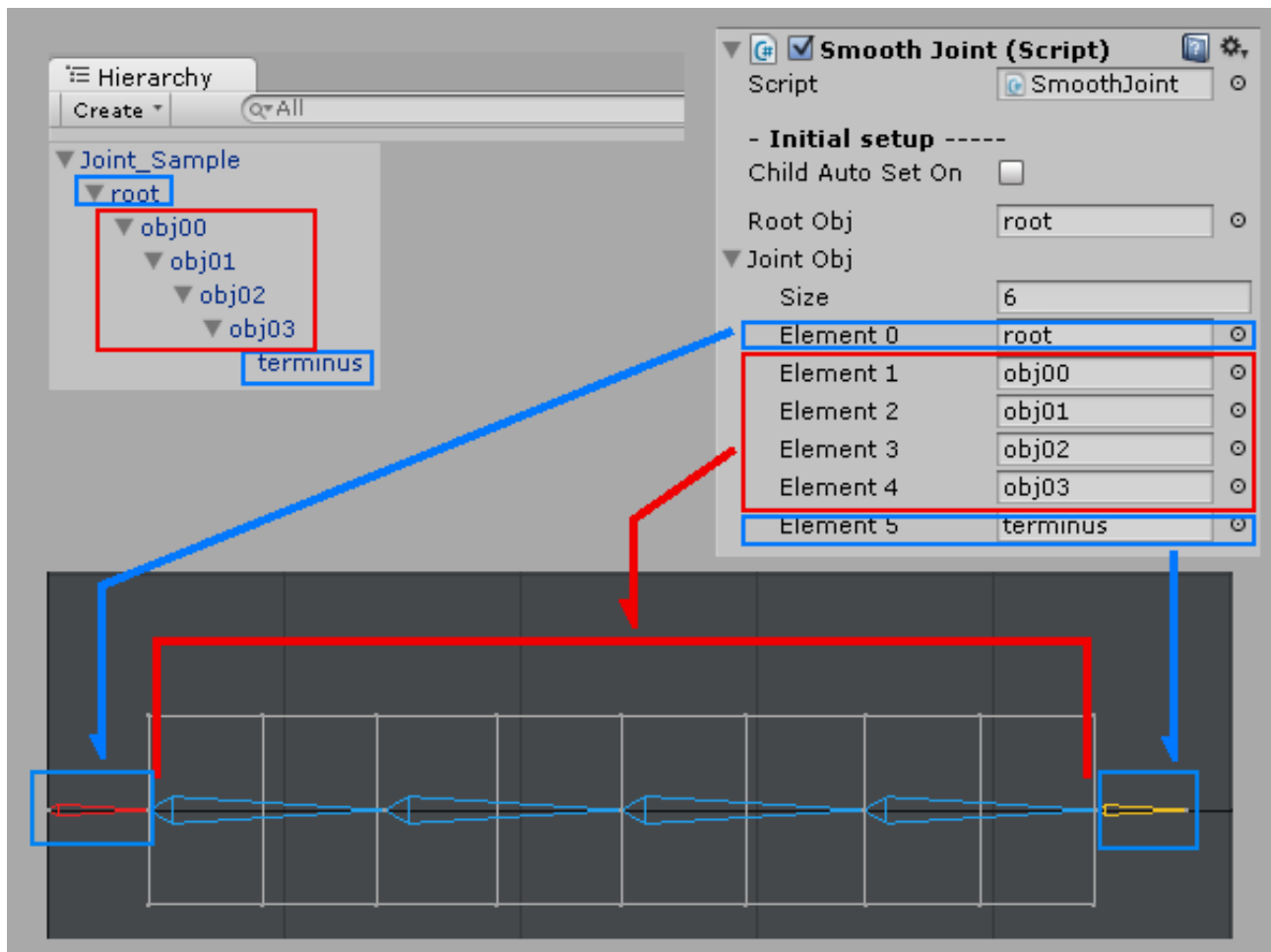


Smooth Joint Use conditions

To use Smooth Joint, some hierarchy organizations are limited.

- 1 GameObject of root (parents) and terminus (terminal) is necessary.



The effect control is not done though root (parents) and terminus (terminal) are necessary for the calculation. (Fix to a local coordinate system.)

