if a scene has none. You can have it spawn your own one, however, by making it a prefab and assigning it at the top of the Menu Manager.



**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](#). If the asset has an [Integer parameter](#), then its value can optionally be set here.

#### **Custom Script**

Does nothing by itself, but the `OnMenuItemClick` [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 displays 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](#).

### Sub Objectives

Shows a list of [sub-Objectives](#). By default, this will display sub-Objectives for the “selected Objective”, which is set by clicking inside an “Objectives” InventoryBox. However, this can be overridden with the element’s **OverrideMainObjective** property through [scripting](#).



**PROTIP:** The element can be connected to a specific “main” Objective by writing to its **OverrideMainObjective** variable through script:

```
(AC.PlayerMenus.GetElementWithName ("MyMenu",  
    "MySubObjectivesList") as  
    AC.MenuInventoryBox).OverrideMainObjective
```

### 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 `OnMenuItemClick` [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.

## 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 [OnMenuItemClick](#) 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**

## 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 OnMenuItemClick [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](#).

#### Timer

Shows the current value of a [Timer](#), relative to its minimum and maximum values.

#### 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](#).

#### Page Texture

Shows the associated texture of the currently-active [Document](#) page.

#### 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.

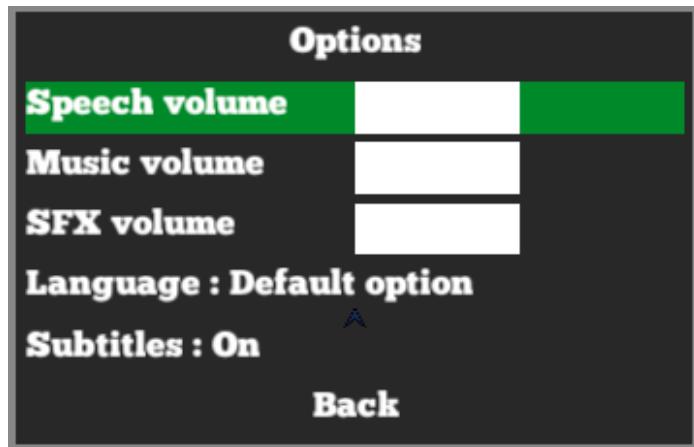
The Save button is automatically hidden



**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:



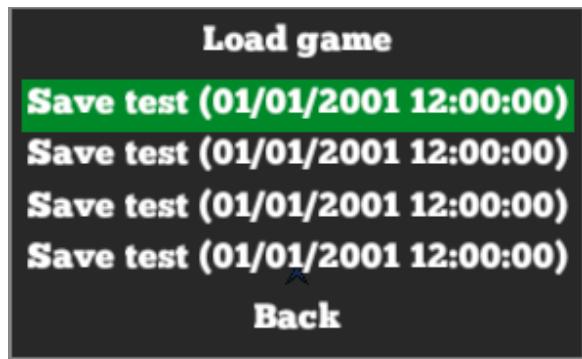
It is accessed via the **SaveButton** element in the [Pause](#) menu.



**PROTIP:** A tutorial on extending this menu to accept custom save labels can be found [online](#).

## The default Load menu

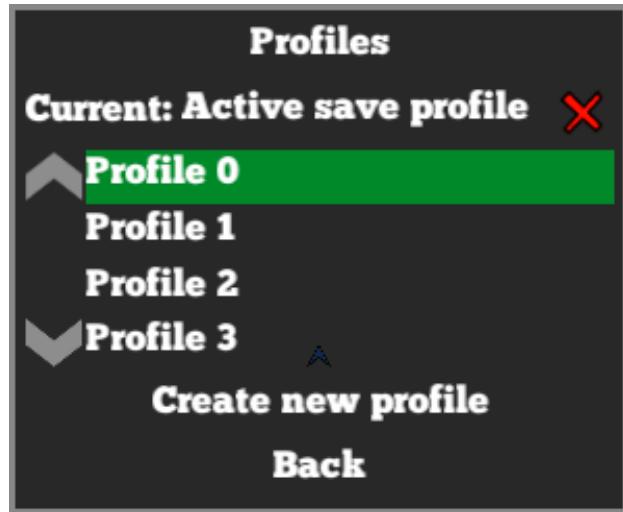
The Load menu allows the loading of save-game files:



It is accessed via the **LoadButton** element in the [Pause](#) menu.

