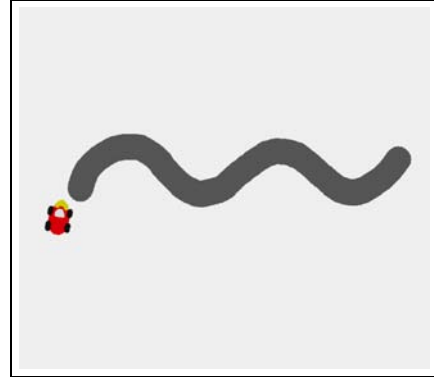


Creating a “Smart” Car that Drives Itself Along a Road

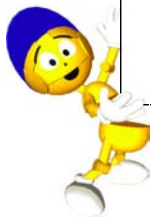


In this project learners will create a robotic car scripted to drive along a single-colored road using a painted sensor. This introduces the powerful idea of feedback and the use of conditional statements.

As in Project 3, learners must think about the car’s heading and direction and the use of positive and negative numbers to control the car’s turn. The car will follow a script using a conditional (if/then) statement “testing” what color the car “sees” using its painted sensor.

Sounds can be added to these projects providing another dimension of feedback. Sounds might indicate when the vehicle has driven off the road or when it has encountered an obstacle.

Exploring feedback is a great way to bridge the mechanical world and the world of biology. A variety of Etoys can be created based on this model of feedback for the exploration of ant, fish or other animal behaviors.



The Drive-a-Car Curriculum

Project Prerequisites: Squeak

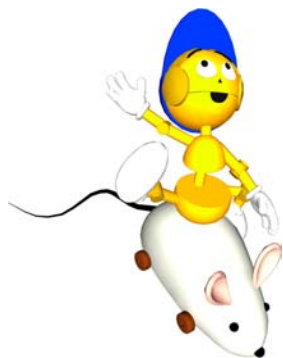
- Using test (Yes/No) tiles.
- Category in Viewer: **tests**.

Related Math Concepts

- Simple conditional statements.
- Using positive and negative numbers to control directionality.

Curricular Objectives

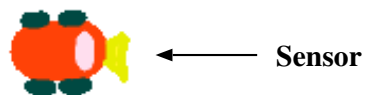
- Understanding how the turn of the road relates to the turn of the car.
- Using feedback from a sensor to keep the car following the road.



The aim of this project is to “program” a car to sense the road and steer itself along the road without using a steering wheel.



The object of the lesson is to use a single-colored sensor to create feedback. This example uses a yellow sensor placed at the front of the car.

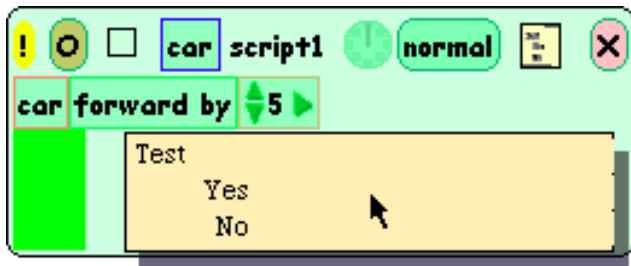


Feedback will be used to determine the direction in which the car will need to turn in order to correct its heading and follow the road. This project requires a transfer of learning from the previous projects about positive and negative numbers. When the car veers to the left it will need to correct its turn by using a positive number, and if it veers to the right it will need to correct its turn by using a negative number.

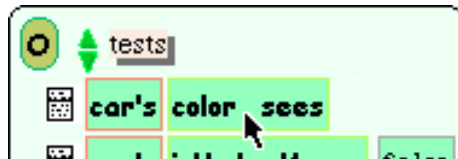
This behavior is created by introducing a *test tile* (or “conditional statement”) into the car’s script. To find a test tile, click on the small beige icon found at the top of the scriptor.



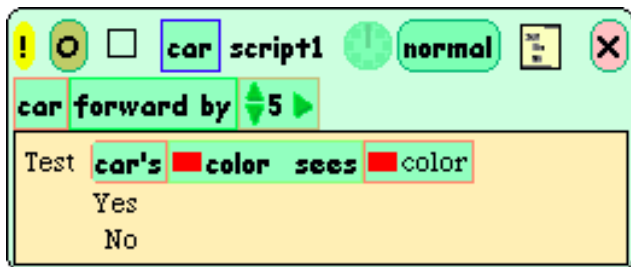
Clicking on this icon will tear off a “Test/Yes/No” tile that can be added into the script. The next step is to give the sensor its instructions.