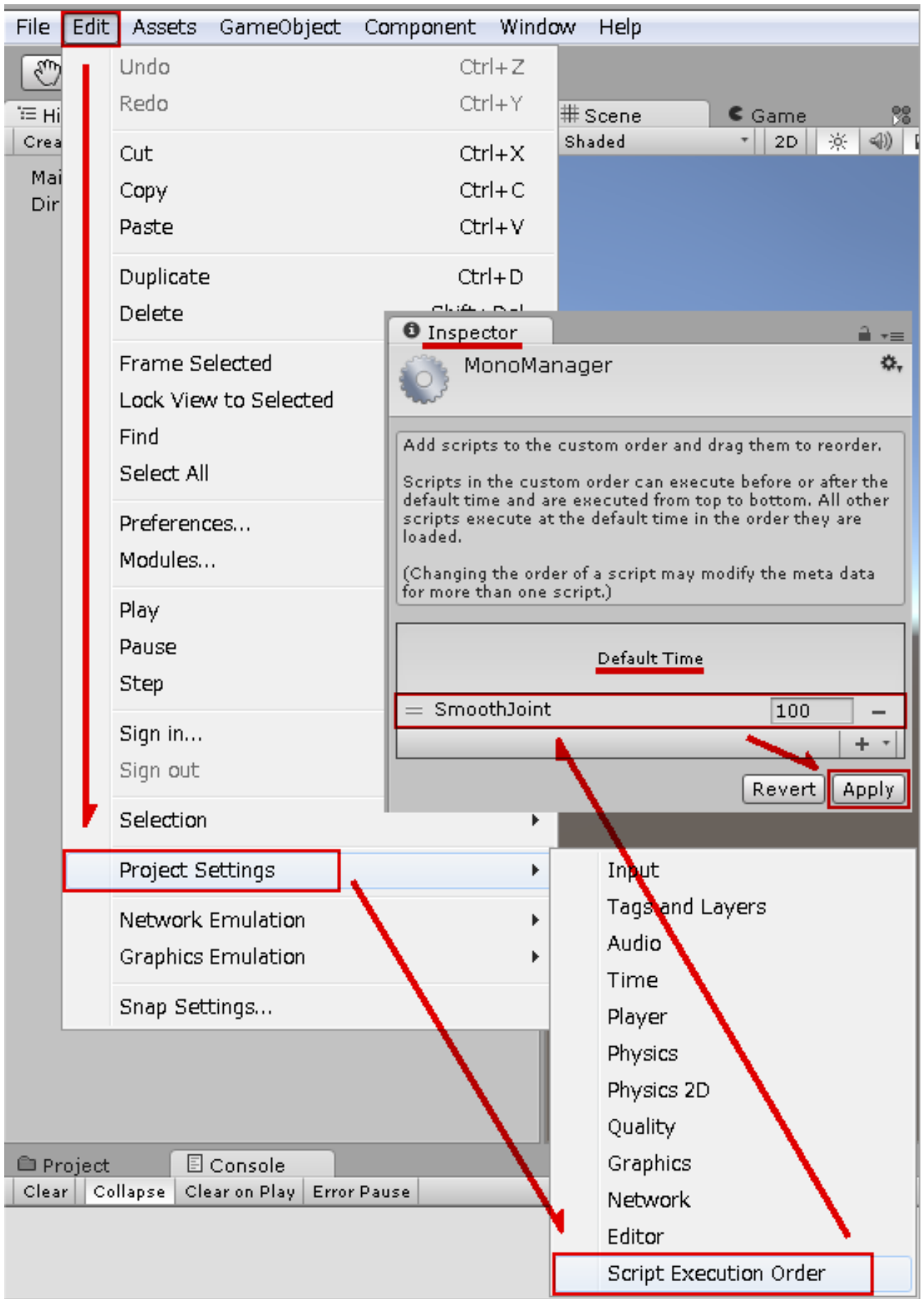
Only GameObject in a red frame is processed.

- 2 Behavior is steady by bring the rotating frame of GameObject in a hierarchical composition together as much as possible in the same direction.

- 3 If there is any other script that controls transfer and rotation of the GameObject as the Smooth Joint Asset does in your project, the Smooth Joint Asset and other script will be controlled in random order. Be forewarned that an unexpected result may result from behaviors that eventually happen. An appropriate measure such as prioritizing the Smooth Joint Asset or the other script or changing the control timing is needed.

Method of changing control timing (Refer to the Unity manual for details).

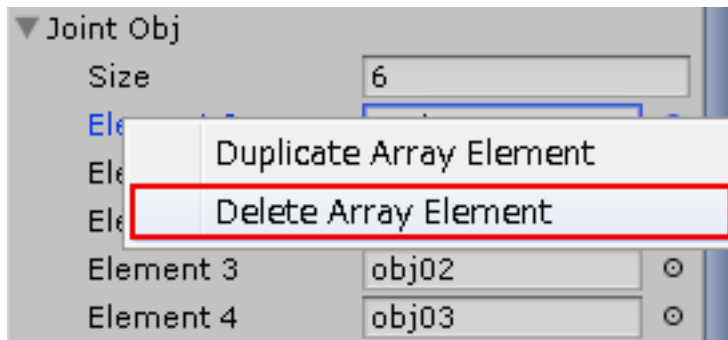
- 1 Unity main menu > Edit > Project Settings > Script Execution Order
- 2 Smooth Joint is registered with Inspector at the order of controlling > lower right > + click end.
- 3 It decides it with Apply. (Refer to the following chart.)



Method of editing list (Refer to the Unity manual for details).

A lot of Element is automatic and will be set manually in this asset.

The function to edit the array list is being offered to Inspector of Unity. (As of now.)



1 The subitem is displayed by the mouse right-clicking on Element to be edited.

2 It is a mouse left-click and the list is empty (None) as for Delete Array Element.

3 A specified array of the list is deleted again by the mouse left-click.

For List to be set with this Asset, use this function to optimize the data. If there is an

invalid setting, e.g. None, in the List, it may not operate normally.

Please refer to the Unity manual for the mouse operation methods other than Windows OS.

Smooth Joint asset use procedure

1 Add GameObject by right mouse click Create Empty in Hierarchy of your project.

(Used to manage Smooth Joint)

Bundle items whose effect settings are close to one GameObject (hair group, skirt group, etc.)

It becomes easier to edit together at the Smooth Joint Editor.

2 Add Smooth Joint with (Add Component) to GameObject.

3 Setting of Smooth Joint.

4 If there is an object to collide, add Smooth Collider Obj (script to control conflict judgment destination) by adding (Add Component) to the colliding object.