## The default Profiles menu

The Profiles menu displays all [Save profiles](#) present:



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:



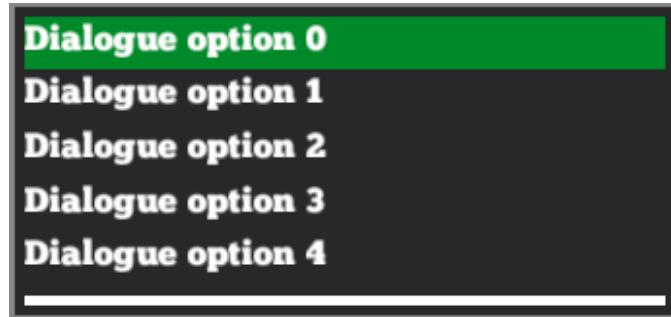
This allows the Pause menu to be opened without the need for invoking the "Menu" input axis, and is useful when playing on mobile devices. It is visible in the lower-left corner of the screen during gameplay.



**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:



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:



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.

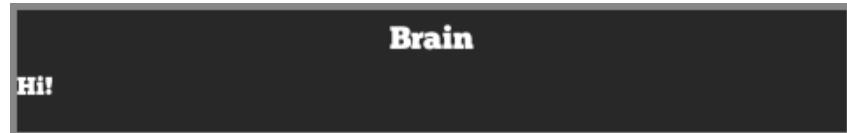
The [Unity UI](#) counterpart of this menu embeds the icon graphics directly within its Image components - they are not pulled from the [Cursor Manager](#) icon graphics.



**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

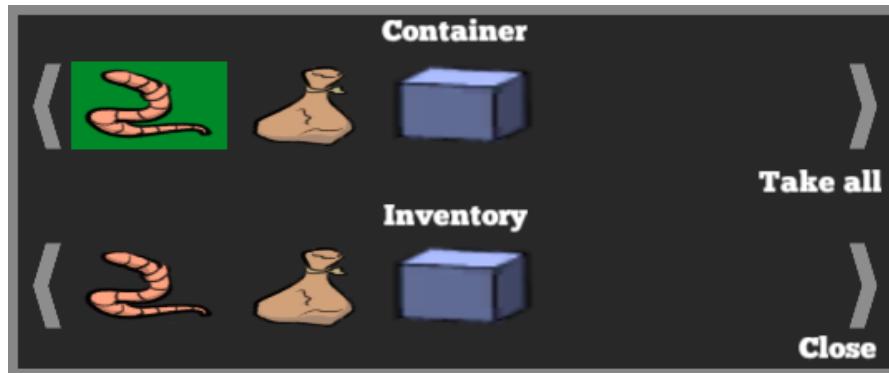
Shows the most recently-said line of dialogue, as well as who is speaking:



It will appear whenever dialogue is spoken, provided that subtitles are enabled - see [Options data](#).

## The default Container menu

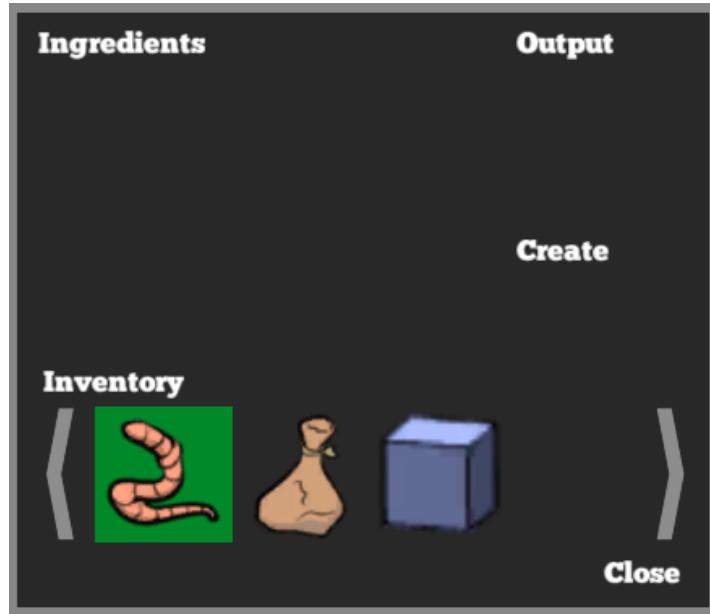
Shows the Inventory items in the currently-opened [Container](#):



