

## CGT 353: Principles of Interactive and Dynamic Media

### Collision Detections and Reactions

#### Collision Detection

- A collision happens when two separate shapes share one or more points in a space.
- **hitTestPoint** or **hitTestObject()** is often used, but is vastly inferior to math-based collision detection scripts

#### Detection using hitTest Object ()and hitTestPoint()

Can use these for three basic types of collisions:

1. Movie-Clip to Movie Clip
2. Movie-Clip Point
3. Shape-Point

#### Movie-Clip to Movie Clip Collisions:

- Use hitTestObject() - Determines if the bounding boxes of two movie clips are overlapping

```
RonsClip.hitTestObject(theTargetMovieClip)
```

#### Movie Clip - Point Collisions:

- hitTestPoint() - lets you determine if a point (x,y) is within the bounding box of a movie clip
- Not many effective uses in games, but sometimes used in click-and-destroy games

```
RonsMovieClip.hitTestPoint(x,y, true)
```

- Third parameter is shapeFlag:[Boolean](#) (default = false) — Whether to check against the actual pixels of the object (true) or the bounding box (false).

## Detection Using Math - Why Use It?

### Three Reasons:

1. Object-shape restrictions
2. Inhibited code-graphics independence
3. Frame-rate independence

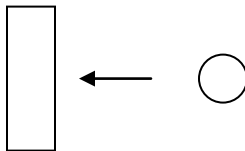
### Object-Shape Restrictions:

- `hitTestPoint()` and `hitTestObject()` only works within the bounding box of a movie clip or between a point and a shape within the movie clip
- Collision detection between two balls for example, would not be accurate, because it doesn't handle the collision detection between shapes within two movie clips.

### Inhibited Code-Graphics Independence:

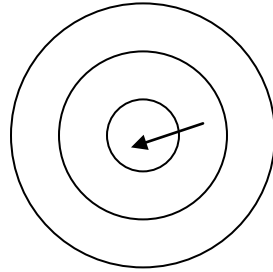
- Position of graphics should be tracked with code rather than using the current placement of the objects on stage.
- Useful when you want to detect a collision before setting the position of the movie clip on the stage.
- With `hitTestPoint()` or `hitTestObject()`, the object must be physically moved on the screen and THEN the collision is detected based on the overlap of the graphics

### Frame-Rate Dependence



If the ball, which is ten units wide, is moving towards the paddle (also ten units wide) with an x-speed of -30 units per frame, what problem could we be facing with traditional collision detection using `hitTest()`?

### Easy Math-Based Detection - Point-Circle Collisions



**In a Flash dart-game, how would you detect if the dart has collided with the board using math?**

*Answer: If the distance between the point and the center of the circle is less than the radius of the circle, then the point is colliding with the circle*