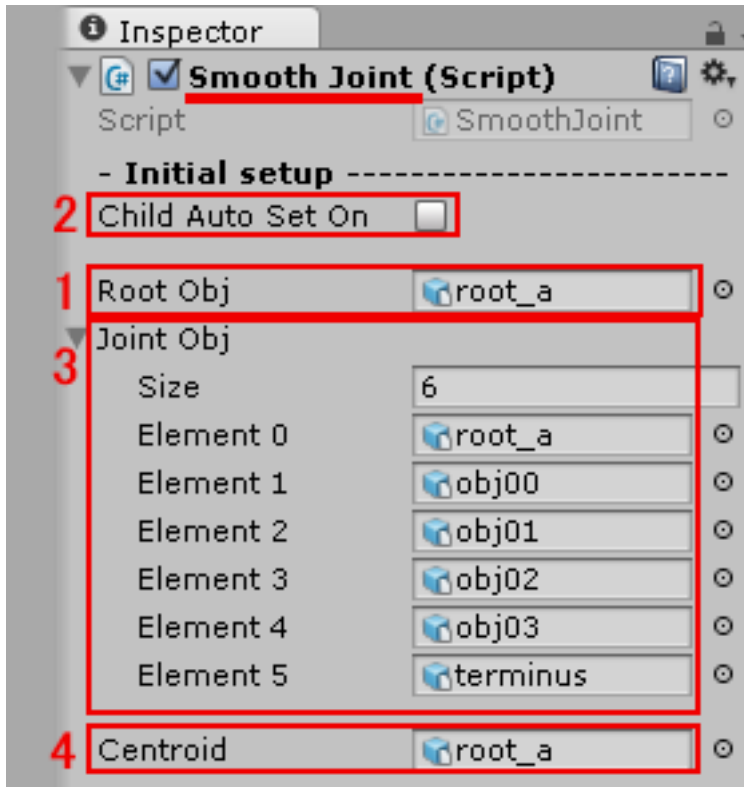
5 Smooth Collider Obj Specify the set GameObject as Smooth Joint.

6 If there are multiple hierarchy to control with the Smooth Joint, use Copy Component in the Inspector to copy them, add them to GameObject by Paste Component As New and refresh Joint Obj of the Smooth Joint.

7 Smooth Joint Editor can be used to correct it bringing the setting of two or more Smooth Joint together.

Setting of Smooth Joint component

It initializes it.



- Initial setup -

1 Root Obj

Root when hierarchy is registered automatically (parents)

2 Child Auto Set On

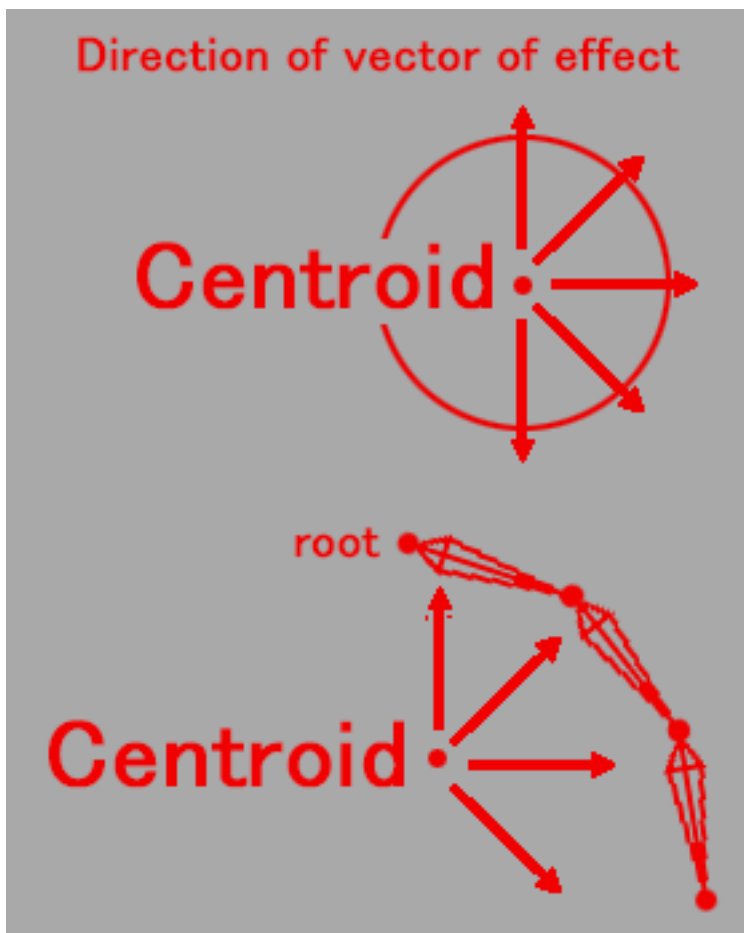
Button that executes automatic setting of hierarchy

3 Joint Obj

The controlled hierarchy is set.

4 Centroid

The center of gyration of the effect is specified.



About Centroid

For some effects, e.g. centrifugal force and collision avoidance, a coordinate must be specified as the center of rotation.

For instance, waist at center of gyration of skirt etc.

For instance, the center of gyration of the hair is a head etc.

As for (None), root of the hierarchy is specified by the script in the automatic operation when not specifying it.

To control, the hierarchy is set.

Automatic setting

1 When the hierarchy by which Root Obj is controlled is set automatically, root GameObject of the hierarchy (parents) is set here.