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

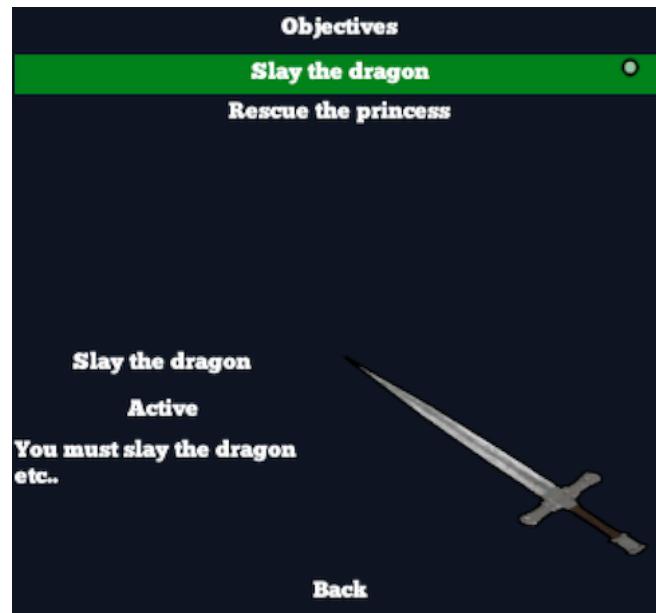
Allows for the viewing of the active [Document](#).



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](#):



Test

The text also includes the current Interaction name if set within the [Cursor Manager](#). It is only visible during normal gameplay.

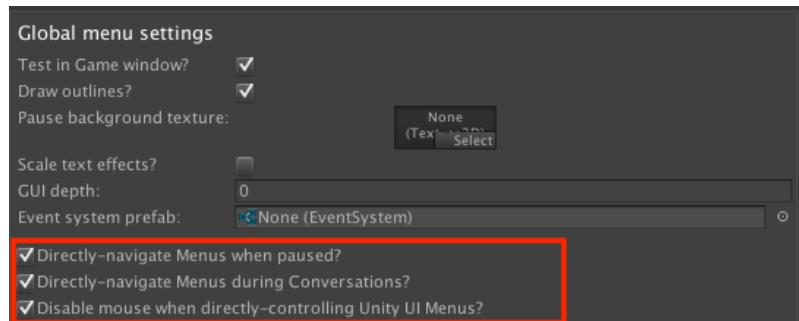
Some menu element types also have a **Hotspot label override** property that can be used to set the Hotspot text. This can also be set dynamically by hooking into the [OnRequestMenuItemHotspotLabel](#) custom event.



**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.

## 11.4. 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:



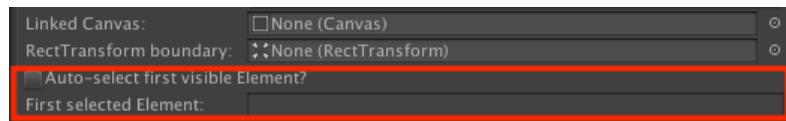
These options can be used to directly-navigate menus when the game is paused, or when a Conversation is active. To allow for this behaviour during gameplay, the [Engine: Manage systems](#) Action must be used to allow it. Note that enabling this will not automatically disable player movement, which can 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:

```
PlayerMenus.GetMenus();
```

To get a specific Menu or MenuElement by name, use:

```
PlayerMenus.GetMenuWithName (string menuName);  
PlayerMenus.GetElementWithName (string menuName, string  
menuElementName);
```

A Menu can be turned on and off through script with:

```
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:

```
myMenu.isLocked = true;
```

To reposition a Menu with an **Appear type of Manual**, use:

```
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:

```
MenuButton myButton = PlayerMenus.GetElementWithName ("MyMenuName",  
"MyButtonName") as MenuButton;
```

[MenuElements](#) can also be used to retrieve information about Unity UI linked to them, for example:

```
MenuInventoryBox myInventoryBox = PlayerMenus.GetElementWithName  
("MyMenuName", "MyInventoryBoxName") as MenuInventoryBox;  
UnityEngine.UI.Button uiButton = myInventoryBox.GetUIButtonWithItem  
(inventoryItemID);
```