Find the **tests** category in the car’s viewer. Select the “color sees” tiles from this category.

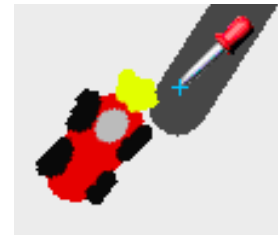
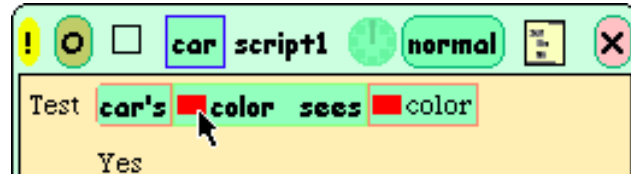


Drag these tiles into the script and place them next to the word “Test”.



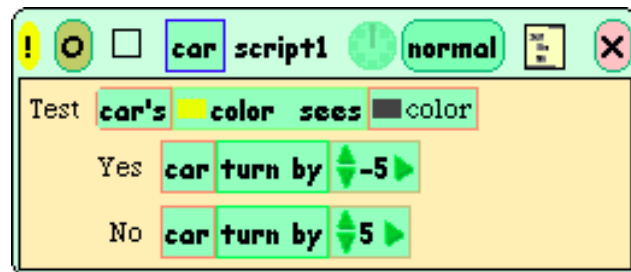
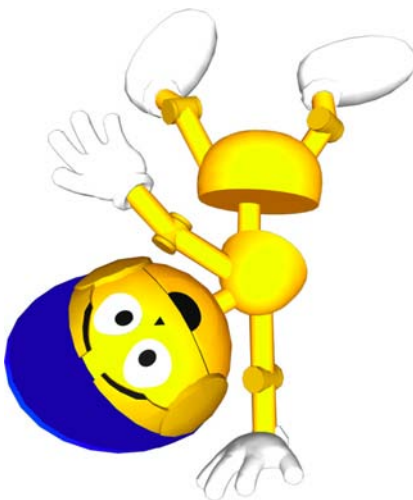
The Drive-a-Car Curriculum

We want the color of the car's sensor to "see" the color of the road. Click on the first color rectangle and drag the eyedropper over the sensor and MouseDown. The rectangle will change to the exact color of the sensor. Click on the second rectangle following the word "sees" and drag the eyedropper over the road to select its color.



To complete the test we must determine which direction the car will need to turn in order to follow the road. The car's turn depends on whether it has been placed to the right of the road or to its left.

In this example the car was placed just to the left of the road.





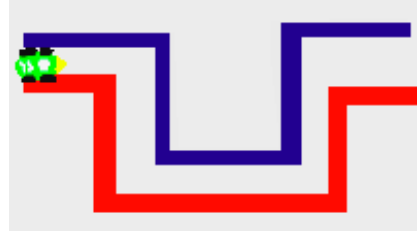
Start the script by clicking on the clock or by setting the **paused** button to “ticking.” Is the car following the road? If not, play with the values in the “turn by” tiles until it does.

There is more than one way to solve this problem. There are other ways to do a “color sees” test that can involve different parts of the car being used as sensors. Can you think of other ways to make a robotic car?

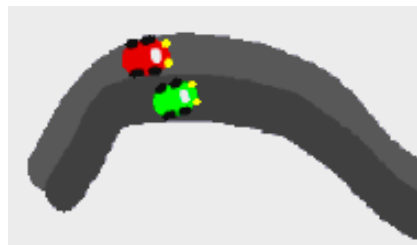


Boy!
This takes some
real thinking!!!

Challenges



- Using what you have learned, script a car or some other object so it can successfully navigate a maze.



- Paint a second car. Place both cars on a road with two lanes of different colors. Can you make them travel side-by-side along the road and stay in their own lane?

You may have to make your road a bit larger or make your cars smaller. Both of these can be done by using the object’s yellow “resize” handle.

What else will you need to think about in order to meet this challenge?