2 The button of Child Auto Set On is clicked.

3 Joint Obj and Centroid are renewed in the automatic operation.

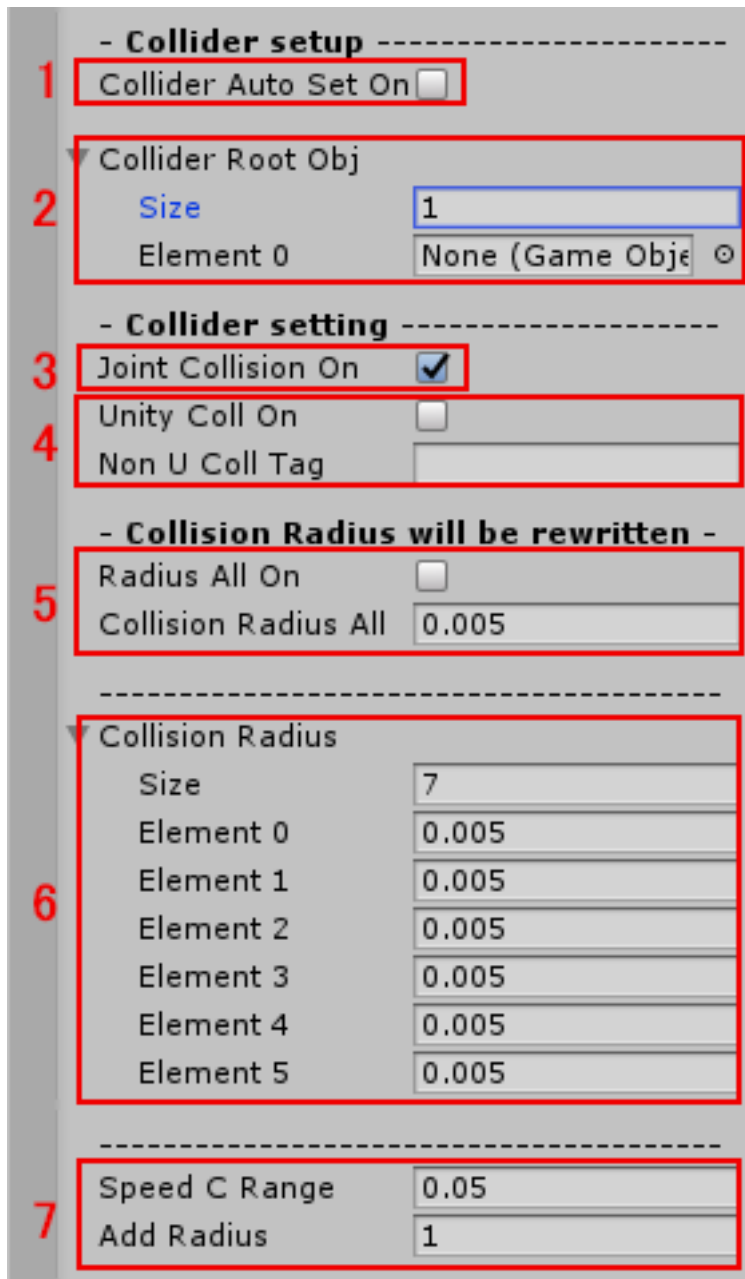
Manual setting

1 Root Obj The root (parent) GameObject of the hierarchy is registered.

2 After specifying the Joint Obj's Size as the number you want to register, you should register Element in the array list yourself.

3 Please set Centroid.

Setting of collision relation processing



- Collider setup -

1 Collider Auto Set On

Button that sets object set with Smooth Collider Obj to Smooth Joint

2 Collider Root Obj

After the set number is specified to Size, Collider Root Obj is set.

Object set in Smooth Collider Obj is set to Smooth Joint.

When root of the hierarchy set with Smooth Collider Obj is specified, the object with which the child collides is registered by the automatic operation.

(When root of the rig is specified when the collision is set to the waist and the arm, everything is registered.)

- Collider setting -

3 Joint Collision On

Enable / disable collision processing with collision destination set in Smooth Collider Obj

4 Unity Coll On

Enable or disable collision processing with collision destinations set using Unity Collider

4 Non U Coll Tag

If you do not want Unity Collider to collide,

specify the GameObject's Tag with string.

That Collider is ignored.

The type of **Unity Collider** that can be used is **BoxCollider SphereCollider CapsuleCollider MeshCollider**.

Smooth Joint uses only the position, size, and shape in Unity's Collider settings.

Other advanced settings are ignored.

You do not need a **Rigidbody**.

Can be used with Smooth Collider Obj.

In Ver.1.4.0, there are notes on using Unity Collider.

Smooth Collider Obj works more stably, such as collision avoidance and stationary behavior.

Use the Smooth Collider Obj or in combination with detailed expressions or places with strong movement.

As it is used on C # script specification released from Unity, for convenience of processing,

When the size of one Unity Collider is huge, it is

It may be processed by an unnatural flow. Please divide the Collider into multiple parts for collisions on as wide a surface as possible.

Some types of Unity Collider (such as CapsuleCollider) may wrap around to the back with frontal collision avoidance

There may be extreme cases, so please try several times, such as combining with BoxCollider.

Please understand that a collision can not be completely avoided.

There is almost no difference in processing load between Smooth Collider Obj and Unity Collider use.

Both require a certain amount of load, so please try it according to your project.

5 Radius All On

It changes to the size in which all the sizes of Collision Radius are specified with Collision Radius All.

(Please note because Collision Radius will be overwritten at the moment you press this button.)

5 Collision Radius All

The collision judgment of the capsule type is set to the hierarchy by the automatic operation. The range specification.

6 Collision Radius

The number of lists is updated in the automatic operation according to Joint Obj. An individual range of the collision judgment can be set.

7 Speed C Range

Setting when crash avoidance cannot be done when hierarchy moves at high speed.

Value in which range of which extent was moved from coordinates of the last frame by one frame is judged (A small value sensitively processes it.)

7 Add Radius

Whether it processes it by the value set with Speed C Range is judged and the range of Collision Radius is changed.