To simulate the clicking of a [MenuElement](#), use:

```
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)
OnMenuItemClick (Menu menu, MenuElement menuElement, int slot, int
    buttonPressed);
OnMenuItemShow (MenuItem menuElement);
OnMenuItemHide (MenuItem menuElement);
OnHideSelectedElement (Menu menu, MenuItem menuElement, int slot);
OnMenuItemShift (MenuItem menuElement, AC_ShiftInventory
    shiftType);
string OnRequestMenuItemHotspotLabel (Menu menu, MenuItem, 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



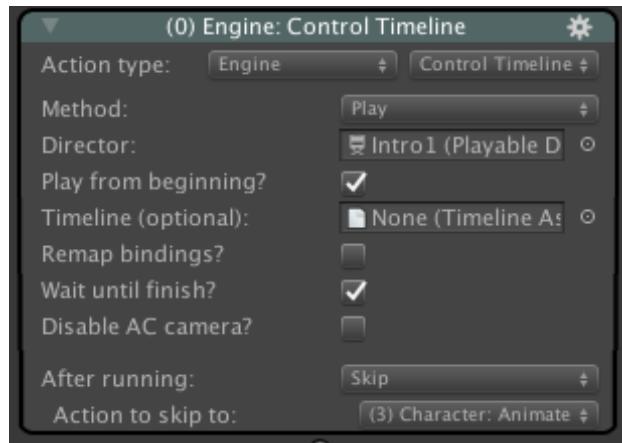
**PROTIP:** From Unity 2018.3 and onward, the [3D Demo](#) relies on Timeline for its opening and closing cutscenes.



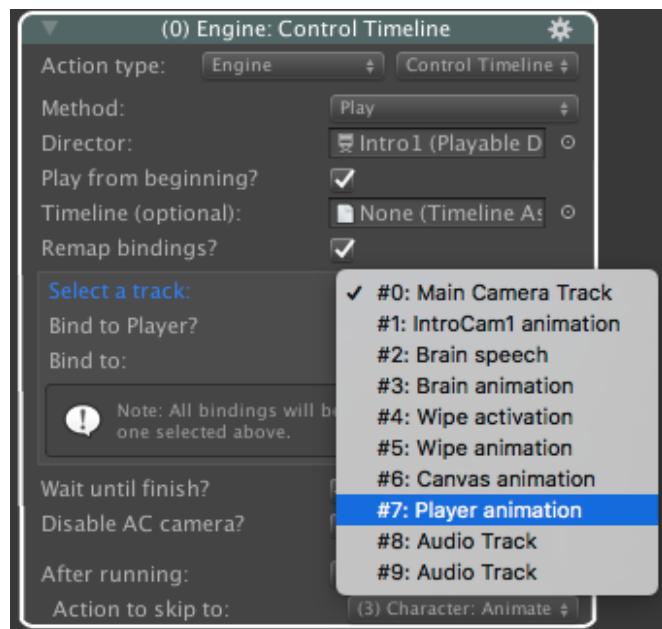
**NOTE:** If Timeline is removed using Unity's Package Manager, then **ACIgnoreTimeline** must be defined as a [Scripting Define Symbol](#) in order for AC to compile.

## 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](#).

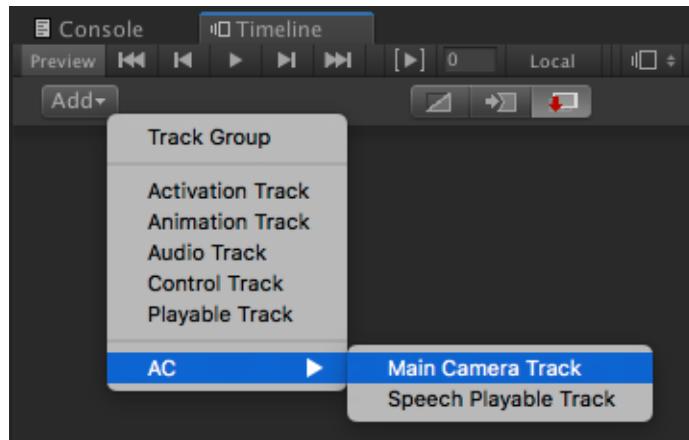
## 12.3. AC Timeline tracks

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
- [Character Animation 3D](#), which animates 3D characters based on their motion
- [Head Turn](#), which controls a 3D character's head direction
- [Shapeable](#), which controls a [Shapeable](#) component

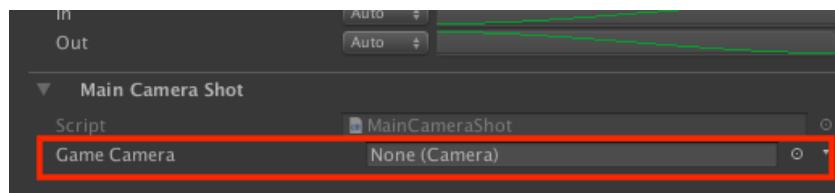
### 12.3.1. Main Camera tracks

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.



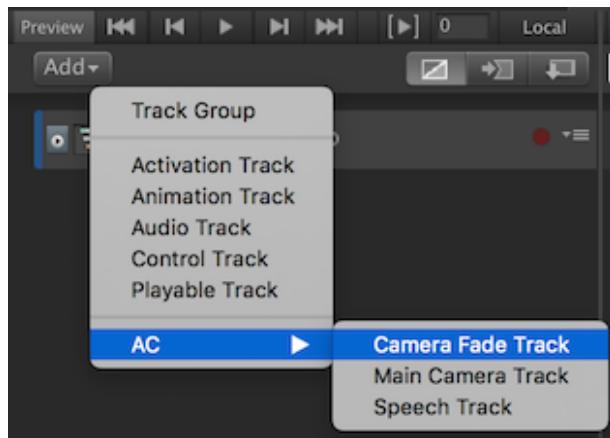
**NOTE:** Only one track of this type should exist in a given Timeline, and only one track of this type should run at any one time.



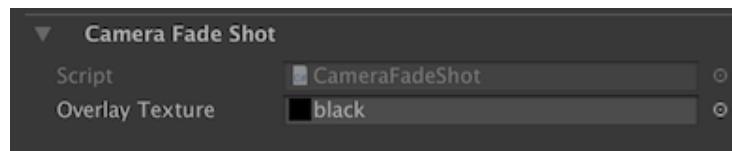
**PROTIP:** Set in the track's Inspector, this track type can optionally call the [OnSwitchCamera](#) custom event.

## 12.3.2. Camera Fade tracks

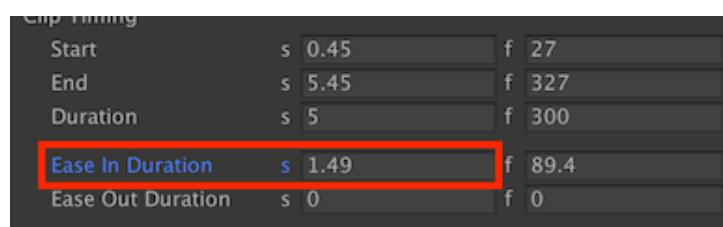
The Main Camera track allows you to fade the camera in and out when a Timeline is running. It is available under **AC → Camera Fade Track** when creating a new track in the Timeline window:



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:



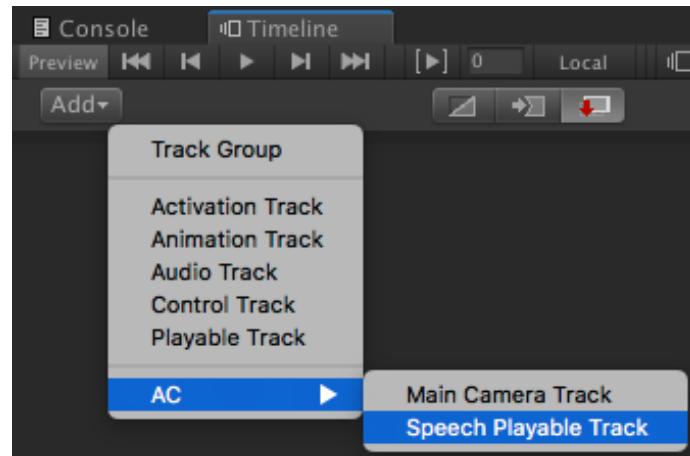
This texture will be overlaid on top of the game view when the clip is active. To create the fade in effect, set the clip's **Ease In Duration** value:



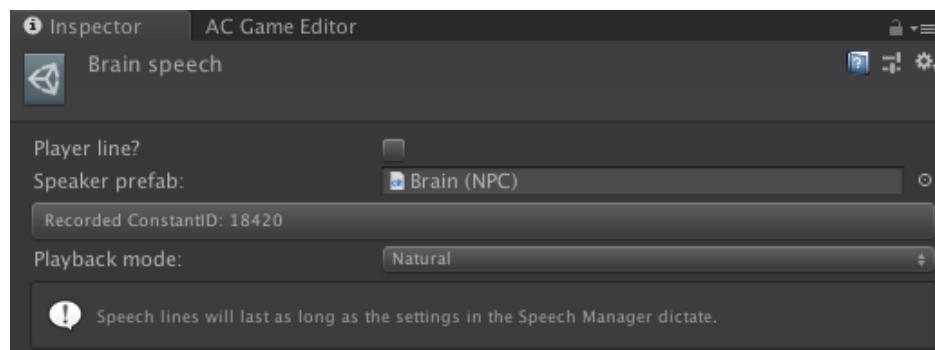
Similarly, to fade out, set the clip's **Ease Out Duration** value.

### 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:

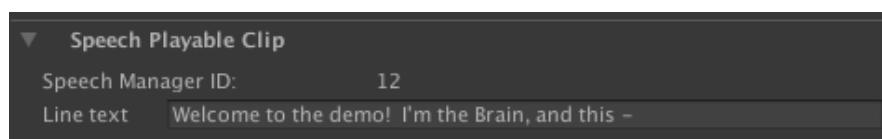


All clips within a single track will be spoken by the same character. The character that speaks its lines is set within the track's Inspector:



Unless the speaking character is the default Player, you must assign them as a prefab into the **Speaker prefab** field. This allows the Timeline be run from any scene without having to rebind it - since the speaking character will rely on the prefab's Constant ID value 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.



**NOTE:** Only one track per character should be defined in any given Timeline.

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

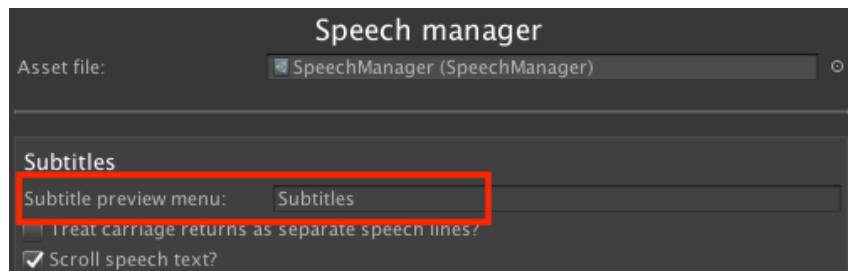
In this mode, speech lines will last for the duration of their associated clip. This gives you precise control over when a line is displayed in relation to other elements in the Timeline.



**NOTE:** Speech skipping is prevented when played from a 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:



This menu will then be used to preview speech tracks while in Edit mode.



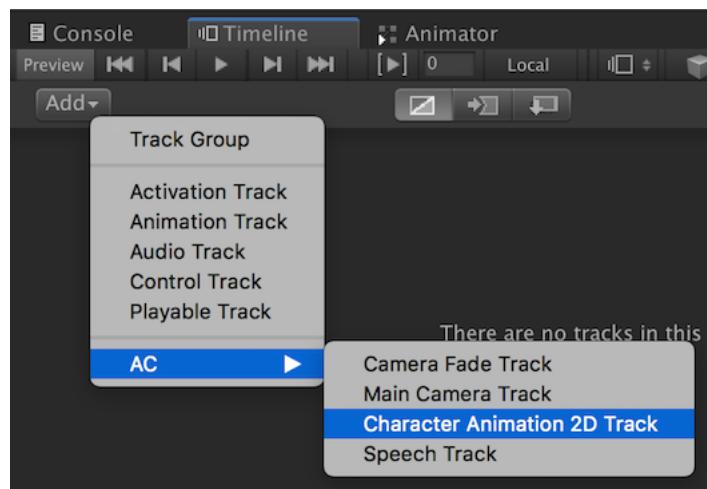
**PROTIP:** Only [Adventure Creator menus](#) can preview speech tracks. If the supplied preview menu uses [Unity UI](#), it will temporarily switch **Source** to **Adventure Creator**.

## 12.3.4. Character Animation 2D tracks

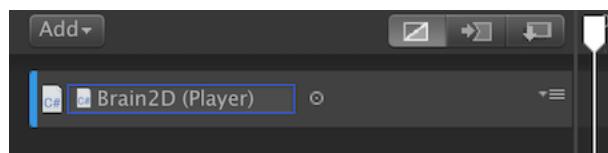
When controlling 3D [characters](#) in Timeline, Unity's Root Motion feature allows their positions to be updated automatically based on their animation. For example, when playing a walking animation, they'll automatically move forward.

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.



