

Constraints: Characters and Prop Interaction

When a character has to interact with a prop, one approach is to duplicate the prop, *parent* it to the character's hand and key an object's visibility. Another approach is to use a *Constraint* and key the Weight attribute of the Constraint to turn it on and off.

- Parenting sets up a permanent relationship between a character and a prop.
- Using a Constraint sets up an animatable relationship between a character and a prop.
Types of Constraints for prop interaction:

Point Constraint	→	constraints X, Y, Z Translation
Orient Constraint	→	constraints X, Y, Z Rotation
Parent Constraint	→	constraints X, Y, Z Translation and Rotation

- Selection order matters when setting up a constraint! First select the target object, then shift-select the object you want to constrain.
 - IK handles are great for use with constraints and allow for good hand placement and locking a hand down on something.
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Parent Constraint Example #1:

Here's a very simple setup to get the mechanics across: The Goon character is supposed to pick up a ball and then let it go. The Maya file is [here](#).

In Settings/Preferences, Preferences, Settings, Animation, make sure the Blend option is set to Always blend with existing connections.

Make sure the ball is placed in the exact position where the Goon character will pick it up.

Animate the hand moving into position and the fingers closing around the ball.

Use Parent Constraint to control Translation and Rotation values: select the Goon character's wrist controller, shift select ball and -- in Animation module -- go to Constrain, Parent, options. Check Maintain Offset. Click Apply.

Values controlled by Constraints appear as light blue in the Channel Box and Attribute Editor fields.

The ball now moves with the hand throughout -- not what we want.

On the frame before grabbing the ball, set keyframes for the ball's translation and rotation values (Shift + W and E). Blue fields turn green and, important, a **Blend Parent** attribute has been created. We will be keying this value to turn the Parent Constraint on and off.

On frame 1, set a key for the ball's Blend Parent attribute with a value of 0 (turns off the Constraint).

One frame before the Goon picks up the ball, set another key for the ball's Blend Parent attribute, again with a value of 0 (keeps the Constraint turned off). In the Graph Editor, set the tangents to "Step" mode for the Blend Parent attribute.

On the frame before the Goon grabs the ball, key the Blend Parent attribute at a value of 1 (turns Constraint on). The ball now moves with the hand.

Two frames before the character let's go of the ball, set another key with a value of 1.

One frame before the character lets go of the ball, set another key this time with a value of 0. The Constraint is now turned off and thus ball jumps back to its original position -- the ball now has to be keyed into its new position (to make this easier, take a quick screenshot of the ball's Translation and Rotation values in the Channel Box before turning/keying the Constraint off. Alternatively, you can duplicate the ball before the Constraint is turned off and template the duplicated ball, now use it as a guide.)

Animate to open the hand to release the ball after the Constraint has been keyed off. Animate the ball falling after the hand releases it. For reference, in [this Maya file](#), the Goon's Parent Constraint has been animated.