(Do it increase by a factor of how many? It is not treated with 1. / Range 1 -)

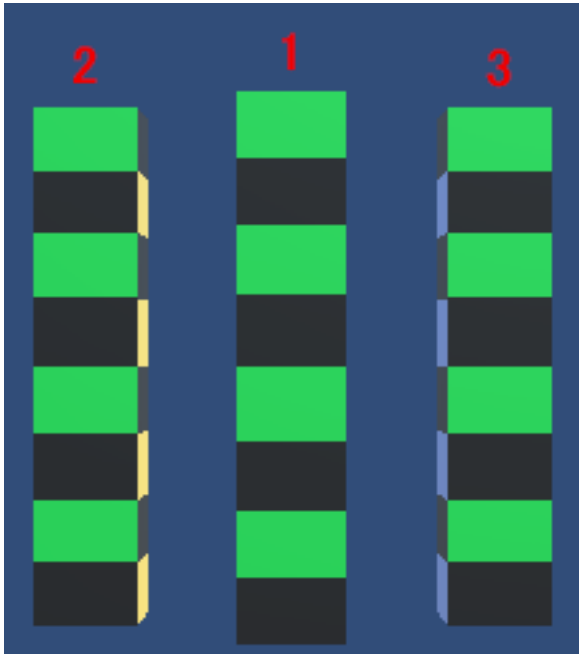
Collision detection = Collision detection × Add Radius

Setting of group relation processing

With the group function, you will be able to cooperate in the hierarchy to each other are controlled by Smooth Joint.

You can set up cooperation with other Smooth Joint component to the two.

Please specify the left and right of Smooth Joint component in cooperation destination as viewed from the hierarchy that you have set.



1 Now, Smooth Joint we have set.

2 , 3 Smooth Joint to be cooperation.

It will work in both or either the left or right the specified.

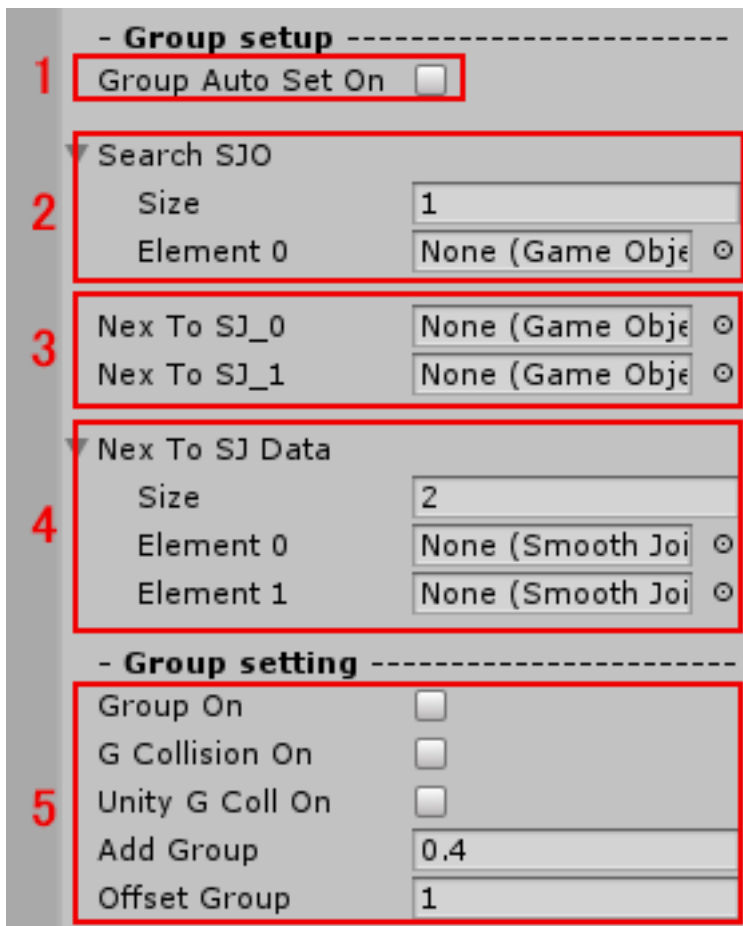
Please specify the cooperation destination in the form of sandwich the hierarchy to two.

Procedure to be used.

1 Set Search SJO

2 To the initial settings by clicking the Group Auto Set On.

3 Set the effect in Group Settings.



- Group setup -

1 Group Auto Set On

This button to automatically search register the other Smooth Joint to cooperation.

2 Search SJO

It specifies the GameObject that has been setting the other Smooth Joint components that work.

Specify the Size in accordance with the number of GameObject that has been set Smooth Joint component.

It specifies the GameObject that search Smooth Joint component is set to Element.

3 Nex To SJ_0 , Nex To SJ_1

Other Smooth Joint components to cooperation

Root Obj, or Joint Obj Set the array list No. 0 GameObject of Element of Obj.

Search for Smooth Joint components that work from GameObject that was specified

in the Search SJO in this GameObject name.

Collaboration you can specify up to two.

4 Nex To SJ Data

The Search SJO after setting When you click the Group Auto Set On and is updated automatically set.

(Customers not necessary to be set.)

(Even two if that could not be detected in the automatic search the Smooth Joint components will be None.)

(Please set the Smooth Joint components that customers make cooperation if it could not be detected.)

– Group setting –

The setting for the group.

5 Group On

Active and linked hierarchies (joints etc.) move in tandem.

5 G Collision On

Adds the collision judgment of Smooth Collider Obj to the space between Smooth Joint of the hierarchy (joint etc.) which is valid and linked.

5 Unity G Coll On

Adds Unity Collider collision judgment to the space between Smooth Joint in the active and linked hierarchy (joint etc.).

Even if Group On is disabled, it will operate if registration of the cooperation destination is set.

It takes a load of collision avoidance processing.

G Collision On and Unity G Coll On can be used together, but please try while considering the processing load.

Collision judgment is added between the collaboration destination and Joint in the horizontal direction. Because it is not a collision judgment on the surface, collision avoidance may be missed.

5 Add Group

You can specify the strength of linkage operation when Group On is enabled.