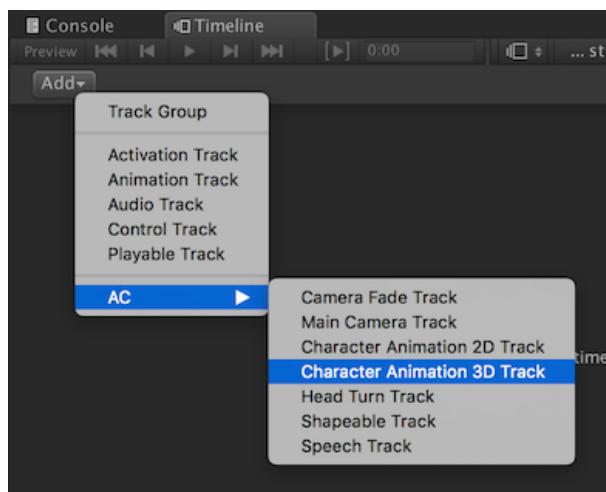
**NOTE:** This track type does not support previewing.

### 12.3.5. Character Animation 3D tracks

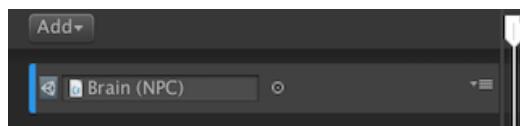
When controlling 3D [characters](#) in Timeline, Unity's Root Motion feature allows their positions to be updated automatically based on their animation. For example, when playing a walking animation, they'll automatically move forward.

If a character does not use Root Motion for their animations, however, this track can be used to play back their idle, walking and turning animations automatically based on their position changes.

It is available under **AC → Character Animation 3D Track** when creating a new track in the Timeline window:



Assign the character by binding them to the track:



While a clip from this track is active, it will cause the character's walk, run or turn animation to play as they move around the scene. This should typically be used in conjunction with an Animation track that is used to control that character's root position and rotation at the same time.



**NOTE:** This track type does not support previewing.

### 12.3.6. 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.

### 12.3.7. 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. Integrations

AC works with a number of third-party assets. They are available in a few places, so their installation process will vary.

Built-in, AC has integrations for the following:

- Addressables
- Localization
- Playmaker
- SALSA With RandomEyes
- TextMesh Pro

Details of these integrations can be found below.

Online, AC's [Downloads](#) page has official integrations for:

- AI Tree
- Articy:draft
- Cinemachine
- Kinematic Character Controller
- Input System
- UCC

The AC [Wiki](#) also has a number of unofficial integrations, including:

- A\* Pathfinding Project
- Anima 2D
- Animal Controller
- Bolt
- Cinema Director
- Easy Performant Outline
- Face FX
- Final IK
- Motion Matching
- Rewired
- Simple Touch Controller
- SLATE
- Spine
- Third Person Motion Controller
- Unity First Person Controller