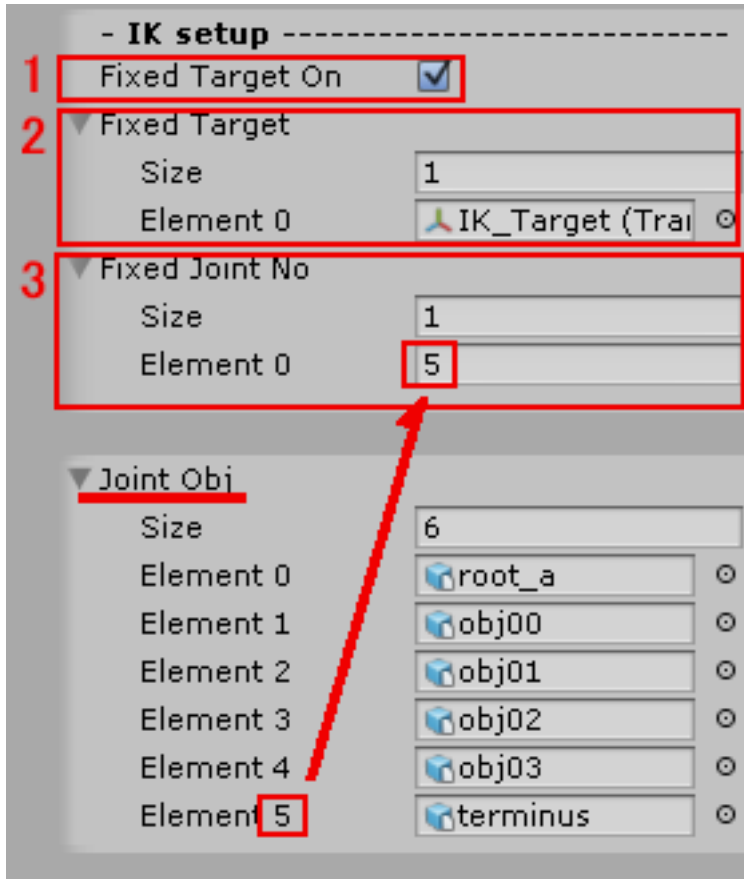
(Range 0 – 1 / effect 100%, 1 and the effect 0% are 0)

5 Offset Group

Designate the direction to be pushed out when linked side by side.

(Move in the basic direction at 1 and in the opposite direction at -1.)

Setting of IK relation processing

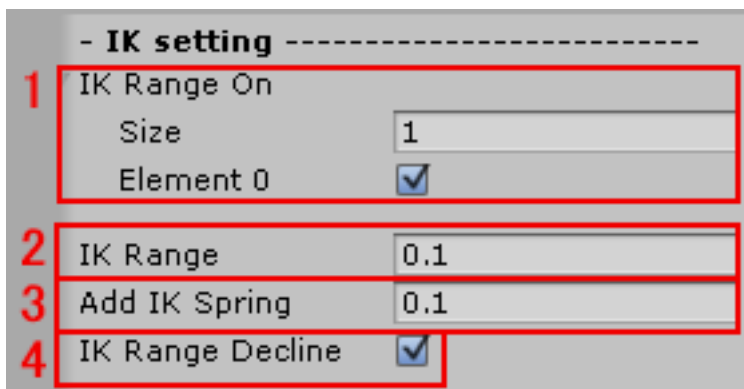


- IK setup -

- 1 Fixed Target On
A part of the hierarchy can be fixed to specified coordinates.
- 2 Fixed Target
GameObject that specifies coordinates that fix.
newly to customer's Project the addition is made.
(For instance, GameObject that fixes the point of the hair is added to the rig of the head.)
It sets it to the number of GameObject that wants to register Size.
GameObject that specifies fixed coordinates is registered.
- 3 Fixed Joint No
The array list number of Element of the hierarchy that fixes is set.

It is behavior and there is a limitation when fixing with IK.

(It is likely to fail in the crash avoidance. The behavior not predictable in the rotation etc. and shakes, etc. happen.)



- IK setting -

- 1 IK Range On
It is fixed at a specified range of the part of the hierarchy.
- 2 IK Range
Set the range of fixed.

3 Add IK Spring

Shaking effect is represented by operating the Fixed Target.

This adjustment of the shaking representation.

4 IK Range Decline

To decline the power to draw in Fixed Target to the extent that it fixed at a distance.

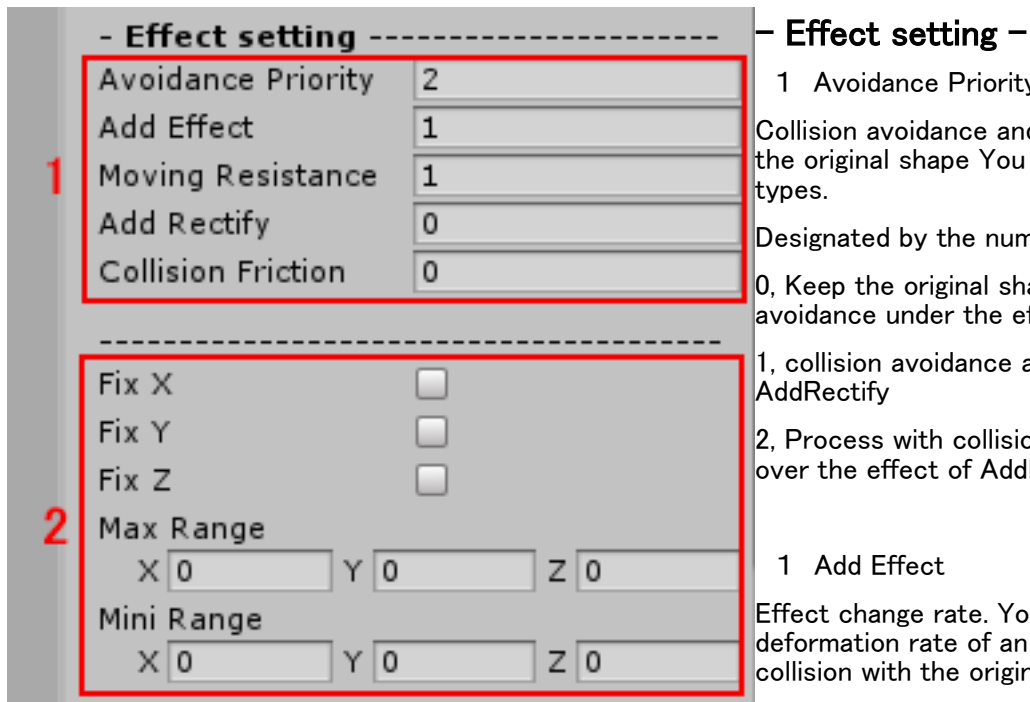
Setting of operation relation processing