- Unity Third Person Controller

## Addressables

AC supports Unity's [Addressables](#) package in a number of areas. Addressables can be used to reference speech files, scene files, Player prefabs, Menu prefabs and save data.

By default, relevant options are exposed automatically when Addressables is imported into a project. If you have removed the included **AC.asmdef** file, you can manually expose these options by defining the **AddressableIsPresent** scripting define symbol.

## Localization

Unity's [Localization](#) package can be used in tandem with AC's Speech Manager for translation data. See [Localization integration](#) for details.

By default, relevant options are exposed automatically when Localization is imported into a project. If you have removed the included **AC.asmdef** file, you can manually expose these options by defining the **LocalizationIsPresent** scripting define symbol.

## Playmaker

[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](#).

To expose relevant options and Actions, define **PlayMakerIsPresent** as a scripting define symbol.



**NOTE:** By default, Playmaker's PlaymakerGUI object will override AC's control over the cursor. To prevent this, disable its **Control Mouse Cursor** option.

## SALSA With RandomEyes

[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](#).

To enable this integration, define **SalsasPresent** as a scripting define symbol.

## Text Mesh Pro

### Description

AC support's Unity's [TextMesh Pro](#) package for crisper text rendering. To have a Menu rely on TextMeshProUGUI component instead of the standard Text component, check Use TMPro

components? in its Properties panel. If such components are not found, the Menu will default back to Text.

By default, this option is exposed automatically when Text Mesh Pro is imported into a project. If you have removed the included **AC.asmdef** file, you can manually expose these options by defining the **TextMeshProIsPresent** scripting define symbol.

## 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:

```
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:

```
KickStarter.playerInput  
KickStarter.stateHandler
```

Similar variables also exist for the [MainCamera](#) and [Player](#) objects:

```
KickStarter.mainCamera  
KickStarter.player
```

And also for Managers:

```
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:

```
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](#):

```
OnInitialiseScene ();
OnAddSubScene (SubScene subScene);
OnManuallyTurnOnAC ();
OnManuallyTurnOffAC ();
```

When a log is made to the Console, it can be read or modified with the event:

```
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](#)

### 13.3. Custom events

AC has a number of events that will run when common tasks are performed - for example, whenever a character speaks, or the mouse hovers over a Menu element.

Such events can be listened out for, so that additional logic can be run at the same time. For example, a sound can be played whenever a "Score" variable's value is increased.

AC provides two ways to subscribe to events:

1. By defining them in the Events Editor or Event Runner component
2. By accessing them through custom script

#### Events Editor / Event Runner component

Using AC's Editor tools, it is possible to listen out for a number of events, and run ActionList asset files when they are fired.

Such events can be declared either globally, or per-object. To declare global events, choose **Adventure Creator → Editors → Events Editor** from the top toolbar. Here, you can create new events based on an initial condition, assign a label, and an ActionList to run.

Some events can be given additional conditions. For example, the **Menu / Turn on** event can optionally be set to only run when a specific Menu is turned on - as opposed to all.

Once an ActionList asset is assigned, the event's parameters can optionally be assigned to it. Such parameters are dynamic, and will depend on the event. For example, the **Inventory / Add** event can pass the added item to an ActionList's Inventory Item parameter. If the ActionList is automatically created and assigned (by clicking the '+' icon beside it), such parameters will be automatically generated and assigned.

Global events will be fired at any time during runtime. To create events that only fire at specific times, the **Event Runner** component can be used.

When attached to a GameObject in the scene, the Event Runner allows events to be declared much in the same way as global events. However, they will only be fired while the component is present and enabled in the scene. They can also run scene-based Cutscenes, in addition to ActionList assets.

Some events also benefit from additional conditions when run from an Event Runner. For example, the **Hotspot / Interact** event can optionally be set to only run when a specific Hotspot is interacted with.

## Custom script events

Custom scripts offer more event types than the Editor, and are more flexible when it comes to the number of parameters passed to them.

Custom scripts can access AC's events from the [EventManager](#) class. These events are static, and should be subscribed to in `OnEnable`, and unsubscribed in `OnDisable`. For example, this code properly subscribes to the **OnEnterGameState** event, which is called whenever the "game state" (i.e. normal gameplay, cutscene mode, etc) is changed:

```
void OnEnable () { EventManager.OnEnterGameState +=  
    My_OnEnterGameState; }  
void OnDisable () { EventManager.OnEnterGameState -=  
    My_OnEnterGameState; }  
  
void My_OnEnterGameState (GameState newGameState)  
{  
    Debug.Log ("The new gamestate is " + newGameState);  
}
```

Each event has its own set of parameters that must be declared in the listener. A list of relevant events is provided at the end of each of the following chapters:

- [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](#).

### 13.3. 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:

```
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:

```
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 via the **Action comment logging** option, 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 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.

If necessary, you can delay the loading of a scene until the correct bundle is loaded by writing a custom script that hooks into the **OnDelaySceneChange** custom event.

### 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?**. Once Unity's Addressables package is installed via Unity's Package Manager, 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 defined. If the **Assume inputs are defined?** option beneath this list is checked, these statements will be ignored. The Inputs will 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.

### Use Addressables for Players

Player prefabs assigned in the Settings Manager can be referenced by Addressable. Checking **Reference Player prefabs with Addressables?** will replace all Player prefab fields with Asset References. For this option to be available, Unity's Addressables package will need to be installed via Unity's Package Manager.

### 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 auto-unloading of assets**

Unless Addressables are used for asset references (see above), AC will call Unity’s [Resources.UnloadUnusedAssets](#) function automatically after scene changes and loading save-game files, in order to free up memory. This automation can be prevented, in favour of being called manually, by unchecking **Auto-call Resources.UnloadUnusedAssets?** in the Settings Manager.

### **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:

```
AC.KickStarter.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.

### Initialise in Update's first frame

By default, AC's startup processes (e.g. running a scene's OnStart/OnLoad cutscenes) occur in Unity's Start function. This is considered the "last 10%" of Unity's scene-loading process - therefore, if these processes involve e.g. the instant spawning of prefabs, it may impact the scene's loading time. On a per-scene basis, it is possible to defer this process to the first loop of Unity's Update function - via the **Multi Scene Checker** component of the scene's **GameEngine** object.

### 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.

Also, be mindful when merging branches that each modify collections of items, menus, variables and other entities within the Inventory and Variables Managers. Such entities rely on unique ID numbers to reference them within a project. If two branches both define a new Inventory item with an ID of 6, for example, then one must be modified - causing references made to that item to be broken.

AC makes it possible to modify the ID numbers for Inventory items, Documents, Objectives and Global Variables via the “cog” menu beside them and choosing **Change ID** from the menu. This operation will search a project for existing references and update them to reflect the updated ID - and should be done before merging branches that feature separate entities that share the same ID.