1 Fix Root

Specify whether behaviors of the root at the top layer are subject to the processing. Turn the button ON to process them, or OFF to make them subject to rotation processing by the Smooth Joint. Use this method if you cannot change the rig configuration and specify a root for existing objects, etc. (Otherwise it may not rotate properly or the rig may be deformed due to the rotation.)

Setting of effect relation processing



1 Avoidance Priority

Collision avoidance and deformation from the original shape You can select from 3 types.

Designated by the numbers 0, 1, 2

0, Keep the original shape prior to collision avoidance under the effect of AddRectify

1, collision avoidance affected by AddRectify

2, Process with collision avoidance priority over the effect of AddRectify

1 Add Effect

Effect change rate. You can specify the deformation rate of an effect other than a collision with the original shape.

(Range 0 - 1 / most deformed 1, original

shape 0)

1 Moving Resistance

Ratio in which it tries to stay in former coordinates when point of each Joint moves.

(Range 0 - 1 / 1 where it stays most and 0 where it does not stay)

1 Add Rectify

The effect from root of the hierarchy to the end is changed.

(Range 0 - 1 / The effect on the direction of hierarchy root is thinned 1. It applies evenly 0.)

To ease the change in former part, it sets it.

1 Collision Friction

Set the friction of the effect the behavior of the collision part of the hierarchy.

(Range 0 - 1 / 0 to disable / 1 Friction is maximum effect behavior becomes zero.)

It does not stop because attract the rest of the hierarchy.

2 Fix X Y Z

When the button is turned on, the rotation limitation of Joint is set.

2 Max Range

Change from the current state. The maximum angle is specified. (Range 0 – 180 / Geostationary by 0.)

2 Mini Range

Change from the current state. The minimum angle is specified. (Range 0 – -180 / Geostationary by 0.)

1 - Wind

Wind On

Wind
X 0 Y 0 Z 0

Rand Wind
X 0 Y 0 Z 0

Wind Pendulum
X 0.1 Y 0.1 Z 0.1

Wind Speed 0

2 - Gravity

Gravity On

Gravity -0.05

3

Inertia On

Add Inertia 1

Inertia Speed 0.1

Inertia Friction 0.91

4 - Centrifugal Force

Centrifugal Force On

Centrifugal Force 1

5 - Spring

Spring On

Add Spring
X 0.1 Y 0.1 Z 0.1

Spring Hardness 0.001

Spring Friction 0.91

1 Wind On

When the button is turned on, the effect behavior that shakes to the wind is done.

1 Wind X Y Z

The direction of the wind is set by the vector value of the world coordinate.

1 Rand Wind X Y Z

Whether the air volume is multiplied by a random value is set.

(Range 0 – 1 / most random number 1, no random number 0)

1 Wind Pendulum X Y Z

The amount of the wind of the shake return is set.

(Magnification It shakes in the counter direction by an amount the same by 1.)

1 Wind Speed

The amount of the wind of the wind is set.

2 Gravity On

When the button is turned on, the gravity effect behavior is done.

2 Gravity

Gravity given to one frame. The value in which world coordinates Y are moved is set.

3 Inertia On

It makes the inertia effect behavior.

3 Add Inertia

Set the strength of the inertia effect.

(Range 0 - 1 / inertia effect = inertia effect × Add Inertia)

3 Inertia Speed

Set the speed of the inertia movement.(Range 0 - 1 / Maximum value at 1 0 to disable)

3 Inertia Friction

Set the friction to decline of inertial velocity.(Range 0 - 1 / 1 Shaking is not slow 0 end quickly)

4 Centrifugal Force On

When the button is turned on, the centrifugal force effect behavior is done.

4 Centrifugal Force

The centrifugal force that hangs to the hierarchy is set. (It strengthens in a larger numerical value.)

5 Spring On

When the button is turned on, the swinging effect behavior is done.

5 Add Spring X Y Z

The value of the shake is calculated from the moved distance of the world coordinates of each parents of Joint.

If the shake is small, you may set the multiplication constant applied to the original data.

(Value is not initialized when the XYZ all 0. It becomes Null.)

(Please specify 0 value in the case of data optimization.)

(You can not use effect start after the start Unity of play. Please note.)

5 Spring Hardness

The swinging speed is set.

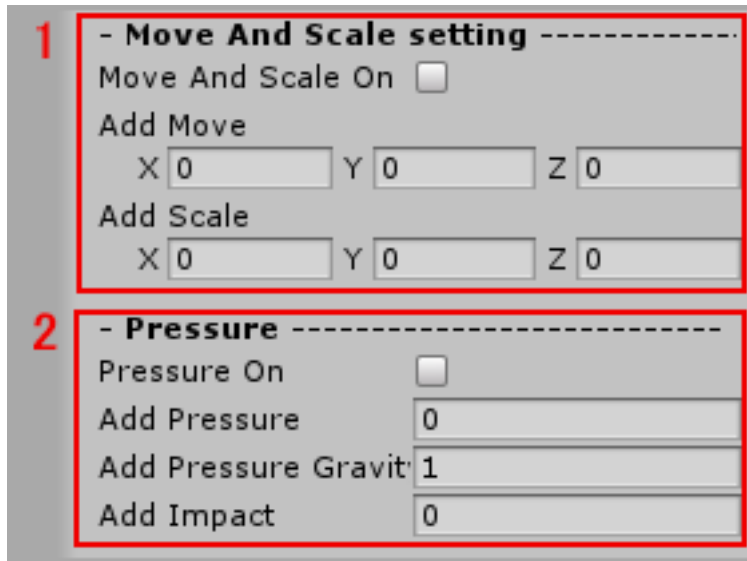
(Range 0 - 1 / The closer to one the value is, the quicker the shake is. The shake slowly : by the value close to 0.)

5 Spring Friction

The shaking behavior sets time until ending.

(Range 0 - 1 / The shake continues by the value close to 1. The shake ends quickly by the value close to 0.)

Setting of Move And Scale relation processing



The screenshot shows two panels of settings. The first panel, titled '- Move And Scale setting', has a red border and contains: 'Move And Scale On' with an unchecked checkbox; 'Add Move' with input fields for X (0), Y (0), and Z (0); and 'Add Scale' with input fields for X (0), Y (0), and Z (0). The second panel, titled '- Pressure', also has a red border and contains: 'Pressure On' with an unchecked checkbox; 'Add Pressure' with an input field containing 0; 'Add Pressure Gravit' with an input field containing 1; and 'Add Impact' with an input field containing 0.

1 - Move And Scale setting -

1 Move And Scale On
Dealing with the movement and scale.

1 Add Move
Processing of movement within the range of setting of each Joint by local coordinate.

(Specify how many times the effect is multiplied for the acquired parent movement data)

(The effect is expressed by rotating the hierarchy usually. The movement is not

processed in value 0.)

(Value is not initialized when the XYZ all 0. It becomes Null.)

(Please specify 0 value in the case of data optimization.)

(You can not use effect start after the start Unity of play. Please note.)

1 Add Scale

Each Joint is set in the direction of the shake and the scale is changed by the local coordinate.

(As an example, X-axis direction and Y-axis direction are reduced when spread in the Z-axis direction.

The scale is not processed in value 0.)

(Specify how many times the effect is multiplied for the acquired parent movement data)

(Value is not initialized when the 0. It becomes Null.)

(Please specify 0 value in the case of data optimization.)

(You can not use effect start after the start Unity of play. Please note.)

2 Pressure On

Deformed by the pressure in the collision or interference.

(Move And Scale On) is not enabled, it will not work.

2 Add Pressure

Addition ratio of pressure.

(Range 0 -)

2 Add Pressure Gravity

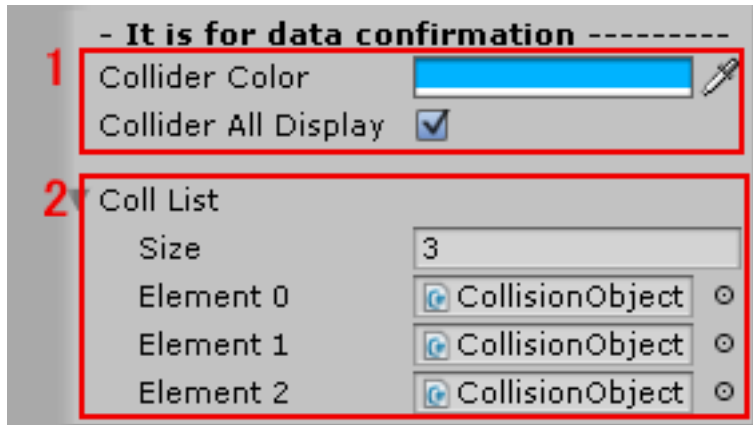
The deformation due to its own weight.

(Range 0 -)


2 Add Impact

Adding the proportion of the collision force.(Range 0 -)

Confirmation and setting of data used with Smooth Joint.




- It is for data confirmation -


1 Collider Color 


Collider All Display

2 Coll List

Size

Element 0 

Element 1 

Element 2 

- data confirmation -

1 Collider Color
The capsule display color for the collision judgment setting is set.

1 Collider All Display
The capsule for the collision judgment setting is displayed.

2 Coll List

(Collision Object) configured in Smooth Collider Obj for checking and processing of collision has been set.

For purposes such as optimization of processing speed and memory efficiency, use the [List Editing Method] described earlier to delete or edit the Element for which collision detection is not necessary in the List.

Other information

Copy Component of Inspector can be used when there are two or more hierarchies that control with Smooth Joint.

The mouse is right-clicked on the Smooth Joint component that reproduces.

Copy Component > GameObject that manages hierarchy that controls with another Smooth Joint

> Inspector > Paste Component As New

It is Automatic setting or updates it in how to set the content of Joint Obj of the added Smooth Joint component (Refer to initialization)(reference that sets the controlled hierarchy) by Manual setting.

If you set the parameters after the Unity Editor starts playing, the Unity Editor will return to before you started playing.

Parameter values can be stored in the Inspector's Copy Component, and parameter settings can be overwritten after the Unity editor finishes playing with Paste Component Values.

Please refer to the Unity manual for details.